CEPF Final Project Completion Report – EMI Small Grants

Please complete all fields and respond to all questions below.

Background Information

Organization Legal Name	*University of Michigan*
Project Title	Partulid Tree Snails of the Solomon Islands: Endemic Species or Products of Prehistoric Exchange Networks?
Date of Report	February 27, 2017
Report Author	Cindy Bick & Diarmaid Ó Foighil
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CEPF Region	**East Melanesian Islands**
Strategic Direction	The proposed research relates best to investment priority 1. 1: Conduct baseline surveys of priority sites that build government-civil society partnerships and bridge political boundaries.
Grant Amount	$19,210
Project Dates	May 2014 – December 2016

1. Implementation Partners for this Project
   (please list each partner and explain how they were involved in the project)

   We did not have any other partners for this project.

Conservation Impacts

2. Please explain/describe how your project has contributed to the implementation of CEPF's Ecosystem Profile for the East Melanesian Islands. For example, you may refer to the Strategic Directions that your project has contributed to.

   The Pacific tree snail family Partulidae is among the most endangered clades on the planet, experiencing the loss of approximately 50% of its ~120 species over the past 40 years. A 2012 IUCN Red List assessment highlighted a conspicuous regional data gap for this vanishing radiation: the Near Oceania archipelagos of Papua New Guinea (PNG) and the Solomon Islands (SIs). The SIs has 8 endemic species of *Partula*; 7 described by 19th century conchologists, most of whom assumed that snails from distinct island groups were necessarily separate species. These snails have received scant scientific attention, apart from brief comment on their phenotypic similarity and questionable taxonomic validity. Indeed, the 2012 IUCN Red List working group could only produce one regional species account free of taxonomic uncertainty. Initial work on Near Oceania partulids has uncovered highly atypical human-associated ecologies, extensive taxonomic/phylogenetic incongruence and cryptic multi-archipelago ranges. This has prompted us to hypothesize that at least some of these regional taxa stem from prehistoric anthropogenic introductions (possibly involving the Lapita culture) from presently unknown source populations,

potentially in Remote Oceania. In order to test this, the prerequisite was to produce a corroborated taxonomy that would guide informed conservation planning for this endangered clade.

Our fieldwork involved baseline studies of partulid tree snail diversity (it is vitally important that endemic invertebrates be included in these surveys) in 3 CEPF priority key biodiversity areas: East Rennell, Nendo and Vanikoro. These locations bridge different provincial boundaries and are known partulid sites (mainly early partulid expert Yoshio Kondo's sampling locales obtained from the Bishop Museum). Our fieldwork is the initial step in our contribution to the implementation of CEPF's Ecosystem Profile for the East Melanesian Islands by addressing information gaps for a critically endangered clade. Following the fieldwork, we used a combination of scientific approaches [*i.e.* Next Generation Sequencing (NGS) double digested Restriction Associated DNA sequencing (ddRADseq) and geomorphometrics analysis] in the laboratory to determine the biogeographical distribution and ecological status of Near Oceania *Partula.* The results of this work are in preparation to be communicated to both national and provincial personnel in the Solomon Islands. We aim to complete a revisionary monograph for Near Oceania partulids for publication in a peer-reviewed scientific journal. These results will also be communicated with IUCN. A Species Red List account will also be generated for Near Oceania partulids with the overall purpose of greatly improving information for their status and distribution to aid conservation planning for safeguarding them.

3. Please summarize the overall results/impact of your project against the expected results detailed in your approved proposal.

Since 2012, we have successfully collected partulid tree snails targeting known type localities sites in both PNG (including the islands of Manus, New Ireland, Bougainville, Buka) and the SIs (Santa Isabel, Choiseul, Shortlands, New Georgia, Guadalcanal, Rennell, Bellona, Nendo and Vanikoro – the latter two are technically part of Remote Oceania). Many of these species are very poorly studied, *e.g.*, on Rennell and Bellona, *Partula cramptoni*, has not been documented since it was first described 75 years ago, and *Partula vanikoriensis*, known only from a type specimen described in 1832.

A notable feature of *Partula micans* is its strikingly aberrant synanthropic ecology, a characteristic that is unprecedented for *Partula*. In none of our field sites did we encounter *P. micans* in native forest habitats, but only near coastal villages and settlements. This detail strongly implicates prehistoric human introduction as the dispersal mechanism and is consistent with a regional exchange network linking PNG islands and the SIs.

We had originally predicted that the most likely source populations for human-introduced PNG partulid populations occur on the adjacent SIs: a large (>900 islands) archipelago extending 1,500 km from Choiseul in the northwest to the Santa Cruz group in the southeast. So far we have not identified the source population but we have established the regional distribution of this land snail family. This raises many compelling questions regarding their ecology and evolutionary life history. Specifically, what is it about their biology and/or ecology that make them transportable and able to survive in close association with humans? We anticipate completing the ddRADseq analyses in July/August 2017 and completing a revisionary monograph for Near Oceania partulids for publication by October 2017.

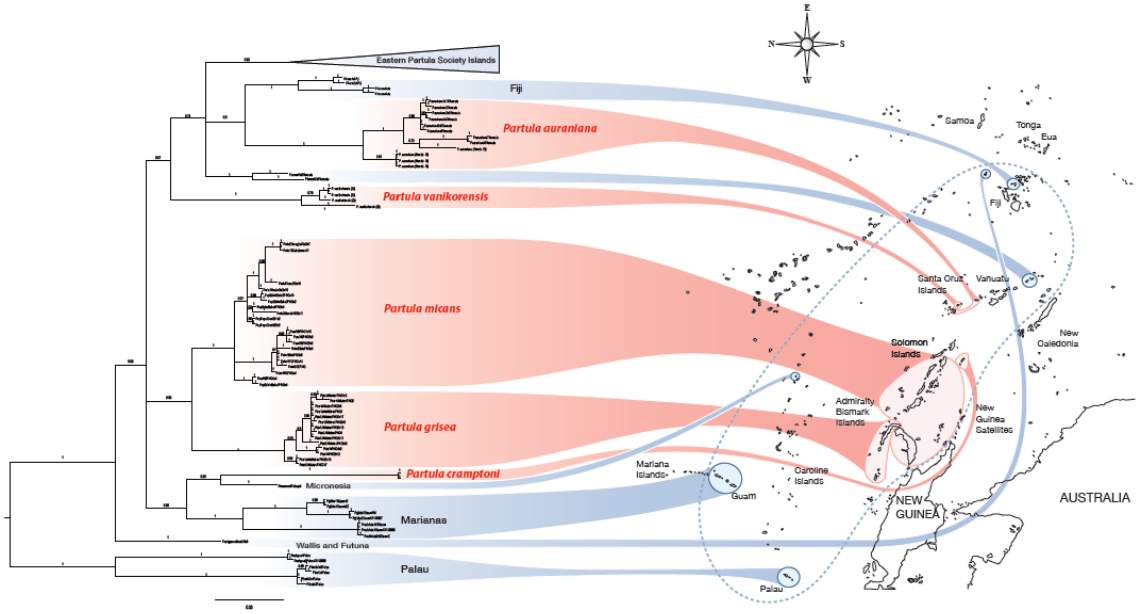

Figure 1. Island locations of *Partula* sampled in Near and Remote Oceania confirmed using mitochondrial COI molecular markers, showing the phylogenetic placement and taxonomic identity of their of their genotyped snails.

4. Please describe any successes and/or challenges faced towards achieving the expected short-term and long-term impacts of the project work.

Short term: We sampled partulid snails in previously described type localities across the Solomon Islands, which included 3 CEPF priority sites - Rennell, Nendo, and Vanikoro. This was by far our biggest success and challenge. Many of these areas, especially the latter two are very remote and somewhat inaccessible localities. Transportation to areas like Nendo and Vanikoro are not reliable and at times there's a real possibility of being stranded on the island for a few weeks. This can be further complicated by the fact that there are only two people working on this project and our timelines for travelling to our study sites can sometimes be delayed by bad weather conditions.

Another challenge we encountered was the lack of community contacts in the area. Often times the local organizations and government agencies that are associated with conservation and biodiversity projects in Solomon Islands do not have guidance on how to proceed and access some of the communities living around our research sites. This can sometimes delay our timeline for carrying out our collecting in certain areas. This delayed our timeline for carrying out our collecting in certain areas.

Long term: We did not anticipate that some of the laboratory work (i.e. molecular and morphometric analysis) for our project would require more time for the analysis. We have had to use Next Generation Sequencing (NGS) double digested Restriction Associated DNA sequencing (ddRADseq) approach to give us higher resolution for some of the regional and phylogenetic relationships determined by our mitochondrial (mt) Cytochrome c Oxidase subunit I phylogenty that includes a comprehensive sampling of PNG and SIs taxa. Our morphometric approach has also been proceeding gradually as a result of trying to locate a lot of the museum type specimens; of which some are housed at international institutions and the loan processes can take weeks to months.

5. Were there any unexpected impacts of your project (positive or negative)?

   Our interactions in our collecting areas have been an educational opportunity for landowners and community members. We have been able to convey our research purposes and goals to local communities and the interest was quite high. For example, many individuals in these communities are well aware of the existence of the species that we were aiming to collect but were not aware of the cultural and biological heritage that these species represented. This prompted local communities to request us to present our work at local primary and secondary schools. On Bellona and Rennell, we worked with a mixture of age groups ranging from young children to adults mainly in Matahenua Village on Bellona and the Lake Tenggano communities on Rennell. We also worked alongside the primary and secondary schools at Emua Village in Vanikoro where the students participated in our field collections. Their interest and willingness to be part of our biological studies as part of their educational curriculum was something that we had not anticipated but we welcomed the opportunity.

6. If you did not complete any project components or activities, how did this affect the overall impact of the project?

   The molecular and morphometrics work are still underway. This does not impact the overall impact of the project other than we have had to revise our internal timeline for completion. We anticipate that all the analysis for this work will be completed and submitted for publication by the end of 2017.

Products/Deliverables

7. Please describe and submit (electronically if possible) any tools, products, or methodologies that resulted from this project or contributed to the results.

   We are still in the process of completing all of the analysis related to this project. We will then transition to preparing a manuscript on the monographic revision of the taxonomy and systematics of Near Oceania *Partula*. We will make this revision available through electronic submission to your agency upon its publication in a scientific peer-reviewed journal. We also intend to complete an IUCN Red List species account for all Near Oceania Partula synonymized in our study.

CEPF Global Monitoring Data

Respond to the questions and complete the tables below. **If a question is not relevant to your project, please make an entry of 0 (zero) or n/a (not applicable).**

8. Did your organization complete the **CEPF Civil Society Tracking Tool (CSTT)** at the beginning and end of your project? No.
   (Please submit the final CSTT document to IUCN Oceania if you have not already done so).

	Date	Composite Score
Baseline CSTT	n/a	n/a
Final CSTT	n/a	n/a

9. Please list any **Vulnerable, Endangered, or Critically Endangered species** conserved due to your project.

   n/a. At the moment we have not reached this outcome but we do anticipate that some changes will be made to the status of Near Oceania partulids upon completion and publication of our findings.

10. Hectares Under Improved Management

Project Results	Hectares*	Comments
11. Did your project strengthen the management of an existing protected area?	n/a	*List the name of each protected area*
12. Did your project create a new protected area or expand an existing protected area?	n/a	*List the name of each protected area, the date of proclamation, and the type of proclamation (e.g., legal declaration, community agreement, stewardship agreement)*
13. Did your project strengthen the management of a key biodiversity area named in the CEPF Ecosystem Profile (hectares may be the same as questions above)	n/a	*List the name of each key biodiversity area*

** Include total hectares from project inception to completion*

14. In relation to the questions above on protected areas, did your project complete a Management Effectiveness Tracking Tool (METT), or facilitate the completion of a METT by protected area authorities? If so, complete the table below. *(Note that there will often be more than one METT for an individual protected area.)*

Protected area	Date of METT	Composite METT Score	Date of METT	Composite METT Score	Date of METT	Composite METT Score
n/a	n/a	n/a	n/a	n/a	n/a	n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a
n/a	n/a	n/a	n/a	n/a	n/a	n/a

15. Direct Beneficiaries: Training and Education

Did your project provide training or education for . . .	**Male**	**Female**	**Total**	**Brief Description**
16. Adults for community leadership or resource management positions	4	3	7	Worked closely with a local principal and school teacher when collecting specimens on Vanikoro Island. On Nendo we were assisted by a local school teacher and a certified conservation ranger. On Rennell and Bellona we managed to get help from someone already working with the World Heritage Conservation organization there as well as a couple of school teachers.
17. Adults for livelihoods or increased income	2	3	5	Some of the guides and school teachers were financially compensated for the time that they spent assisting us with carrying out our surveys.
18. School-aged children	n/a	n/a	~ 30	Gave presentations of our research in the local primary and secondary school. We didn't really count how many males and females but the number in the total is an approximations
19. Other				

20. Please list the name and approximate population size of any “community” that benefited from the project.

Community name	Population size	Surrounding district	Surrounding province	Country
Emua Village	~ 80 people	Vanikoro Island	Santa Cruz	Solomon Islands
Luesalo Village/Settlement	n/a	Nendo Island	Santa Cruz	Solomon Islands
Lake Tenggano Village	~ 50 people	Rennell Island	Rennell and Bellona	Solomon Islands
Matahenua Village	> 100 people	Bellona Island	Rennell and Bellona	Solomon Islands

21. Socioeconomic Benefits to Target Communities

Using the communities listed above, please complete the table below, inserting the name of the communities in the left column, and placing an X in all relevant boxes in the subsequent columns under Community Characteristics and Nature of Socioeconomic Benefit.

Community Name	Community Characteristics								Nature of Socioeconomic Benefit											
									Increased income due to:											
	Small landowners	Subsistence economy	Indigenous/ ethnic peoples	Pastoralists / nomadic peoples	Recent migrants	Urban communities	Communities falling below the poverty line	Other	Adoption of sustainable natural resources management practices	Ecotourism revenues	Park management activities	Payment for environmental services	Increased food security due to the adoption of sustainable fishing, hunting, or agricultural practices	More secure access to water resources	Improved tenure in land or other natural resource due to titling, reduction of colonization, etc	Reduced risk of natural disasters (fires, landslides, flooding, etc)	More secure sources of energy	Increased access to public services, such as education, health, or credit	Improved use of traditional knowledge for environmental management	More participatory decision-making due to strengthened civil society and governance	Other (please provide details below)
Emua Village	x	x	x	x	x		x					x									
Luesalo Village	x	x	x				x		x				x	x	x				x	x	
Lake Tenggano	x		x				x			x	x			x							A lot of mining and logging on this island.

																					Many of the people here are dependent on the financial gains acquired from these activities either as a landowner or working directly for the logging and mining companies.
Matahenua Village	x	x	x				x		x	x	x		x	x	x				x	x	

If you marked “Other”, please provide details on the nature of the Community Characteristic and Socioeconomic Benefit

Lessons Learned

Please describe any lessons learned during the design and implementation of the project, as well as any related to organizational development and capacity building. Consider any lessons that would inform future projects designed or implemented by your organization or others, as well as lessons that might be considered by the global conservation community.

22. Project Design Process *(aspects of the project design that contributed to its success/shortcomings)*

    There are only two people working on this project, which made it easier to manage our transportation and schedules. However, we did occasionally run in to issues at sites where it would be beneficial to have more personnel collecting to cover a wider area. Having more personnel is very critical in issues of safety abroad and in areas where we did not have local contacts.

23. Project Implementation *(aspects of the project execution that contributed to its success/shortcomings)*

    We learned early on in the project that at the end of each field work we should also visit the site of the next year’s field work in order to establish contacts in that area. This gave us at least a year of correspondence and familiarity with local people that could aid in our work. We did run into some fraudulent enterprises disguised as legitimate governmental practices (*i.e.* outrageous research fees, questionable entrance to customary lands fees, officials proclaiming to be the land owners etc.) and we were able to avoid such issues by visiting with the landowners and local school officials in the area.

24. Describe any other lessons learned relevant to the conservation community

    Perhaps publicizing resources and individuals/groups that are funded by IUCN and doing research in certain areas so that other entities interested can make contact with these individuals to determine how they can proceed with their work. We have done our best to do this for our work by providing contact names and information with the local government and conservation agencies for remote areas we have visited for our work. This may be helpful for other people who might be looking to do scientific research in these areas.

Sustainability/Replication

25. Please summarize the success or challenges in ensuring that the project will be sustained or replicated in the future.

This project was a scientific study that aims to address information gaps for a critically endangered clade that has been studied intensively throughout its distribution in the Eastern Pacific. The other part of their familial range, Near Oceania, is not well studied. Our regional monograph [comprised of phylogenetically- and morphologically-corroborated taxa together with a complete synonymy, documentation of types, museum specimen holdings, diagnostic characters and geographical ranges together with an identification key] will catapult Near Oceania taxa from least known status to becoming the best-characterized members of the radiation. This information is critical for conservation biologists working on developing safeguarding strategies for this group. Note that understanding their regional biogeography and evolutionary relationships is only the first step. The preliminary results of the current study raise a lot of compelling questions regarding their understanding ecology and evolutionary life history. These will be the subjects of future studies on Near Oceania partulid.

26. Please summarize any unplanned activities that are likely to result in increased sustainability or replicability of your project work.

There has been quite a lot of interest in *Partula* tree snails in general mainly because of our participation in the several of the Mollusk Division of the University of Michigan Natural History Museum's activities with the community, including: (1) ID-Day: where we identify mollusk shells that the public has brought to the museum and discuss curiosities and interesting facts about mollusks of the world (of which *Partula* is one of them); (2) Behind the scenes: we lead tours of the research collection and museum laboratories, as well as discussing my work on Partula that is conducted at the museum and its broad importance to the public. In the Ecology and Evolutionary Biology department at the University of Michigan our work has become a staple of introductory biology courses regarding extinctions and the role of science in aiding conservation. This has increased awareness for our work at the university level here in Michigan. Due to this we have also been contacted by individuals working in local and international zoos to carry out collaborative research work.

Safeguards

Please provide a summary of the implementation of any required action toward the environmental and social safeguard policies for this project.
This is attached in the form of an updated Social Safeguards document.

Additional Comments/Recommendations

27. Please use this space to provide any further comments or recommendations in relation to your project or CEPF.

Additional Funding

Please provide:
28. details of any additional funding that supported this project
29. details of any further funding secured for this project, your organization, or the region, as a result of CEPF's investment in this project

Donor	Type of Funding*	Amount	Notes
National Geographic Society	A	$24, 000	$24,000 has been provided by the National Geographic Society for a parallel project (encompassing Papua New Guinea partulid tree snails in addition to the Solomon Islands), entitled: *Reconstructing Prehistoric Inter-Archipelago Exchange Networks in Near Oceania Using Partulid Tree Snails*. These funds were insufficient to comprehensively sample and taxonomically revise the Solomon Islands endemic partulid species (especially those from Rennell, and Temotu provinces) and we requested supplemental CEPF funds to complete the study.
University of Michigan Ecology and Evolutionary Biology	A	~ 6,000	These are departmental funds given to students to work on field research during the summer. The amount listed is over the course of 4 summers of field work in the Solomon Islands.

** Categorize the type of funding as:*

A Project Co-Financing (other donors or your organization contribute to the direct costs of this project)

B Grantee and Partner Leveraging (other donors contribute to your organization or a partner organization as a direct result of successes with this CEPF funded project)

*C Regional/Portfolio Leveraging (other donors make large investments in a region because of CEPF investm*ent or successes related to this project)

Information Sharing and CEPF Policy

CEPF is committed to transparent operations and to helping civil society groups share experiences, lessons learned, and results. Final project completion reports are made available on our website, www.cepf.net, and publicized in our newsletter and other communications.

Please include your full contact details below if different from what has already been provided:
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