

The Rufford Foundation Final Report

Congratulations on the completion of your project that was supported by The Rufford Foundation.

We ask all grant recipients to complete a Final Report Form that helps us to gauge the success of our grant giving. The Final Report must be sent in **word format** and not PDF format or any other format. We understand that projects often do not follow the predicted course but knowledge of your experiences is valuable to us and others who may be undertaking similar work. Please be as honest as you can in answering the questions – remember that negative experiences are just as valuable as positive ones if they help others to learn from them.

Please complete the form in English and be as clear and concise as you can. Please note that the information may be edited for clarity. We will ask for further information if required. If you have any other materials produced by the project, particularly a few relevant photographs, please send these to us separately.

Please submit your final report to jane@rufford.org.

Thank you for your help.

Josh Cole, Grants Director

Grant Recipient Details	
Your name	Robert Davis
Project title	Turning the tide for the Bekai: identifying refugee from climate-induced sea level rise for the Palau Megapode.
RSG reference	13637-1
Reporting period	
Amount of grant	£5000
Your email address	
Date of this report	14 July 2016

1. Please indicate the level of achievement of the project's original objectives and include any relevant comments on factors affecting this.

Objective	Not achieved	Partially achieved	Fully achieved	Comments
Home Range and Habitat Determination		X		We require one more field season to complete this objective but were very successful in assessing the habitat variables where mounds were located and taking foraging observation of birds. Attempts to capture birds were difficult and have delayed the animal tracking aspects.
Modelling Rising Sea Levels		X		We have completed mapping of a significant number of mounds on most major islands, however one more season is required to complete this objective. We have commenced preliminary GIS modelling,
Secondary Impacts (Tourism and Rats)		X		We successfully initiated this component by deploying cameras to monitor mounds and tourist interference at a number of sites. We were able to identify disturbance to mounds and initiated our observation of bird behaviour to further quantify human impacts.

2. Please explain any unforeseen difficulties that arose during the project and how these were tackled (if relevant).

Logistical Challenges:

Although we had sought and arranged prior approvals and logistical support, we experienced a delay of 2 weeks upon arrival to get all research permits in place. Furthermore, we experienced logistical issues with our project partners the Koror State Government Rangers who, due to staffing and other issues, were not able to take us to our study sites in the Rock Islands for several weeks of our 3-month field

season. After the Rangers resolved several issues, our field work finally commenced on 19 February 2016 (after arriving on 25 January) and drew to an end on 14 April 2016.

We relied entirely on the Ranger patrols for transportation to our study islands in the Southern Lagoon for data collection. They did a fine job of accommodating us, and even provided a local assistant to support our data collection efforts. However, their schedule and other priorities resulted in our study design being biased towards islands that were within their area of regular patrol. A number of islands (which hosted significant megapode populations) that we needed to access to search for megapode mounds were not able to be visited during this first field season. This situation will be addressed during the next field season and we are pursuing funds to support independent boat transport.

Technical Challenges:

Nobody has previously attempted to capture Micronesian megapodes in Palau and our attempts to do so for the purpose of colour banding and collection of genetic samples, proved more difficult than anticipated. Baiting birds to a walk-in-trap was unsuccessful and capture by mist-net was a little less than fruitful, despite the effort expended on it. In the end, only three megapodes were captured (with a lot of effort and persistence), colour banded, and feather sampled. Further capture attempts, with more appropriately sized nets and walk-in traps, will be attempted in the second field season.

After discussion with other researchers and not receiving funds in time to order equipment, we decided to postpone radio telemetry until the second (upcoming) field season. Recent discussion with researchers studying Micronesian megapodes in the Northern Mariana Islands, however, has lead us to determine that telemetry is not a safe option for studying this species. Field workers in the Marianas have discontinued use of telemetry because of problems experienced with the harness configurations they tried on adult birds. In all cases, birds became tangled in their harnesses and had to be recaptured to have the transmitters removed. If it were not for close monitoring by field staff in the Marianas, these entanglements would have resulted in fatalities. Thus, we will not be employing radio telemetry to study megapodes in Palau for this project.

Ten RECONYX Hyperfire HC 600 trail cameras (Holmen, Wisconsin, USA) were deployed between 1 March and 14 April 2016 at 11 active mounds across five islands for the purpose of monitoring levels of megapode activity at mounds on human visited vs non-visited islands. The use of these cameras for monitoring megapode incubation mounds proved challenging and we are still refining the best approach. Ultimately, of 5,370 images captured, only 17 were of megapodes taken at two mounds. However, there were a number of occasions during which we flushed birds from mounds on which cameras had been deployed, and yet no images were captured by these cameras. This casts doubt in our minds regarding the effectiveness of this camera for our particular needs. We intended to use them for rat surveys in the second field season but we may research another method that is also less labour intensive, such as chew cards.

3. Briefly describe the three most important outcomes of your project.

1. We were able to mobilise and engage the Palau community in conservation - and monitoring of the Micronesian megapode. The Koror State Government was a strong partner in our project, and the involvement of this government body managing the Rock Islands World Heritage Area was a significant success. We provided talks to the community and engaged and involved the Palau Museum and Palau Conservation Society in the project.
2. We successfully undertook the collection of habitat data at 24 megapode mounds and 24 randomly chosen sites. These data will be used to support an analysis to determine what habitat characteristics are important to megapodes when selecting sites to construct their mounds. This will facilitate the development of a habitat model for the species and enable us to identify and protect critical breeding habitat.
3. Mapping of mounds. The locations of 137 mounds (35 active, 96 inactive, and 6 under construction) across 10 islands were accurately acquired with a *Trimble Yuma* differential GPS (DGPS) unit. Many of these mounds were previously undiscovered, including some older, inactive mounds. These data will enable us to model the impacts of sea level rise and associated habitat loss, and identify and protect critical breeding sites throughout the Rock Islands Southern Lagoon Conservation Area.

4. Briefly describe the involvement of local communities and how they have benefited from the project (if relevant).

We worked in close cooperation with the local Koror State Government Rangers. They facilitated our access to islands in the Rock Island Southern Lagoon Conservation area by providing all necessary boat transport. They also assigned a local Palauan staff member to assist in the field with data collection. Copies of all collected data were shared in digital format at the end of the field season with both the Koror State Government and the National Government. A written summary report was also provided to each.

5. Are there any plans to continue this work?

Yes. The work funded by RSG allowed us to undertake the first of two planned field seasons. We will return to Palau to complete the second season in early November 2016. Work next season will focus on gaining access to the remaining Rock Islands known to be inhabited by megapodes, which we were unable to survey without independent boat access. We will search for and map all remaining mounds in the Rock Islands Southern Lagoon Conservation Area. We will also continue gathering microhabitat data at active megapode mounds and gather megapode foraging habitat data via a method referred to as "Instantaneous Sampling." Lastly, we will

establish rat survey transects and employ chew cards to assess rodent densities in the Rock Islands.

6. How do you plan to share the results of your work with others?

We will share the results of our work both in the form of final reports to government and non-governmental organisations in Palau, and to the scientific community via publication in relevant peer-reviewed scientific journals. We also have an active blog on our custom website www.palaumegapode.com.

7. Timescale: Over what period was The Rufford Foundation grant used? How does this compare to the anticipated or actual length of the project?

Rufford Foundation funds were used from 25 January to 21 April, 2016. This was nearly three months and was the duration anticipated for the first field season of the project.

8. Budget: Please provide a breakdown of budgeted versus actual expenditure and the reasons for any differences. All figures should be in £ sterling, indicating the local exchange rate used.

Item	Budgeted Amount	Actual Amount	Difference	Comments
Colour Bands	203	595	-392	Colour bands had to be custom made by Haggie and were considerably more expensive than first envisaged when we thought that generic colour bands could be ordered.
VHF Radio Transmitters	2087	0	2087	These were not purchased – see comments in section 11, below
Receiver	907	0	907	Purchased from another grant
Antenna	448	0	448	Purchased from another grant
Mist Nets	244	115	129	Mist-nets were slightly cheaper than expected
Walk-in Trap Materials	200	10	190	We were not able to find materials in Palau to construct this trap
Boat Fuel and Consumables	900	571	329	These funds covered research permits, Palau exit and green fee, misc. field gear, and fuel for the rental vehicle

Housing and Vehicle Rental	0	2497	-2497	See comments in 11, below. Covering these expenses was a high priority to allow us to undertake the work and were not covered by other grants.
Round-Trip Airfare	0	1173	-1173	As above. This was essential to get to Palau to undertake the work and was not covered by any other funds at our disposal.
Total Original budget	4989	4961	28	
Additional funds	11		11	
Total	5000	4961	39	

9. Looking ahead, what do you feel are the important next steps?

Our next steps, which will be pursued during the second field season (November 2016 through January 2017) are to: 1) complete the acquisition of DGPS locations for all megapode incubation mounds on islands known to support them in the Rock Islands Southern Lagoon Conservation Area; 2) collect microhabitat data at as many active mounds as possible; and 3) investigate foraging habitat used by megapodes in the Rock Islands. Combined with the data collected this first field season, we will use all habitat data to construct a dynamic habitat model for the Micronesian Megapode in Palau. The DGPS locations of mounds in the Rock Islands will be used to model the effect of three scenarios (1 m, 3 m, and 6 m) of projected future sea level rise, as predicted by the IPCC. Our habitat model will be employed to determine what amount of habitat important to megapodes will be lost, and where in the archipelago such habitat may remain as possible future refugia. We will further conduct a survey of rats in the Rock Islands to assess their population densities to determine any possible impacts of the rodents on megapodes and to determine to what extent the tourist industry may be maintaining or increasing rat numbers.

10. Did you use The Rufford Foundation logo in any materials produced in relation to this project? Did the RSGF receive any publicity during the course of your work?

Yes. We have used the Rufford logo on our new Palau Megapode website at www.palaumegapode.com and on internal university presentations concerning this project and presentations in Palau.

11. Any other comments?

We are extremely grateful for this grant. Without Rufford it would not have been possible to undertake this work on an endangered and poorly known species. Our work is the first such research on this species and we hope it will have strong management outcomes. Our ultimate aim is to have informed management of this species by identifying critical habitat and engaging Palauans in its conservation.

Comments Regarding Budget Differences

As discussed above, we decided to postpone radio telemetry (and have since decided to abandon it due to concerns for safety of the birds in our study) and did not use RSG funds to purchase them. Prior to our decision to postpone radio telemetry, we had decided to purchase all telemetry equipment (receiver and antenna) via another grant to save RSG funds for other needs such as boat transport.

We had originally applied for another grant from which we intended to take all travel support funds (i.e., airfare, housing and rental car) for the project. However, we did not receive these funds prior to our field season. In order to be able to execute the project it was a high priority to cover all travel necessary to this project, and we used the surplus from not purchasing radio-tracking equipment, to cover these costs. We are very grateful to Rufford as ultimately, the costs of our entire first field season was covered by RSG and this work would not have occurred at all had it not been for these funds.