

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	Caitlin Eschmann
Project title	Conservation of the Critically Endangered blue-eyed black lemur (<i>Eulemur flavifrons</i>): Hybridization with the parapatric black lemur (<i>E. macaco</i>) in Madagascar
RSG reference	18729-1
Reporting period	2016
Amount of grant	£5000
Your email address	caitesch@gmail.com
Date of this report	November 18, 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
To record, describe, and compare the vocalisations of lemurs living within the contact zone during the mating season.		✓		Calls have been recorded from the allopatric populations of <i>E. flavifrons</i> and <i>E. macaco</i> , and from adjacent populations of <i>E. flavifrons</i> and <i>E. macaco</i> . These calls are currently being analysed.
To use playback experiments to determine whether lemurs can discriminate between the species-specific vocalisations.			✓	Playback experiments were conducted at all locations and currently are being analysed.
To determine whether vocalisations may serve as a premating isolation mechanism.	✓			This type of conclusion will only be possible upon completion of my next field season.
To identify types of social behaviours exhibited by the lemurs.		✓		Social system data have been recorded for the allopatric populations of <i>E. flavifrons</i> and <i>E. macaco</i> . These data will be collected from the adjacent populations of the two species in 2017.
To gather and compare their mating behaviours.		✓		Mating systems data have been recorded for the allopatric populations of <i>E. flavifrons</i> and <i>E. macaco</i> . These data will be collected from the adjacent populations of the two species in 2017.
To examine social organisation, intergroup encounters, and proximity preferences.		✓		These data have been recorded for the allopatric populations of <i>E. flavifrons</i> and <i>E. macaco</i> . These data will be collected from the

				adjacent populations of the two species in 2017.
To determine whether aspects of social behaviour may serve as a premating isolation mechanism.	✓			This type of conclusion will only be possible upon completion of my next field season.
To determine whether there is gene exchange between <i>E. flavifrons</i> and <i>E. macaco</i> at the contact zone.		✓		We are currently analysing faecal specimens at the Duke Lemur Center in North Carolina, USA.

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

The Manongarivo Special Reserve is an exceptionally difficult area to navigate and work in. There are no trails or camps in an area comprised of sheer cliffs that reach up to 1600 m in elevation. Despite being protected, illegal hunting and deforestation remain a continual problem here. Suspicion of researchers by local villagers adds an additional layer of complexity. Collectively, this means that finding and following lemurs in the Manongarivo Special Reserve is exceptionally difficult. In order to collect sound behavioural data from these lemurs, collaring and considerable habituation will be necessary. This is currently outside of the scope of this PhD, but I believe that it warrants consideration in the future. There is still a considerable amount of information to be gathered from this region—from which lemurs are present, to the effects of continued deforestation and hunting pressures, to the need for permanent education outreach.

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

It is still too early to conclude the most important overall outcomes of this project as it is still ongoing. Instead, I will comment on the most important outcome to-date.

- During both the 2015 and 2016 field seasons, we observed what appears to be *E. flavifrons* residing approximately 20 km north of their known distribution. The distance is not the remarkable factor, but rather the fact that this area is on the opposite side of the Andranomalaza River. This river has long been assumed to be the natural barrier between *E. flavifrons* and *E. macaco*; observations prove that this is not the case. Faecal samples are currently being analysed to determine the exact nature of these lemurs.

- *E. flavifrons* exhibit a female dominant society that is characterised by females initiating more social interactions, and strong associations between individuals of the same sex. Preliminary results during the mating season suggest that intersexual interactions and pairings are more common during this time. Males were found to initiate more social interactions than females. This is opposite to what has been observed outside the mating season or these lemurs. This suggests that there is actually a degree of flexibility in the social systems of these lemurs.
- Both *E. flavifrons* and *E. macaco* appear to display a dynamic range of courtship behaviours and mating strategies, which appear to be similar in nature. With this said, there seems to be a stark difference in female receptivity. *E. flavifrons* were almost never receptive, forcing the males to employ aggressive courtship strategies. In comparison, *E. macaco* females were almost always receptive; at times females were even observed eliciting copulation by presenting in a lordotic posture. These findings may have important implications for the likelihood of the two species hybridising.

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

This past field season, two Malagasy Masters research students were core members of the research team—Sedera Solofondranohatra and James Ruphin Solofonirina. They were integral to data collection, field logistics, and supervising local guides. Sedera managed his own team out in the field. This allowed him to garner important research, managing, and English language skills. Working on this project has opened up an opportunity to manage a new research project looking at lemur use of cacao plantations. He is also beginning to write up his PhD proposal, which he hopes to start in 2017.

At each field site (there were seven this past year), I employed local villagers and services to help with the project logistics. These included porters helping us to move to different field sites, cooks to prepare meals, and guides to locate lemurs. We made it our goal to always discuss with the villagers what we were doing, why it is important, and how their involvement is vital. If and when possible, we leave the villages with something more than when we arrived, whether it is financial contribution for hosting us, additional food, or much needed supplies (batteries, clothing, cooking items, etc.). It is important that the communities see researchers in a positive light.

5. Are there any plans to continue this work?

I will be going back out to Madagascar for one additional field season (March 2017) for this specific PhD research. During this time I will be working with adjacent *E. flavifrons* and *E. macaco* groups. I will also return to the Manongarivo Special Reserve to see if I can locate any additional groups of *E. flavifrons* living outside of the known range, as well as collect faecal samples for analysis.

Upon completion of my PhD, which is expected in early 2018, my intention is to continue working with AEECL and local institutions to improve the scope and quality of education programmes in northwest Madagascar. Teacher training in educational techniques is needed. Curricular assessment through evaluations; surveys; and interviews with teachers, students, and parents is essential to developing a successful programme. Data from this will inform the effectiveness of the curricula on individual's perception and valuing of lemur conservation.

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

This past August, I presented preliminary findings from my first field season at the 26th Congress of the International Primatological Society held in collaboration with the 39th meeting of the American Society of Primatologists in Chicago, Illinois. There I gave a talk entitled "Social behaviors of blue-eyed black lemurs (*Eulemur flavifrons*) during the mating season in northwest Madagascar". I will also be giving a talk to the Bristol Zoological Society's Research Advisory Board in the end of November. It is my hope to present my findings at either the International Mammalian Congress or the International Congress for Conservation Biology in summer 2017.

I am currently writing a short communication on the updated distribution of *E. flavifrons*. This article will be targeted to either *Folia Primatologica* or *Lemur News*, and will be distributed to the IUCN's Primate Specialist Group. Furthermore, it is my intention to publish the bioacoustic data before I return to the field in 2017.

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

The Rufford Foundation grant was used between March-August 2016. This time represents a third of the total project. The first field season occurred during this time in 2015 and the last field season will take place in 2017.

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.

There was a change in exchange rate (from GBP/MGA = 4,674 to GBP/MGA = 3,854) between when the budget was created and when I needed to pay for services/goods/equipment in Madagascar; this change is represented in the budget differences. Items in **bold** were paid for, either in part or in total, with The Rufford Foundation grant. Student stipends were 32,500 MGS/day, field guide stipends were 10,000 MGA/day, cook stipends were 7,000 MGA/day, and porter stipends ranged between 10,000-40,000 MGA/day depending on the length of travel. Car hire/drive hire is 160,000 MGA/day plus gas which ranges between 3,600-4,600 MGA/L.

Item	Budgeted Amount	Actual Amount	Difference	Comments
Roundtrip flight from England to Madagascar for researcher	£902	£1010	- £108	Flight costs changed prior to purchasing a ticket.
Car hire/gas/driver salary for internal travel	£785	£722	+ £63	This was basically on point. We were able to negotiate with drivers that we used multiple times, but we also ended up needing to take a car to an unforeseen field location.
Food for the research team 20 weeks	£1,180	£1,003	+ £177	At some of the field sites it was impossible to get fresh produce or meats, so we only ate rice and beans.
Accommodation in Antananarivo and Ambanja for 14 days	£364	£288	+ £76	We did not need to spend as much time in towns as anticipated.
Two Malagasy student stipends for 20 weeks	£1,974	£2,362	- £388	Exchange rate differences.
Malagasy field guide and cook stipend for 20 weeks	£486	£592	- £106	Exchange rate differences.
Malagasy porters, as needed, across 20 weeks	£350	£370	- £20	We ran out of rice and other essentials twice in the field, so porters were hired to bring food in.

Roland digital recorder (x2), directional microphone (x2), playback speakers	£595	£595	0	
Garmin GPS (x2), laptop, and hard drive	£525	£525	0	
Faecal collection containers (x250) and 100mL RNAlater solution	£714	£714	0	
Isatphone Pro satellite phone and credit	£435	£435	0	
Head torches, tents, and field notebooks	£385	£200	+ £185	We were able to find affordable tents in Madagascar for the team.
Clothing items/ personal equipment	£563	£611	- £48	My Malagasy assistants required more personal items than anticipated (rucksacks, backpacks, hiking boots, water sandals).
Katadyn Combi water purifying pump, Goal Zero Solar Kit	£674	£674	0	
Researcher visa	£84	£84	0	
Park entrance fees for research team 5 months	£439	£439	0	
University of Antananarivo department fees	£244	£244	0	
Travel insurance, medications, immunizations	£275	£203	+ £72	
Batteries	£35	£32	+ £3	
Miscellaneous items in the field	£200	£239	+ £39	This was budgeted for phone/credit, equipment problems, etc. There happened to be a medical emergency in the field, so this category was over budget.
Total	£11,209	£11,342	- £133	It was due to the unforeseen change in exchange rates that I went over budget this field season.

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

Besides completing the last field season of this project, which is undoubtedly essential, I feel there are several major next steps that will improve the conservation output of this project. The IUCN SSC Primate Specialist Group for Madagascar will be reviewing their Action Plans for lemur species soon. These are my immediate recommendations for *E. flavifrons*: (1) Now that we know there are lemurs residing outside the known distribution, detailed surveys are needed in this region. It is likely that the population estimates may change, which could also have an impact the conservation status of the lemurs; (2) This region would greatly benefit from monitoring and patrolling, which is currently absent; and (3) As habitat loss is the most immediate threat to the lemurs, a reforestation programme that would connect remaining forest fragments would be extremely beneficial. If hybrid lemurs are officially confirmed through genomic analyses, then a hybrid management plan may be needed as well.

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, The Rufford Foundation logo was used in my presentation at the International Primatological Society Congress this past summer. It will also be used in any additional conference presentations and RSGF's support will be noted in all publications.

11. Any other comments?

I want to extend my appreciation to The Rufford Foundation for their support of this project. Your contribution this past field season made the research possible. While the immediate benefits to my degree are obvious, your support has also had a further reaching impact on important conservation work.