

**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	Hugo Cardoso De Moura Costa
Project title	Ecology and Conservation of the jaguar <i>Panthera onca</i> at Cristalino State Park in Southern Amazon.
RSG reference	12231-1
Reporting period	April 2013 – June- 2014
Amount of grant	£6,000
Your email address	hugocmcosta@gmail.com
Date of this report	September, 2014

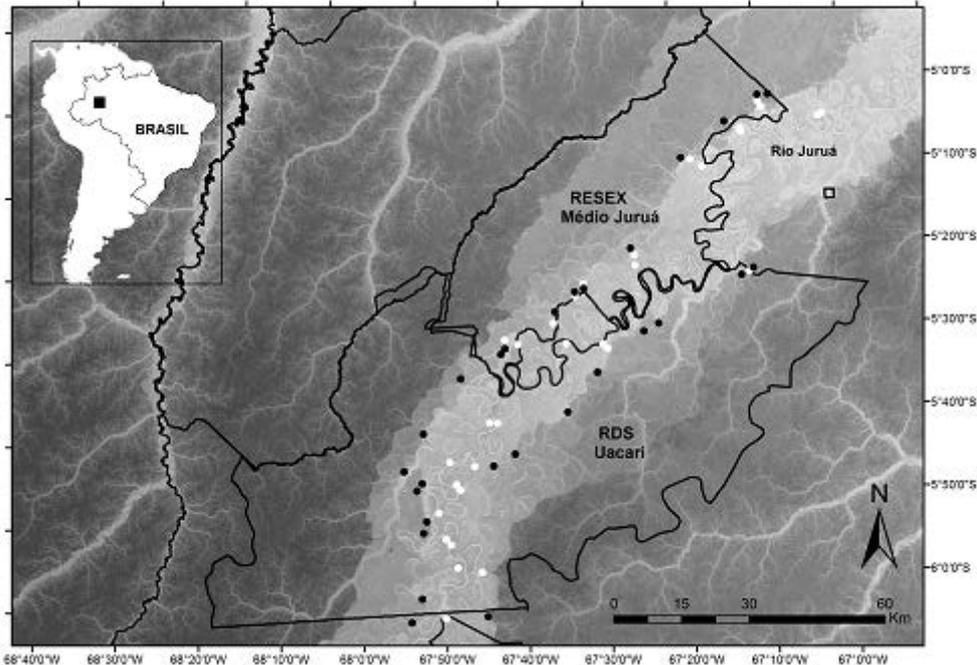
1. Please indicate the level of achievement of the project's original objectives and include any relevant comments on factors affecting this.

Objective	Not achieved	Partially achieved	Fully achieved	Comments
Estimate jaguar population size	X			See Justification below
Characterise its diet	X			See Justification below
Estimate main prey species abundance	X			See Justification below
Propose technical support to cattle ranchers to avoid livestock predation and reduce the cat losses by retaliation.	X			See Justification below

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

The originally proposed project **12231-1** started its activities in October, 2012 with a 60-day pilot study to identify potential areas to install the camera trapping grid to estimate jaguar abundance and jaguar prey population parameters. Just after visiting the planned Rio Cristalino study area in northern Mato Grosso in October, 12th, 2012, events that were entirely beyond my control rapidly changed, affecting the viability of the original proposed study, as the main coordinator of the project Dr. Liza Veiga tragically passed away (see Obituaries in Barnett 2013, Ferrari 2013). The proposed project therefore discontinued its activities until April, 2013 when I, Dr. Veiga's MSc student at the Emílio Goeldi Natural History Museum was transferred to a new project supervisor, Dr. Carlos Peres. Without any field conditions and possibility to maintain the original project I started to work on an even more ambitious new field project along the middle Juruá River of western Brazilian Amazonia. This new research aims to study the seasonal landscape-scale lateral movements of all mid-sized to large-bodied terrestrial mammals between Amazonian flooded and unflooded forests, an ecological issue of faunal dynamics that is rarely considered in conservation planning. With this project I intended to provide crucial scientific evidence for the notion that Amazonian upland (*terra firme*) and seasonally flooded (*várzea*) forests need to be juxtaposed within the same forest reserves, thereby boosting what we know about designing and managing highly heterogeneous natural forest mosaics in Amazonia for both biodiversity persistence and local extractive communities.

I am visiting the Juruá region twice a year now to install camera traps travelling 500 km by boat to cover two contiguous sustainable protected areas (which amount to nearly 900,000 ha): the Médio Juruá Extractive Reserve (RESEX) and the Uacari Sustainable Development Reserve (RDS), sampling both *terra firme* and seasonally flooded *várzea* forests. Approximately 35% of the area of these two reserves is subjected to a persistent seasonal flood pulse of ~12 m that lasts up to 6 months of the year. These are therefore some of the most seasonal environments anywhere in the lowland tropics.



Map of the study area in the middle Rio Juruá region of western Brazilian Amazonia, upriver of Carauari, Amazonas, Brazil. Black lines indicate the boundaries of the Médio Juruá Extractive Reserve (RESEX) and the Uacari Sustainable Development Extractive Reserve (RDS). Solid and white circles represent CTs in *terra firme* and *várzea* forest sites, respectively.

Barnett, A. 2013. Obituary: Liza Veiga (née McCarthy) (October 31, 1963–October 28, 2012). *International Journal of Primatology*, 34: 443-444.

Ferrari, S. F. 2013. Liza Maria Veiga (October 31, 1963 – October 27, 2012). *American Journal of Primatology*, 75: 252–253.

(http://www.rufford.org/rsg/projects/liza_veiga)

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

On the basis of 1,800 trap nights, I recorded 25 terrestrial vertebrate species, including 23 mammals and two large-bodied bird species. Overall species richness was higher at *terra firme* forest sites during the flood pulse than at *terra firme* sites during the dry phase of adjacent *várzea* forests, which in turn was higher than in *várzea* sites. Camera trap stations grouped by both forest type and season was the main factor explaining the variation in overall capture rates across all terrestrial mammal species, which were higher at *terra firme* forest sites during the flood pulse, followed by *terra firme* sites during the dry phase and finally *várzea* sites during the dry phase. This was confirmed by the variation in capture rates for seed predators (granivores) and insectivores but not for the other two trophic guilds (carnivores and folivores). At *terra firme* sites, capture rates for granivores, folivores and carnivores increased with the rising floodwaters, whereas the reverse was true at *várzea* sites, except for carnivores. On the basis of pairwise seasonal contrasts, 11 of the 14 CT sites sampled in both seasons within *terra firme* forest showed an increase in overall capture rates during the flood pulse of adjacent *várzea* forests.

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

5. Are there any plans to continue this work?

Yes, I'm planning two extra field expeditions in October 2014 and March 2015 to this study area to complete our camera trapping sampling, thereby boosting the field data necessary to publish a high-quality paper. During the next few years I will focus on acquiring detailed animal movement data across seasonally flooded and unflooded forests in Western Brazilian Amazonia by studying the spatial ecology of landscape species such as large carnivores, jaguars *Panthera onca* and pumas *Puma concolor*, and/or large herbivores such as tapirs *Tapirus terrestris* and white-lipped peccaries *Tayassu pecari*.

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

The results of this project are part of my MSc thesis which will be published as a scientific paper as soon as the data sampling is completed in March 2015. Previous results will be shared with my peers at the forthcoming 7th Brazilian Mammalogy Congress on September 20th, 2014.

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 grant was used during the 2013 year, ensuring that two field expeditions during the flood pulse and the dry phase, respectively, could be completed. The RSG funds were critical in this study as it is very expensive to work in this part of the Amazon. Fuel costs are the highest in Brazil, and flights alone from Manaus to Carauari cost R\$1,600 for a return airfare in a small aircraft. For the 2014 and 2015 expeditions we will use funds from other sources, but clearly **The Rufford Small Grants Foundation provided critical funds to make this study possible.**

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
Transport	1,500	2,500	1,000	New study area is accessible only by boat, field expeditions activities include a 30-day river travel.
Local field-guide	1,000	500	500	
Camera traps and memory cards	3,000	3,000	0	
GPS	500	0	500	
Total	6,000	6,000	2,000	

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

Important next steps are to complete the camera trapping sampling, and analyse the data to support our analyses of seasonal movements of terrestrial vertebrates between neighbouring but very

different forest types in Amazonia. After this general pattern is confirmed it is crucial to obtain more detailed animal movement data between unflooded and seasonally flooded forests using GPS and radio telemetry data.

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?

The RSG logo has been used at the public project presentations, and at the 7th Brazilian Mammalogy Congress panel. All publications resulting from this project will duly acknowledge this financial contribution.

11. Any other comments?

Unfortunately I was not able to keep working on the original project, although, the entire amount received as part of this grant was spent in a conservation project which will improve the planning and design of nature reserves in Amazonia, thereby fulfilling RSG Foundation aims. Moreover, I believe that (1) the overall conservation significance of the new project is greater than that of the original single-species (jaguar) project, and (2) the spatial scale of the new project is approximately 20 times greater than that of the original project. We will now make the data work hard to consolidate both the findings and the applications of these findings in Amazonian forest conservation planning policy. Finally, I sincerely thank the RSG for granting me critical funding to enable this project, and I can be reached at any time to provide further clarification on why and how the objectives of this project were revised, and we believe for the better.