

The Rufford Small Grants Foundation

Final Report

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

We ask all grant recipients to complete a Final Report Form that helps us to gauge the success of our grant giving. 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. 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	Lindsey N. Rich
Project title	Developing a large scale, standardised monitoring program for carnivores in Botswana
RSG reference	13241-1
Reporting period	28 March 2013 – 27 March 2014
Amount of grant	£5971
Your email address	LindseyRich83@gmail.com
Date of this report	27 March 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 the densities of sympatric meso- and large carnivores using camera trap surveys		X		I deployed 25 camera stations in two, 100km ² study sites for ~5 weeks each. The cameras photographed all meso- and large carnivores indigenous to this region (Table 1).
Estimate overall carnivore richness and assess the ecological factors (e.g., land cover, human impact, and prey density) underlying the occupancy and detection of sympatric meso- and large carnivores		X		I conducted eight distance sampling surveys for prey species and collected data on the microhabitat features surrounding each camera station. I also gathered several GIS layers that I am using to estimate vegetative cover, road density, and distance to a permanent water sources.
Evaluate the efficacy of spoor surveys for monitoring the distribution and population trends of large carnivores		X		A wildlife guide from Sankuyo and I carried out eight spoor surveys within each study site. We surveyed >200 km for large carnivore spoor; spotted hyena spoor was detected most often while cheetah spoor was detected least often.

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

The primary difficulty was the sub-par performance of the remote-sensing cameras. I purchased several models of Moultrie cameras but found that the quality of many of the photographs taken at night was too poor to identify individuals. This is problematic as my goal was to use the unique pelage patterns on species such as leopards and servals to identify individuals and then estimate density via spatially explicit capture-recapture models. I will be able to use the collected data to estimate occupancy and will explore the use of a newly developed statistical model that can estimate density using photos only identifiable to the species level. I am currently seeking funding to purchase higher quality cameras in order to complete individual identification in upcoming field seasons.

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

- 1) I will identify and implement a sustainable monitoring programme for carnivore communities across northern Botswana. To identify a monitoring programme, I am employing camera trap and track surveys. To implement the programme, I am training local wildlife guides and offering field workshops and presentations to communities, government agencies, and research institutes.
- 2) My study will be the first to use camera trap surveys, in combination with advanced statistical models, to estimate the densities of an entire carnivore community. In a field where money, time, and personnel are limiting factors, this multi-species study design could result in considerable savings as well as a more efficient use of available data. This design can be implemented internationally in areas where population data is sorely needed for multiple wildlife species.

Table 1. Meso- and large carnivores photographed during the 2013 pilot season where n = the number of independent detections.

Species	Scientific Name	n
Aardwolf	<i>Proteles cristatus</i>	28
African wild dog	<i>Lycaon pictus</i>	17
Bat-eared fox	<i>Otocyon megalotis</i>	11
Black-backed jackal	<i>Canis mesomelas</i>	72
Caracal	<i>Caracal caracal</i>	16
Cheetah	<i>Acinonyx jubatus</i>	9
African civet	<i>Civettictis civetta</i>	85
Honey badger	<i>Mellivora capensis</i>	50
Leopard	<i>Panthera pardus</i>	64
Lion	<i>Panthera leo</i>	29
Serval	<i>Leptailurus serval</i>	28
Spotted hyena	<i>Crocuta crocuta</i>	237
Wildcat	<i>Felis silvestris</i>	47

- 3) My research will elucidate how the spatial ecology of carnivore species and carnivore communities are influenced by human land use practices, access to water, and habitat quality. The Botswana government can use this information to predict the impacts of changing land use and management policies.

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

To implement a long-term, sustainable monitoring programme it is imperative to involve and train individuals from local organisations. Thus, I met with several members of the Sankuyo Community Trust to discuss my research. Sankuyo is a village in my study area and has user rights of the wildlife management areas (NG33/34) I work in. Two wildlife guides from Sankuyo also received intensive, hands-on training on how to implement my field techniques. When I return to Botswana, I plan to have several field workshops for the Sankuyo Trust, Okavango Research Institute and the Department of Wildlife and National Parks to build local capacity in regards to monitoring wildlife

populations. My long-term goal is to provide the Batswana with the skills needed to continue monitoring wildlife independent of western researchers. Following my project, local wildlife guides can implement my field methodologies and collaborate with researchers (e.g., from the Okavango Research Institute) to model the populations. This will provide widespread, comparable data on carnivores and help the government and local communities to make informed decisions regarding carnivore conservation and management.

5. Are there any plans to continue this work?

Yes. This was the pilot season for my research. I plan to carry out 6-month field seasons in 2014 and in 2015. The anticipated completion date of this research is August 2016.

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

I will publish results in peer reviewed journals and in popular media (e.g., Botswana newspapers or U.S. magazines). I will also maintain a website (www.lindseyrichresearch.com) and present my results at national and international conferences and to local organisations/institutes in Botswana and in the United States.

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 supported the pilot season of my field research. As anticipated, my pilot season lasted from mid-May until the end of August 2013.

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
Airfare (Virginia to Maun, Botswana)	1420	1285	135	I found a good deal on airfare
Vehicle gas, maintenance, and parts	1270	1620	350	Field car had to be equipped with tool kit, high-lift jack, and extra spare tire
Lodging & food	1020	1020	0	
Camera traps	4095	4025	70	One camera trap model was on sale
Field equipment (GPS, rangefinder, stakes, batteries, memory cards)	1562	1670	108	I purchased an extra GPS & rangefinder in case one was lost/stolen
Field assistant + supplies for Wild Joys	310	343	33	
Total	9677	9963		**1 USD = 0.60 pound sterling

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

The most important next step is the successful completion of my 2014 field season. During my upcoming field season, I will continue carrying out my field work (e.g., camera trapping with better cameras and track surveys) and work diligently to build collaborations and trust with local government agencies, organisations, and research institutes as well as local capacity in regards to monitoring wildlife.

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 Rufford Foundation logo was used in all presentations I gave pertaining to this research, including at the Annual Systematic Thinking in Action conference in Washington DC and to local organisations, such as to the student chapter of The Wildlife Society. I also acknowledged The Rufford Foundation on the crowdise website I created for my outreach program (www.crowdrise.com/wildjoys). I will acknowledge The Rufford Foundation in all future presentations and publications pertaining to my PhD work in Botswana; their financial support was vital in getting this important research off the ground.

11. Any other comments?

In addition to the anticipated field work, I piloted Wild Joys, a conservation outreach programme for children from rural communities. Wild Joys is a joint effort between Monthusi Sinvula, a wildlife guide from the local community of Sankuyo, and me. We take kids into nearby protected areas to provide them with positive wildlife encounters and expose them to natural history, animal behaviour, and field techniques (e.g., camera trapping, track surveys, and radio-telemetry). In August 2013 we took 42 children from Sankuyo village into the field over the course of 6 days. This was the first time the majority of children had ever seen lions, wild dogs, and leopards. To see a fundraising video we created, please visit www.lindseyrichresearch.com/wild-joys-outreach.