

## The Rufford Foundation Final Report

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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](mailto:jane@rufford.org).

Thank you for your help.

**Josh Cole, Grants Director**

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Grant Recipient Details	
<b>Your name</b>	Jessica Comley
<b>Project title</b>	Carnivore intra-guild competition in Selati Game Reserve, Limpopo, South Africa
<b>RSG reference</b>	19552-1
<b>Reporting period</b>	February 2017 to February 2018
<b>Amount of grant</b>	£5000
<b>Your email address</b>	jessiecomley44@gmail.com
<b>Date of this report</b>	22 February 2019

**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
<p>To determine whether intra-guild competition (for space and resources) occurs within the large carnivore guild of a small, enclosed game reserve of South Africa (Selati Game Reserve).</p>				<p>My research was successful in providing insight into the complexity of both interference and exploitative competitive interactions within the large carnivore guild of Selati Game Reserve. My results revealed that lions were the competitively dominant large carnivore in Selati and that leopards were the most negatively affected large carnivore.</p>
<p>To determine to what extent competition determines how the large carnivore guild utilizes and partitions space and resources.</p>				<p>My study provided valuable information regarding the resource and spatial utilisation of large carnivores in Selati. For example I found that spotted hyaenas always avoided habitats preferred by lions, and that leopards preyed on small mammals to potentially avoid competition with lions. My study, however, also highlights various important knowledge gaps in our understanding of carnivore intra-guild competition in small, enclosed reserves throughout southern Africa.</p>
<p>If competition does occur in the large carnivore guild, the third objective will be to determine to what extent competition influences the structure of the entire carnivore community.</p>				<p>I found evidence that the occupancy dynamics (i.e. space use) of small- and medium-sized carnivores were primarily negatively influenced by the presence of large carnivores. Additionally, the competitive dominance of large carnivores through ecological processes such as predation and interspecific killing were also found to be potentially negatively influencing the smaller, less dominant carnivores in terms of population densities.</p>

<p>The final aim will be to determine what impacts the carnivore guild can have on non-carnivore (e.g. ungulates) species and whether they influence species diversity.</p>		X	<p>My study revealed that despite their (ungulates) relative abundance, lions and leopards were preferentially preying on ungulate species listed as vulnerable (tsessbe) and endangered (mountain reedbuck). My study highlights that in order to conserve biodiversity in small, enclosed reserves, ecosystem-based research is needed in these systems throughout southern Africa.</p>
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**2. Please explain any unforeseen difficulties that arose during the project and how these were tackled (if relevant).**

The only unforeseen difficulty that transpired throughout my PhD research project was the availability of a functional and reliable fieldwork vehicle as this jeopardised data collection (especially the collection of carnivore scats and kill sites)

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

Firstly, I found that carnivore-carnivore interactions, and their associated impacts, varied within the carnivore guild and that co-existence may be due to trade-offs between various risks (i.e. interference and exploitative competition) and benefits (i.e. resources such as food and space).

Secondly, my findings revealed that large carnivores, such as lions (*Panthera leo*), spotted hyaenas (*Crocuta crocuta*) and leopards (*Panthera pardus*) do not have homogenous effects on subordinate carnivores and that site-specific research on multiple-carnivores is integral for conserving biodiversity and ecosystem dynamics.

Thirdly, lions were found to be the dominant large carnivore (in terms of intra-guild predation, space use and resource use) despite being outnumbered seven to one by spotted hyaenas (i.e. overly abundant). Additionally, leopard occupancy was negatively influenced by lions and leopard diet overlapped almost completely (91%) with spotted hyaenas, suggesting increased kleptoparasitism of leopard kills by the overly abundant spotted hyaenas.

While my study provides valuable insight into the complexity of carnivore intra-guild competition in a small, enclosed reserve it also highlights major research gaps and emphasises the need for ecosystem-based research throughout Southern Africa to fully understand how multiple sympatric carnivores co-exist in these systems.

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

Selati Game Reserve employs local community members who work full time on Selati. During my fieldtrips I had the privilege of working with a number of

During each year of my research at Selati (2016-2018) I would give a presentation at Selati's Annual General Meeting, which was attended by the landowners, their families, friends and invited guests. I would talk about my progress, preliminary results and their potential impacts.

Unfortunately, my research fieldtrips never coincided with the Bush Buddies initiative (a youth development programme aimed at providing an educational background to conservation and sustainability) of Selati Game Reserve, so I was unable to help out in person. However, Selati personnel would use a poster I created for the SAWMA (South African Wildlife Management Association) Conference in Tzaneen, 2016, along with any relevant preliminary findings of my research during the Bush Buddies weekends.

In October 2017, I gave a talk to high school Life Science pupils at Victoria Girls High School (which I attended throughout my schooling career), about "Life as a Zoologist" detailing the various paths this could entail, with examples of what I have studied throughout my academic career and where it has taken me.

In August 2018, I presented at the 17<sup>th</sup> International Society of Behavioural Ecology in the United States of America where I met with fellow researchers studying large carnivores in Africa.

**5. Are there any plans to continue this work?**

Yes. On the provision that my PhD degree is awarded, I have been accepted for a Post-Doctoral Fellowship at Rhodes University for 1 year, with the potential for renewal for a 2nd year. As a result of the overly abundant spotted hyaena population found during my PhD research in Selati, I proposed a research project to investigate the genetic diversity and structure of this species in Selati and surrounding small, enclosed systems. My main aim is to evaluate levels of potential inbreeding (due to prevention of dispersal) and illustrate the importance for conservation genetics in conserving biodiversity.

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

I plan to publish my results as at least two papers in accredited journals. Additionally, as I have done with data collected during my Master's degree, I am open to sharing my results and data with interested personnel who need or want data from additionally study sites.

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

I began my PhD research project in April 2016 and was awarded a Rufford Foundation Grant in February 2017. In March 2017, the Rufford grant was used to purchase large carnivore collars. The grant was also used to cover fieldwork travel costs in June-August 2017 (travel between Grahamstown and Selati Game Reserve which is ~1500 km).

**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
Leopard collar x 2	1532	1335	-197	Original budget was for three leopard collars but only two were purchased due to an increase in the collar price as well as the drop in the exchange rate from the time of applying for the Rufford Small Grant to purchasing the collars
Spotted hyena collar x 1	510	668	-158	The difference is due to the fact that the collar price increased at the beginning of 2017 after the application was submitted, in addition to the exchange rate changing
Lion collar x 1	568	729	-161	
Service fee	1540	1317	-223	Service fee was decreased due to one less collar being purchased
Shipment and insurance	119	130	-11	Shipment and insurance costs increased at the beginning of 2017
Tax on collars, service fee, shipment and insurance		353	+353	The original budget did not include the mandatory 14% tax on the above items as the quote received from the collar company did not include the tax, therefore this was an additional expenditure
Transport to and from Selati	277	437	+160	Due to not having to pay Rhodes University admin fee, the extra money could be used to cover transport costs
Rhodes University admin fee	454		-454	The Rufford Small Grant got paid into my personal account, so instead there was a bank charge
Bank charges		30	+30	
<b>TOTAL</b>	<b>5000</b>	<b>4999</b>	<b>-1</b>	Budget exchange rate was 17.53 Actual exchange rate was 16.40

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

The most important next steps are to publish my results in accredited journals and potentially attend more conferences, in order to highlight the conservational gaps identified in my research and to highlight the importance of ecosystem-based research instead of single species research. These findings are important for conservational managers, as they will aid the development of appropriate programmes to conserve biodiversity.

**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 RF did receive publicity during the course of my work. The Rufford Foundation logo was used in every single presentation I gave from 2017 onwards (including the ISBE Conference in the USA in 2018). The Rufford Foundation was also acknowledged in my PhD thesis, which once I have been awarded the degree will become publicly available through the Rhodes University library.

**11. Please provide a full list of all the members of your team and briefly what was their role in the project.**

**Prof DM Parker -** Prof Parker is my main supervisor

**Dr N Mgqatsa -** Dr Mgqatsa is my co-supervisor

**Mr CJ Joubert -** Mr Joubert is Selati Game Reserve's General Manager