

## Final Evaluation Report

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Your Details	
<b>Full Name</b>	Dr Jessica Comley
<b>Project Title</b>	Population genetics of brown hyaena ( <i>Parahyaena brunnea</i> ) in the Eastern Cape, South Africa
<b>Application ID</b>	28888-2
<b>Grant Amount</b>	£5000
<b>Email Address</b>	jessiecomley44@gmail.com
<b>Date of this Report</b>	14 December 2021

**1. 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
Characterise the genetic structure of brown hyaena in the Eastern Cape				We were able to determine that brown hyaenas in the Eastern Cape have extremely low genetic diversity at the mitochondrial level. Due to logistical constraints, we were unable to quantify gene flow or evaluate patterns of relatedness.
Compare past and present brown hyaena population genetic diversity				The number of 'past' samples collected from museums was insufficient to reliably perform these analyses.
Compare the genetic diversity of enclosed brown hyaena populations from the Eastern Cape to those sampled in Namibia				Brown hyaenas in the Eastern Cape show a lack of population genetic diversity like research has shown in Namibia.
Develop a new protocol to individually identify brown hyaenas from their paste markings				Due to Covid-19 and logistical constraints this new research objective was developed. We have shown that paste markings and microsatellite markers could potentially be used to identify individuals through fingerprinting.
Determine the spatial dynamics and population densities of brown hyaena in the Eastern Cape				The spatial dynamics and densities of three brown hyaena populations in the Eastern Cape have been determined.

**2. Please explain any unforeseen difficulties that arose during the project and how these were tackled.**

Due to the Covid-19 pandemic, a few of my original fieldwork plans and project objectives were impossible to achieve. As a result, new research objectives were developed, which included developing a new protocol to identify individual brown hyaenas through microsatellite fingerprinting. Another new objective was to determine the spatial dynamics and population densities of brown hyaena in small, enclosed reserves of the Eastern Cape. Another unforeseen difficulty that arose was that once we were allowed back into the genetics lab at Rhodes University, for the first three months none of my genetic samples (i.e., PCR tests) or the samples of

colleagues worked correctly. After some investigations, it turned out that the Taq we were using was compromised. Therefore, 3 months were spent in the lab with no results produced.

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

1) We have potentially developed a new protocol that will allow researchers to individually identify brown hyaenas from paste markings, using microsatellite fingerprinting and a simple sexing PCR test.

2) In terms of spatial dynamics, brown hyaenas seems to be influenced by top-down forces which could be attributed to their non-aggressive and scavenging behaviours. Across four small, enclosed reserves, the biotic factors influencing the spatial dynamics of brown hyaenas differed, reiterating the importance and need for single-site management and conservation initiatives.

3) The genetic diversity of brown hyaenas in the Eastern Cape is extremely low and future research needs to be invested into determining whether a metapopulation management scheme is needed for this species to prevent extinction.

### **4. Briefly describe the involvement of local communities and how they have benefitted from the project.**

At each of the reserves where I personally collected fieldwork data (e.g., Kariega Game Reserve, Lalibela Game Reserve), nature conservation students or field guides who joined me on my fieldwork trips were shown how to set up camera trap surveys and how to appropriately collect brown hyaena paste markings for genetic analyses.

Unfortunately, the restrictions South Africa implemented during my postdoctoral fellowship due to the Covid-19 pandemic prevented me from giving talks on the importance of research and biodiversity to local communities and schools in the Eastern Cape. The restrictions also prevented me from volunteering at the numerous environmental education programmes that the private game reserves held before Covid-19.

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

At this moment in time there are no plans to continue working on the genetic diversity of brown hyaenas. I do, however, have plans to do research on the genetic health of African wild dogs (*Lycaon pictus*), which is Africa's most endangered canid. This research will be part of a Postdoctoral Research Fellowship through the University of Mpumalanga which will begin early next year (2022).

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

Firstly, once all analyses are complete, I will host a Zoom meeting with all reserve managers in order to ensure that they fully understand how data collected on their reserves was utilised and how the outcomes can be used to ensure the conservation

of brown hyaenas. Secondly, I plan on publishing two journal articles, which I will also share with all parties that were involved in my research. Thirdly, if Covid-19 and its associated restrictions allow for it, I would love to present my work to local community gatherings, schools and reserves.

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

The grant was used from October 2019 to June 2021, whereas my Postdoctoral Research Fellowship ran from June 2019 to July 2021.

**8. Budget: 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. It is important that you retain the management accounts and all paid invoices relating to the project for at least 2 years as these may be required for inspection at our discretion.**

Item	Budgeted Amount	Actual Amount	Difference	Comments
<b>Original budget proposal – September 2019</b> (£1 = R18.12)				The Rufford Foundation agreed to budgetary changes in March 2021
Amin fee	£454	£509	+£55	
Fieldwork equipment	£720	£367	-£353	
Fieldwork travel and expenses	£3187	£914	-£2273	
Biopsy darts	£639		-£639	
<b>New budgetary items - March 2021</b>				
Lab reagents		£1757	+1757	
Sequencing		£1523	+1523	
<b>Grand Total</b>	<b>5000</b>	<b>5070</b>	<b>+70</b>	

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

The important next steps are to ensure that the two proposed journal articles that I am currently working on get published next year (2022). The first article will be on the spatial dynamics and population densities of brown hyaenas in the Eastern Cape. The second paper will be on the new potential protocol that we have developed to individually identify brown hyaenas from their paste markings using microsatellite fingerprinting.

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

The Rufford Foundation logo was used when I gave a presentation at the Southern African Wildlife Management Conference in Kruger National Park in September 2021. The Rufford Foundation will be duly recognised in any publications that derive from data collected during this research project.

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

**Dr S Edwards** was my primary host and is Head of the Zoology and Entomology Molecular Laboratory at Rhodes University. Dr Edwards provided invaluable information and mentorship with regards to all genetic analyses and laboratory work.

**Professor D M Parker** was my secondary host and is an Associate Professor at the University of Mpumalanga but maintains research links with Rhodes University's Department of Zoology and Entomology. Prof. Parker's sound theoretical grounding in ecology helped tremendously with regards to fieldwork and will be greatly beneficial when it comes to publishing out outcomes.

**12. Any other comments?**

Despite the numerous setbacks thrown at us due to the Covid-19 pandemic, I believe that the outcomes from this research project will greatly contribute to the literature on the ecology and conservation of brown hyaenas, a species which is tremendously understudied.