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	Manuel Leonardo Fonseca Aldana
Project title	Arthropod Dietary Variation in Highland Woolly Monkeys: Identification Using Genetic Barcodes and High Throughput Sequencing
RSG reference	23955-1
Reporting period	2019
Amount of grant	£4500
Your email address	ml.fonseca946@uniandes.edu.co
Date of this report	30/08/19

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
DNA Extractions			■	All DNA from 247 scats was extracted successfully.
PCR amplification of samples			■	Amplicons from COI target were successfully amplified by PCR, but it required more time than expected as the primer were very long and difficult to standardise.
High-throughput Sequencing	■			This is still in process.
Data Analysis			■	Ecological and behavioural data was analysed.
Conservation workshops with local community			■	Workshops were very successful, and had a great response from the children in the community.

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

We had a setback before sending to the sequencing platform. Primers got contaminated, so we had to order a new set of primers and the adaptors with the barcodes. This delayed the project seriously as we had to wait for the new primers to arrive and also at this point we run out of financial resources. So we had to apply for new grant and recently we obtained the support we needed to finish the project. So right now we are in the final steps of sending to sequence the samples and afterwards process the molecular data.

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

We still need the molecular results, but still we obtained very interesting results in the ecological and behavioural data we obtained from the year that we sampled at Cueva de los Guácharos National Park. Our three most outstanding results so far were:

1) Woolly monkeys have a positive relationship in terms of eating fruits and arthropods. This means that they might be using these items as complementary resources, which means that they combine or eat both items (i.e. fruits and arthropods) as fruits can provide carbohydrates and sugars, while insects can provide protein to their diets. This is important as this finding can explain why woolly monkeys consume fruits and arthropods at the same periods of time in their habitat

and how they can fulfil their nutritional requirements more efficiently than eating these items separately.

2) The time woolly monkeys invest in a resource depends on their age. In terms of fruits, we did not find a significant difference between adults and juveniles. On the contrary, we did find a significant difference in the time adults and juveniles invest on arthropods. Surprisingly, adults were the ones that invest more time foraging for insects and arachnids. This is important because we expected the opposite result, we expected adults to eat more fruits than juveniles as it has been reported for other woolly monkey populations, but this result might support for this population that they have a more flexible group cohesion (fission—fusion) that could explain why these groups of woolly monkeys behave so different than lowland populations, also adults might be more efficient foragers than juveniles, explaining why they invest more in looking for arthropods.

3) We analysed woolly monkey's activity budget and dietary composition. We found that Colombian woolly monkeys invest most of their time feeding (44%), followed by moving (29%), resting (23%) and others (4%). Furthermore, highland woolly monkeys eat mainly fruits (54%) followed by arthropods (28%), leaves (14%), flowers (3%) and seeds (1%). This is consistent with previous studies for other population, but still a 28% of arthropod consumption in a year study is still the highest value for a woolly monkey reported so far.

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

Local communities were involved mainly during fieldwork. They helped us for example when we asked for groceries we had to hire local people to bring the food to the park, which helped them a lot in their incomes. With the ecotourism guides we talked fluently, they got very interested in the project and included in their talks why primates are important in the forest dynamics to conserve or reforest an area. Also, when local universities or tourists that got interested in our work visited the park, we made small talks about what we were doing and the importance of the area we were working. Recently, during the workshops rangers from the national park were involved so they could get to know closely the activities we were doing with children and how they might help children of the nearby areas to the park to bond with the woolly monkeys.

5. Are there any plans to continue this work?

Yes. We still have to send to sequence our samples, and also analyse the raw data obtained from the sequences in order to know what arthropods woolly monkeys are eating and finish the study. There are also other questions we have for future projects, which I will address them in point 9.

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

So far results have been shared during my Master's presentation at Universidad de Los Andes and they have been also shared during a few workshops with children of the local community where we did not only told them in a more dynamic way our findings, but we also prepared some games so they could experience how is a day in fieldwork, using binoculars, a Q&A about ecosystem services, they made their own woolly monkey mask and at the end they wrote in a poster how they could help with their actions (e.g. going on a visit to the national park to see the monkeys, not contaminating water, not hunting monkeys) in the conservation of woolly monkeys at Cueva de los Guácharos.

Also after I analyse the sequence data the results will be published in an international journal so these knowledge and data can be shared with more primatologists and scientist interested in the topic and hopefully in the future I can share this results in meetings as the Rufford meetings or congress.

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

We used a period of 18 months from January 2018 till July 2019. This was more time than expected in our timescale, because we decided to extend our fieldwork, in order to obtain better ecological data. This implied we were a little bit behind schedule, but we certainly believe we had to take this risk in order to obtain better a more relevant ecological data in our study.

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
Lab Supplies	£520	£1912	+£1392	The budget changed hugely in terms of laboratory supplies, as the reagents for example DNA extraction kits are not sent to Colombia by companies by Qiagen, instead they use agents and that increases considerably the price of the kits and reagents needed. Additionally, primers contamination made us require a new stock of the primers.

Lodging		£342	+£342	In our budget we did not include lodging, but as the project continued we had to use part of the money for the second period of fieldwork.
Foods	£3828	£1495	-£2063	We were able to save more than expected in groceries, especially from the first fieldwork period and also because people from the community helped us at obtaining better prices in local stores for our food.
Transport		£410	+£410	We used part of the money saved from the first part of the project to pay transport of new field assistants and transport of groceries for the second period of the project.
Equipment	£ 152		-£152	From the other grant we had from University, we could manage to buy the equipment we needed, so we did not have to use part of the money from the Rufford Small Grant in this subject.
Workshops		£341	+£341	We were able to visit the nearby area and do some workshops with kids and teenagers. This budget included transport, foods, lodging, materials, posters and snacks for the children involved in the activities.
TOTALS	**4500**	**4500**		

All the values have been transformed from COP to £, using the exchange currency the bank used when the grant was deposited in the account (1 COP = £ 3663.40) on January 15th 2018.

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

I think it is very important to continue working with the community. Especially, with these children that will be the future of the nearby area. We had a very positive feedback from them. They enjoyed the activities of listening how the monkeys vocalise and understanding what it means in their daily life. They also enjoyed learning how to use binoculars properly and the uses and advantages this equipment has in studying biodiversity.

In terms of future studies, we have some project ideas with this population of monkeys. For example as we know most of the plants that they eat during a year, we want to study their seed dispersion and also correlate how effective this is, in order to check how threatened are these plant species and depending on the results highlight the seed dispersal woolly monkeys provide to these plants in sub-Andean forests. We also have a project of reintroduction of woolly monkeys to the wild habitats. These primates come usually from illegal traffic centres and so far it has not been very successful. What we want to do in order to understand if we are missing something before sending them free into the wild, is to compare the microbiota of those monkeys and with the microbiota of wild individuals. We could use the fecal samples obtained from this study and check if this is an important factor before sending primates to the wild.

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

Yes I did use the logo. First, at the presentation of my Master's thesis where I acknowledged the support from The Rufford Foundation. Without your help this project would have not been possible at all. I also used the logo during the workshops, where we made some posters for the children and we highlighted our partners at studying woolly monkeys.

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

Marcela Ramirez was a Colombian field assistant during the first part of the fieldwork. She had no previous experience in this kind of work, and I must admit that at the beginning was quite hard for her. She had to follow the monkeys in the forest, collect focal data from individuals, scats and also plants and identify them. She kept getting better and better with determination and improved very quickly. Right now I think she can be a one's to watch biologist for the future, especially in conservation of felids, which one of the topics she feels more is interested in.

Michelle Guevara was also a Colombian field assistant during the first part of the fieldwork. She did not have experience in fieldwork and she worked also in the project following monkeys and identifying plants. For her, following monkeys was quite hard and it was difficult to motivate her in this aspect, but when it comes to plants she was very curious and passionate, I do not remember to see someone so interested in plants and I think this is quite rare to see nowadays. Indeed, I believe she improved incredibly her knowledge of botany for such a short period of time.

Kaylie McNeil was an American field assistant for the second period of fieldwork. She was highly recommended as already had experience in following woolly monkeys at Tiputini, Ecuador. Her role was to follow a new group of monkeys we recently found that were not habituated at all to researchers, and she collected focal and scat samples from the group. She did very well and is such a hardworking

person. Without a doubt our success during the second part of fieldwork was because of her capacity to work under pressure and passion for monkeys

Finally, for the workshops with children I took two of my conservation biology class, who were interested in learning to work with communities. They were Laura Gómez and Francisco Camacho. I think they learned a lot during the activities and both were proactive in all the process, since we were planning the activities and applying the knowledge they learned from the class, but at the same time adapting the activities for the community we were going to work with. I can say I am very proud with all the work and effort they did for the workshops as I could see that both children and our team was very happy with the experience.

12. Any other comments?

I would like to thank by all means The Rufford Foundation for believing in this project and making it possible. This has been one of the best experiences I have ever had in my life, and without The Rufford Small Grant this project would have not been possible to achieve. Also, your support did not only improved me as a biologist and as a person, but also helped new scientists that joined me in this process and that I can assure they did a great work and are these new biologists generation that must be those one's to watch for the future.