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	Ninon Meyer
Project title	Participatory monitoring of Baird's tapirs in the Darién, Panama
RSG reference	17792-1
Reporting period	September 2015 – September 2016
Amount of grant	£4915
Your email address	ninonmeyer@gmail.com
Date of this report	September 2016

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
Collect ecological data about tapirs in and around the station of Pirre, Darien NP			X	35 of camera trap stations that were deployed effectively worked for 2-4 months. Valuable information of tapirs could be inferred from the data.
Improve the conservation of tapirs		X - unknown		The length of the project, which was a pilot study, did not allow measuring the impact on the tapir conservation in the area. It will probably take longer (scale of several years), more research and effective collaboration with more stakeholders, especially the Ministry of Environment before any concrete results can be observed. A meeting was organised in August 2016 at the Ministry of Environment, with people working with captive tapirs in the country; as I was in the field Nestor Correa, the director of the Asociacion Panamericana Para la Conservacion, represented me and the team I work with to study tapirs and other mammals in the wild. All agreed that efforts should be joined to increase conservation of tapirs in the country, including through environmental education, and eventually work on a National Action Plan. The plan remains at a very early stage.

Collect information about tapir persecution in the study area		X		While some people with whom we have created a trust relationship are willing to share what they know about tapir hunting in the area, most of the local people remain quiet and deny that any such event do occur because hunting tapir is so highly prohibited. I was able to gather some pieces of information that were concordant and that is how I could assess if it was reliable or not.

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

I did encounter several difficulties while in the field.

First, some cameras that were placed in key places for the purpose of this study, i.e. on trails outside the boundary of the park were stolen. Therefore, some information about whether tapir do wander outside the park where disturbance is higher was lost. It is not rare that cameras get stolen and little can be done about that except talking to people that we meet in the area and expose them our work. Reaching everyone in the study zone is quite difficult because our working zone is quite extensive (120 km^2 and everything by foot!), and also because hunters who steal the cameras come from remote communities difficult to access.

Furthermore, some forest fragments that I was planning on placing cameras in and where tapirs had been photographed during a 2014 survey, are now deforested (Plate 1) or heavily disturbed because of roads recently opened for timber. That is something I figured out while walking in the purpose to place the camera as that cannot be seen from digital maps which are not updated. Consequently, the cameras were placed in adjacent forests, or closer to the park.

I was originally planning on leaving 10 cameras for 1 year in the field by changing their locations every 4 months twice in order to have 30 points surveyed but I changed the methodology. As Darien is a region with heavy rainfalls, camera traps usually stop working properly after a few months, and must be retrieved and left to dry out for several weeks before working again. This was not too much a problem in my case because I could combine the data obtained with this project with data

obtained from the jaguar monitoring program run by my colleague R. Moreno. We deployed the cameras together to make a bigger array and yield a higher sampling effort of 2711 trapping nights.

As mentioned above, not all the information about tapir hunting is reliable, because many people fear the legal repercussions if discovered. Unlike white-lipped peccaries and jaguars that are openly known to be heavily hunted in the area, any such event for tapir remains under cover because it is punishable by a fine of up to US$5,000 and imprisonment. Law enforcement seems to be stricter for that species than for the others. Consequently, so far I only consider information obtained from my indigenous assistants with whom I've been working for longer, and the game wardens, as reliable for the area. Spending more time in the study area will probably lead to more pieces of reliable information from more local people.

Plate 1. Deforestation in a place where there used to be a forest fragment and where tapirs had been previously recorded

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

1. Ecological insights of tapirs and other large endangered species of interest, i.e. the white-lipped peccary and the jaguar in the Darien (plate 2). Some very rare and elusive species such as the giant anteater and bush dog were even photographed on several occasions! Tapirs were photographed in just seven camera stations out of 35. Six out of seven cameras were placed inside the boundaries of the park where human disturbance is less (Fig. 1). The camera data was completed with information from people (farmers and indigenous) living in the buffer area; most reported that tapirs used to occur on their lands in the past but that it has been

years that they did not see any sign (tracks or direct observation). Based on the analysis, it is clear that tapirs avoid anthropogenic disturbance in that part of Darien, namely by occupying sites of higher elevation where there is almost no human disturbance. This is interesting as another study in Cana, Darien, a remote site just 25 km from Pirre (my site) with similar habitat structure, revealed that tapirs actually remained mostly in the lowlands rather than in higher elevation. Cana, due to its remoteness and difficult access is quasi-not affected by any human disturbance (neither human encroachment, nor hunting).

Jaguars on the other hand were recorded on cameras independently of whether they were placed inside or in the buffer of the park, most likely because there are sufficient prey (e.g. collared peccaries and deer) everywhere. However, of all the individuals photo-captured this year, just one was photographed in 2015 and 2014, highlighting the turnover of the population. It is probable that the others individuals that were not photographed got killed (numerous events reported) or they may have been dispersing individuals. The use of telemetry would allow answer this question.

In view of the results of the survey, the population of white-lipped peccary seems to be healthy, with relatively large groups commonly photographed in various camera trap stations. This finding highlights the importance of the Darien NP for the global conservation of this critically endangered species in Panama.

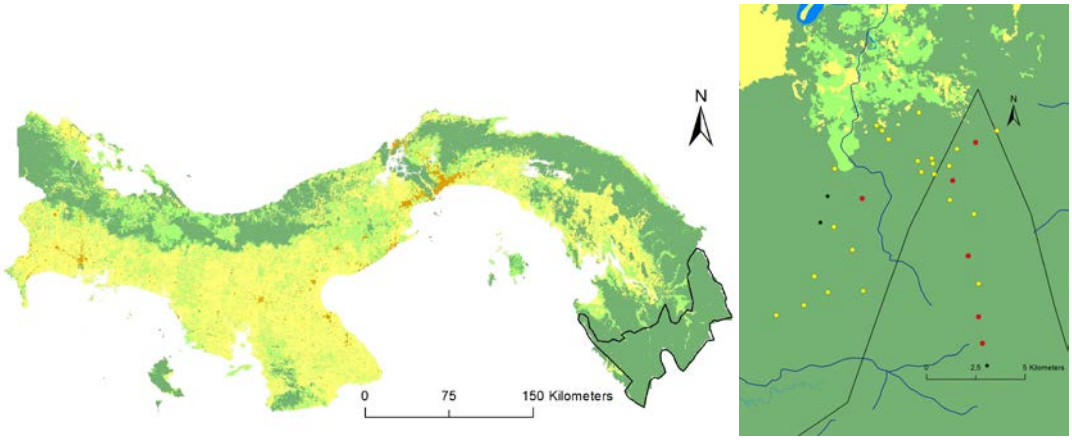

Figure 1. Panama with forest (green) and non-forest (yellow) cover and principal human populated areas (orange), and locations of camera traps stations (dots) in and around the Darien National Park boundary (black outline). Red dots are cameras where tapirs were photographed, while black dots are cameras that were initially deployed but were stolen.

Plate 2. Camera trap photos of tapir, white-lipped peccaries and jaguar

2. Increase awareness of local people towards tapirs and other large mammal conservation. I've been principally working with Embera people from the indigenous community of Pijibasal. They rely partly on small scale agriculture but also hunting for subsistence. Involving them in the project allowed to spend a lot of time in the field and to learn from them, but also to teach them about why the tapir and other species are so important in the forest ecosystem, and how preserving them is beneficial on many aspects. Without questioning them, they spontaneously told me that they were used to hunting more but now that they have been working on this conservation project, they understand that they should take care of the animals and not overkill. They also mentioned that by being involved and able to work, they do not need to hunt for subsistence and can buy chicken or pork directly from the shop, which makes it easier for them. This is especially an improvement for white-lipped peccaries (and to a lesser extent wildcats that are persecuted for other reasons than consumption) as tapirs are very rarely hunted by the people of Pijibasal

because the meat is not appreciated. Importantly, increase awareness did not only apply to the three to four assistants who were always working directly with me, but also to the entire community (children and women included – Plate 3); I spent a long time in their community which gave me the opportunity to talk a lot to everyone, passing from one house o another and showing them the photos, videos and results of the project

Simultaneously, I helped GEMAS –the organisation that executes the jaguar monitoring programme in the DNP- to make an informative poster about Baird's tapirs (Figure 2), that was distributed in schools of the region and local people for education purpose. Surprisingly, despite its large size the tapir remains poorly known in Panama, even by local people.

Plate 3. Ninon showing the camera trap pictures to the children of Pijibasal

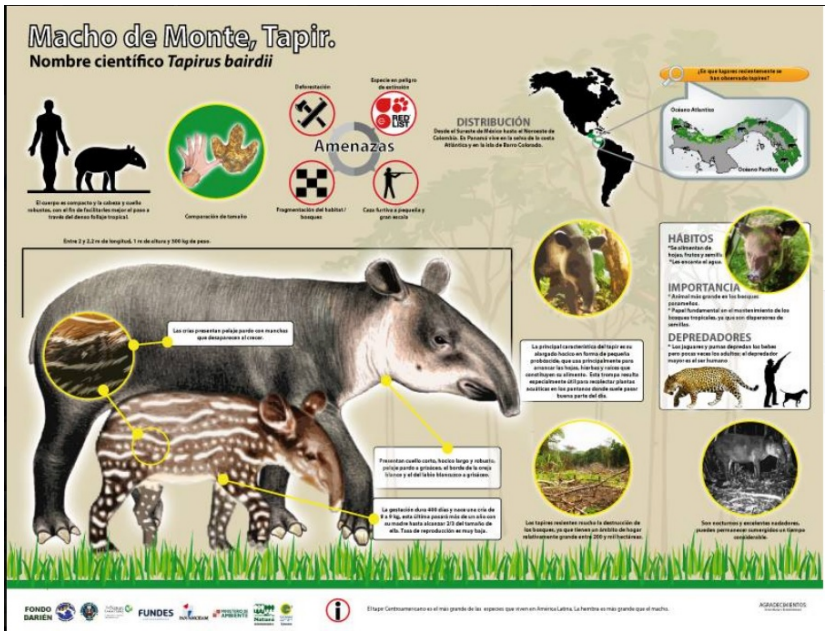

Figure 2. Infographic about Baird's Tapir made by GEMAS

3. Identification of key people to involve for the conservation of tapirs and other endangered species. My local emberas assistants have been courageous, reliable and extremely dedicated to this work (Plate 4). I know I can count on them for the future to conduct some of the field work (e.g. checking camera traps), and keep me informed of anything related to tapir or jaguar in the area, even when I or other colleague is not on site.

Plate 4: Tylson, Arkinio and Ulise, my principal emberas assistants in the field

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

I exclusively worked with Embera people. A minimum of two and sometimes three assistants always accompanied me in the field for 5 months (Plate 4). As I mentioned earlier, they benefited from the project because they have limited resources and must sustain their families. The project directly provided them a source of income for something that they actually like to do, i.e. patrolling the forest looking for animal signs. They also showed a high interest in the ecology of the mammals, even though they already have vast knowledge about the distribution of the species in the area, and in the use of camera traps.

5. Are there any plans to continue this work?

Yes, there is a plan for sure to continue studying the tapir ecology in the Darien with camera traps but also to add a telemetry component in the study. While the cameras data do provide useful information as regard to the tapir population in general in the study area, they do not allow to infer on their movement, i.e. home range, resources use, how far they move, information that is relevant for further understanding the tapir ecology in the Darien and help making wildlife management decision. Moreover, this work would extend to include another endangered and very important ungulate species, the white-lipped peccary.

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

I plan to present the results at the International Tapir Symposium that will be held in Colombia in 2017. Moreover, I will most likely attend two other congresses in 2017 where results would be presented, the International Mammal Congress (Perth, Australia) and The International Congress of Conservation Biology (Cartagena, Colombia).

Manuscripts are planned to be submitted in the course of next year (2017).
Finally, once all the final data will be collected, the results will be summarised to pass them on to the Ministry of Environment.

Meanwhile, I will spend some more months in the field in Darien until early 2017 to collect more data about tapirs and now white-lipped peccaries, and improve the precision of the results.

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 over a period of 6 months. Although it was supposed to last for 1 year, more intensive work was carried out during these 6 months (five of which I spent in the Darien forest!), and thus was spent more quickly, especially for paying the assistants from the Embera community. Eight cameras are still deployed at the moment in new strategic places that we discovered recently, i.e. ridges, mud bath and small caves that tapirs and white-lipped peccaries seem to use based on tracks, and hence that jaguars and pumas may use too as they usually follow the prey. I will now keep on going to Darien until at least March 2017. I will have to go back to Mexico for a short period after that (where I am enrolled as PhD student), but will return to Darien in the course of 2017.

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
10 Camera Traps	1682	1682		
Batteries	404	150	-254	Cameras were placed for a shorter time than planned.
Assistants	1615	2630	+1015	Because some camera sites were so far away –i.e. up to 14 km on a straight line, but the real way was much longer with an altitudinal gradient of 1500 m, we had to do expeditions which means more things to carry (camping and cooking gears), and more assistants were needed. Also the base fee is US$20 per day but some sites in the mountains are difficult to access and require a huge physical effort, thus the daily fee rises up to US$30 per person per day.
Food	808	800		

GPS	270	0	-270	I bought the GPS with another donation
Memory cards	137	65		The jaguar project lent me some memory cards
Unexpected expenditure				
Transportation to study site	0	60	+60	I usually tried to combine my transportation with other researchers but sometimes dates would not match and I had to travel by my proper means.
Logistics: camping gear and equipment for assistants during field work (bag packs, flashlights, etc.)	0	210	+210	I had planned to use the equipment from the GEMAS project but it turned out it was used by other researchers or broken.
Total	4915	5597	682	

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

Currently, I see two important steps:

The first is to continue the monitoring of the tapir population (and other species – especially the white-lipped peccary) in the area with the use of camera traps. Currently, eight stations are deployed in strategic places that we discovered during fieldwork: on ridges that connect two zones where the species of interest were detected, near mud baths, ponds and 'tunnels' that tapirs and white-lipped peccaries seem to use (based on tracks we saw). These cameras are deployed thanks to my colleague's and my personal funds. We will check in 2 months what kind of results we get from these places. We hope to reveal some insights on the behaviour of these two species and answer some questions such as how frequently they come to visit these places, group size, if they are different individuals, and why. The data collected would allow us to understand more about these two species ecology and resources use.

In addition, redeploying other cameras at the same points as this year would allow continue the monitoring of the population on a relatively large scale.

Second, in order to complement the information obtained from camera traps, the use of GPS telemetry allow to answer different questions such as how large the home range of the species is in Darien, the habitat use, and if they do venture outside the boundaries of the park which would not be necessarily detected by the

cameras. This kind of information would allow to address more question such as the species needs.

Noteworthy, doing more research in the area is a way to keep on involving the local indigenous people so they can benefit from the project which is a way to conserve the area; and it would also allow to interact with more local people and little by little get them to measure the importance of conserving the large mammals species (and the wildlife in general) in the area.

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 logo will be used during congresses in 2017, and was used at the Congress of the Mesoamerican Society for Biology and Conservation late August 2016, where my colleague Ricardo Moreno presented about the white-lipped peccary status in Panama and for which he used data collected as part of this project.

-Currently, a manuscript led by Cody Schank about tapir distribution in Mesoamerica is in review for the journal 'Biodiversity and Distribution'. Some of the Panama data I provided as co-author were collected as part of this project.

-An album of camera trap photos from Darien is published on the Yaguara Panama Facebook page and the RSGF is acknowledged - https://www.facebook.com/yaguarapty/photos/?tab=album&album_id=1276563715710789

-A press article about the mammals in Darien and in which the support of the RSFG is being acknowledged should be released by the end of September in La Prensa, the main newspaper in Panama. I will send you the link when ready.

11. Any other comments?

Thank you very much for your support! It was greatly appreciated.