

Final Evaluation Report

Your Details	
Full Name	Fredy Alberto Falconi Briones
Project Title	Response of the Baird's tapir (<i>Tapirella bairdii</i>) and white-lipped peccary (<i>Tayassu pecari</i>) to climate change and habitat fragmentation in the Mayan Forest
Application ID	31180-1
Grant Amount	£6,000.00
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Date of this Report	March 28th 2022

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
<p>To estimate the abundance and density of Baird's tapir and white-lipped peccary populations within and adjacent to the Montes Azules Biosphere Reserve; within the Lacandon forest.</p>				<p>The Baird's tapir showed a considerable abundance in this study, compared to others carried out in its range, which could indicate that it is a species that is little hunted and to the possible effects of governmental conservation programmes implemented in the area for more than 15 years (i.e., payment for environmental services. According to relative abundance rate (RAI) estimates by species, the white-lipped peccary presented the highest total abundances of the three species with 66.3 ind/1000 camera-days; 15.9 ± 3.24 D.E. ind/100 km), and 4.60 [0.16] traces/ 100 km. In contrast, for Baird's tapir abundances were estimated at 8.72 ind/1000 camera-days; 0.76 ± [0.1] ind/100 km; 7.3 [0.02] tracks/100 km)</p>
<p>Estimating the home ranges of Baird's tapir and white-lipped peccary.</p>				<p>It was not possible to acquire the satellite service due to lack of financial resources. The prices of the equipment (radio-collars) rose too high in a short period of time.</p>
<p>To estimate and model the probability of habitat occupancy of the ungulates under study in the study area.</p>				<p>We are fitting models to estimate site occupancy (Ψ) along with detection probability (P) for each ungulate under study. With this method, it will also be possible to infer habitat-associated relationships, e.g., data on site-specific characteristics (i.e., canopy cover) with the presence of the species. This occupancy modeling will focus on estimating the proportion of a suitable habitat area that is occupied by an individual or group of the species under study, thus also interpreting the results in terms of habitat use by focal</p>

			ungulates. Therefore, occupancy analyses were initiated for Baird's tapir and white-lipped peccary populations in the study area.
Generate a habitat suitability model (HSI) for each focal species in the study area.			Work on this is still ongoing. The work depends on many experts answering a virtual survey to give their opinion on habitat suitability variables related to the species under study and on the completion of the habitat occupancy modelling. Due to the health contingency, it was not possible for me to approach many villagers/cowboys to measure several variables on their properties, as well as to conduct a larger number of interviews.
5. characterise connectivity for Baird's tapir and white-lipped peccary in the Selva Maya, a humid tropical ecosystem that is fragmented by agriculture and livestock, using least-cost path analysis (circuit theory). ⁴			The main findings indicate the different degrees of connectivity between various potential corridors. Although all possible connectivity routes offer the same resilience costs, NPAs or core areas have very high costs for the movement of Baird's tapirs and white-lipped peccaries, especially for Guatemala and Mexico, while Belize has a kind of reserve circuits (connectivity networks) with good levels of connectivity and low costs for the movement of both Baird's tapirs and white-lipped peccaries. High speed roads, urban centers and large deforested areas that have fragmented habitat for both species represent the main variables that erode connectivity and habitat quality for both ungulates.

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

One of the genuine objectives of this project was to capture the ungulates under study and attach radio-collars to track their movement patterns (GPS tracking collars). However, due to unexpected and severe funding complications related to the radio-collars and their implementation, my research advisory committee decided to cancel the plan to capture individuals.

This was after assessing that radio-collars (with standard VHF collars technology) were not reliable to use for accurate range assessment. I needed around £7000 for GPS-collar monitoring equipment for at least two individuals and the payment of the satellite service for 1 year. To balance this deficit in the research project we decided to purchase Audiomoths (ultrasonic recorders) to incorporate information on possible temporal and spatial patterns of poachers (by recording gunshots) in the Lacandon rainforest to inform and guide management interventions in the area. However, due to the international shortage of chips and electronic components, we had an emerging complication of not getting the devices from the suppliers. We have, to date, a delay of approximately 1 year since their purchase (the administrative department of El Colegio de la Frontera Sur can account for this).

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

1. The contribution of this study is part of the monitoring of Baird's tapirs and white-lipped peccaries undertaken by the author for the last decade. We now have a clearer vision of the population trends and dynamics of the species under study.
2. I consider that providing information on the drivers of habitat distribution patterns and assessing habitat connectivity is crucial for conservation in the face of climate change.
3. Worked with people in the communities on issues of awareness, norms and environmentally friendly attitudes. Through interviews and talks, I was able to generate information, not only to learn about the current perception of the ungulates under study but also to strengthen capacities that can be implemented soon in the surveillance committees and community wildlife and habitat monitors in the region.

4. What do you consider to be the most significant achievement of this work?

Despite the situation related to the Covid 19 pandemic, restrictions were relaxed in the last year. Therefore, we managed to visit neighbouring farms, ranches, or estates in the working area. We interviewed the ranchers and main settlers living around the Montes Azules Biosphere Reserve to characterise human-Baird's tapir interactions and white-lipped peccaries to understand their perception of the threats faced by these ungulates in the region.

This, together with the population, connectivity, and habitat suitability analyses, are extremely important for this project. Undoubtedly, with this information, we will be able to present the results of a robust assessment in one or two scientific articles that will make it possible to make known the conservation status of both study ungulates in the Lacandon region under current habitat fragmentation scenarios and climate change. We believe that this is only the beginning of a large conservation project in which we can include the participation of other key actors, governmental and non-governmental sectors, and, above all, citizen participation. For example, to have support in implementing electric fences or improving the guarding between some

farms, as well as in the formation of volunteer brigades for surveillance in critical conservation areas.

5. Briefly describe the involvement of local communities and how they have benefited from the project.

During the monthly camera trap monitoring, some groups of local monitors were trained. These were people who showed real interest in the project and the data collection techniques (i.e., tracking and use of camera traps). These people will be able to strengthen a community committee for the future surveillance and monitoring of wildlife, as well as be able to participate in different ecotourism programs in the region.

The local monitors were trained in the correct use of GPS, camera-traps, tracking and line transect walks to obtain faunal signs, as well as the recording and basic processing of information in logbooks. Finally, this project contributed to a small economic benefit, as at least 12 local people were hired as guides or boatmen for the fieldwork. In addition to paying for cooks and accommodation services.

6. Are there any plans to continue this work?

Yes, I intend to continue the evaluation of the hunt with the use of the Audiomoths (ultrasonic recorders). This is unfinished business, which we will seek to complete with external funding that we can get soon. We already have serious news about the arrival of the audiomoths, and as soon as they arrive, we want to install them in areas that we have detected as potential hunting sites. We also intend to finalise the documentation of evidence of in situ deforestation to incorporate this variable along with hunting rates and habitat fragmentation/connectivity indices into our habitat suitability models.

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

1. We expect that the results of this project, and the information obtained will be published in scientific international journals that focus on ecology and conservation.
2. We hope to share the information directly with the expert specialist groups on Baird's tapirs and white-lipped peccaries, a group in which we have taken place in the last decade.

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

The grant was transferred in September 2020 to El Colegio de la Frontera Sur, the institution that received and administered the funds. I had already started prospective activities in the field, so the same month that I received the Rufford Foundation funds, I continued with the activities in the study area. The study was planned with a duration of 24 months, from February 2020 to February 2022. The Rufford Foundation grant was used from the date of its receipt until the beginning of February 2022.

9. 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
Batteries for camera-traps	258	50	-208	Although I spent 80 GB on batteries, I was not able to prove the expenditure with El Colegio de la Frontera Sur through an invoice. I was not careful to keep the receipt. I also managed to recover used batteries that were still charged for use in this project. The rest of this amount was transferred to the purchase of audiomoths (reported at the time to Rufford Foundation).
Food and supplies (Meals)	2976	1931	-1045	The amount spent in food and supplies was congruent to the amount requested.
Lacantún River crossing and navigation	1587	1918	+331	To cross between sites within the study area, it was necessary to navigate the Lacantún river. This requires payments of MXN 400 (GBP 16.6), four times a month (GBP 66.14), for the 24 months of sampling that would be GBP 1,587.36. Sin embargo,
Gasoline /Fuel	1179	539	-640	For the fieldwork it was necessary to drive ~600 km. This implies an expenditure of 60 litres of petrol. The average price per litre during the study was ~20.00 MXN (0.85 GBP). The fuel was used for an off-road truck and for the boats.
Sub-total	6000	4438		
*Audiomoths		1503	+1503	Recording devices were not initially contemplated, but we communicated with RSGF, to make this adaptation in the project. The adjustment was made, taking

				resources from the other budget lines.
*Overhead cost		128	+128	*Extra costs generated by currency conversion
TOTAL	6000	6069	+69	

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

The next step is: 1) to publish as soon as possible the main findings derived from this research in three scientific articles (in prestigious science journals), of which drafts are already available² and 2) provide the information obtained in this study to the federal authorities that administer the protected area (Montes Azules Biosphere Reserve and zones of influence) so that they can make decisions and it can be incorporated into the reserve's management plan.

11. 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?

Yes, I used the Rufford Foundation logo in workshops and forums where we presented information related to this project. In addition, I report that we will continue to use the logo at upcoming national conferences, as well as on the day of my thesis defence.

I extend my gratitude to the Rufford Foundation for supporting this project; this grant was instrumental in the development of this study.

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

Fredy A. Falconi Briones. Project coordinator and responsible for the monitoring of field activities and the analysis of the information obtained.

Eduardo Naranjo Piñera. Directly responsible for the project before the administration of El Colegio de la Frontera Sur, the institution that administered the resources. He will participate in the analysis of the information and publication of results.

Carlos Trillanes Flores, Jorge Rodríguez, René Bolóm-Huét and Pablo González. They were of great support during some of the field sampling activities.

Edwin Hernández García was in charge of the management of the ultrasonic recording devices (Audiomoths).

Rubén Jiménez Álvarez was the lead guide and liaison in the Lacandon Jungle region. His experience as an assistant in wildlife monitoring, as well as his knowledge of the region, helped substantially in the development of this project, for example in identifying key actors and getting people to agree to answer interviews or

participate in forums. **Doris Castañeda**, as well as **Ronald Domínguez Mayorga**, supported the necessary procedures and management for the use of the financial resources of this project. **Finally, Efrain Orantes** was in charge of taking some photographs during the forums and workshops, as well as of the landscape in the study area. To all of them, thank you.

13. Any other comments?

It is well known that connectivity can influence populations and communities through a variety of mechanisms, including inbreeding avoidance, colonisation of unoccupied habitats, mass effects and disease spread. We will therefore seek to continue working for the rest of the year to generate information on: 1) the connectivity status of tapir and white-lipped peccary populations; and 2) population viability in the face of climate change in the Maya forest region.