

Final Evaluation Report

Your Details	
Full Name	Gilson de Souza Ferreira Neto
Project Title	Unveiling the Main Drivers of Mammal Assemblage Structure in Amazonian Islands
Application ID	30394-2
Date of this Report	05/11/2023

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 conduct inventories of terrestrial mammals across a large, unflooded area (terra-firme forests) in Central Amazonia</p>				<p>We recorded 27 terrestrial species through camera traps. Three additional primate species that are predominantly arboreal (<i>Saimiri sciureus</i>, <i>Sapajus apella</i>, and <i>Cebus albifrons</i>) and other small rodents (i.e., <i>Makalata</i> spp.) were registered, but considered as eventual, and therefore not included in our analyses. Body weights ranged from less than 1 kg (<i>Metachirus nudicaudatus</i>, <i>Philander opossum</i>, <i>Proechimys</i> spp., <i>Sciurus igniventris</i>, <i>Sciurus</i> spp.) to more than 200 kg (<i>Tapirus terrestris</i>). Additionally, seven species from Rodentia, seven species from the Carnivora, four species from the Artiodactyla, three species from Cingulata, three species from Didelphimorphia, two species from Pilosa and one species from Perissodactyla were classified.</p>
<p>To evaluate the influence of anthropogenic stressors (i.e., distance from human settlement and number of families per settlement) on the occupancy probability of mammals subject to different poaching preferences</p>				<p>The occupancy probability of the bushmeat group (i.e., deer, peccaries, agoutis, pacas, and armadillos) was lower at locations closer to human settlements. Still, the number of families correlated positively with occupancy, with the occupancy probability of the group being slightly higher at sites with more families, probably due to larger and more abundant crops and fruiting trees at such sites that attract wildlife, for example, mammal species. Conversely, the occupancy probability of the retaliation group (i.e., carnivores) and the not hunted species (i.e., opossums, spiny rats, squirrels, and anteaters) were indifferent to anthropogenic stressors. The detection probability of the less and particularly the most depleted species correlated</p>

				<p>negatively with body weight. This may suggest that larger species, especially from the bushmeat group, are rarer or less abundant in the system, possibly, because they are the preferable target of hunters.</p>
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2. Describe the three most important outcomes of your project.

- a) We provided consistent and robust camera trap registers, recording at least 27 forest floor mammal species in our under sampled area. Some species are under higher pressure since they are also the most hunted not only in our study area, but also in different parts of the Amazon, locally and regionally.
- b) Our results serve as an important reminder about the sustainability of the possible current harvest in the study area, since the anthropogenic proxy stressors had a strong negative effect on the occupancy probability of bushmeat species for all mammal sizes but not for the other groups (less hunted and carnivores). In the long term, locals will likely need to travel long distances to find harvest meat. Poaching also threatens food security, since game bushmeat is an important source of protein for isolated rural populations in Amazonia.
- c) Our results showed that measures of anthropogenic effects are robust and could be considered in conservation units, in regions that have been little studied, and with fewer resources. In this context, our model approach might be a good tool to monitor temporal variation in mammal distributions and densities according to poaching proxies and, thus, drive conservation actions accordingly for specific wildlife groups and locations.

3. Explain any unforeseen difficulties that arose during the project and how these were tackled.

During this project, I learned that the unlikely could happen more often than we expected, but we were resilient and hardworking. The most important and challenging difficulty during the project was the pandemic. I had planned to do my fieldwork in 2020 and 2021, but this was not possible since the Anavilhanas and Jaú National Parks where the work was going to be undertaken were closed. As we are all aware, from 2019 to 2022, we had President Bolsonaro in Brazil during the pandemic who was not supportive of the vaccines and encouraged the use of chloroquine, for example. Consequently, vaccines arrived in Brazil a lot later. Therefore, the mortality rates in Brazil, and especially in Manaus, were proportionally higher than in other countries. I am convinced that the pandemic did not affect the whole world in the same way since, for example, vaccines arrived a lot later in developing countries. I lost close relatives and friends, and this tragic scenario affected me for a while. But when the numbers of cases dropped and more people started getting vaccinated, we started fieldwork again.

In addition, in 2022, we had an extreme flood in Manaus, which disabled me from working on the fluvial islands as we planned. Therefore, we had to work in unflooded forests (terra-firme). We also had to rent the boat since the national parks were not able to lend their boats to us since most of them were damaged and the ones in a good condition were used for the survey of the national parks. The combination of these factors (pandemic, political crisis in Brazil and floods) increased the costs of fuel, food, equipment, and field assistants as well, and I had not planned that in the original budget. Therefore, we had to reorganise the budget to provide the best possible sampling effort without compromising much of the project.

4. Describe the involvement of local communities and how they have benefited from the project.

Due to the pandemic, our original plan to involve more directly local communities around Jaú and Anavilhanas National Parks was not possible. However, the results of our work are informative for local communities in our study area. During this period, I also taught two young undergraduate girls (Kethelen Ferreira and Thaís Lorrane from the Federal University of Amazonas), who participated in the project, and they will continue to work on a similar topic and use all the remaining materials and equipment from this project. I was also able to present this project to high school students at public schools in the cities of Manaus and Goiânia. During my data collection, the fieldwork assistants were all locals from the study area, and most of our food and gasoline were bought in Novo Airão, which I believe, helped locals improve their income at difficult times.

5. Are there any plans to continue this work?

Yes. The next steps of the project will be:

- One of the papers is already under review at the journal Ecology and Evolution.
- Submit proposals for post-doctoral opportunities and continue this research in the same study area (Anavilhanas and Jaú National Parks).
- Guide two young undergraduate students (Thaís Lorrane and Kethelen Ferreira) that will continue to use all the remaining material and equipments from this project in the following years.
- Continue to participate in seminars, conferences and talks for locals, stakeholders and academics at the local, national and international levels.

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

The manuscript related to this project is currently under review in the journal Ecology and Evolution, as part of my thesis defence in October 2023. I shared the results of my project in different ways, both at the national and international levels. Happily, I was also able to share the results during the Rufford seminar held in Recife, 2022; several presentations at the Queensland University of Technology (QUT) in Australia,

where I was doing part of my PhD; as well as my PhD defence, which was open to both academic and non-academic people. In addition, we will share the results with the stakeholders of the Anavilhanas and Jaú National Parks, as well as non-profit organizations, such as WCS. I also had the opportunity to give several local talks at public schools in the cities of Manaus and Goiânia about this project.

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

My personal goal is to continue in the academy and keep on researching in the same study area. I hope to get a post-doc position and be able to work teaching and tutoring. If this is possible, the following steps of this project will be to:

1. Besides considering body size, we intend to compare other community-level assessments, such as the impact of poaching on canopy wildlife in relation to forest floor species in the central Amazon.
2. Improve our understanding of species game preference, poaching types, techniques and strategies, cultural taboos and species avoided, how poaching is performed, and also the main reason for clandestine hunting and the relationship of all these to the nutrition profile of locals (i.e., if it is for bushmeat, retaliation, use of animal parts, etc.). The knowledge gained would help to detect the influence of poaching and safeguard forest floor species in oligotrophic ecosystems.
3. Differentiate the magnitudes of direct poaching effects across different groups of hunted and non-hunted species, such as species hunted for bushmeat, and species hunted for retaliation.

I aim to continue working in the study area not only with a post-doc position, but also with my two undergraduate students. In addition, I aim to continue to participate in seminars, conferences and talks for locals, stakeholders and academics at the local, national and international levels.

8. 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, definitely. In all the events mentioned in question 6, I used the Rufford Foundation logo at the end of my presentations (in an acknowledgment slide) during talks to universities and the presentation for my Ph.D. defence. I will also thank RF in my future papers, as I already did in my written thesis.

9. Provide a full list of all the members of your team and their role in the project.

Gilson de Souza Ferreira Neto is the main leader of the project. I was the main person responsible for all the phases of the project: Conceptualization, funding acquisition, methodology, logistics, field expeditions, investigation, statistical analysis, evaluation report writing, paper writing, and editing.

Fabricio Beggiato Baccaro, supervisor of the project. Contributing to the project in the following areas: Supervision, conceptualization, methodology, investigation, statistical analysis, paper writing, and editing.

Rodrigo Lima Massara is the co-author of the article related to this project, which is currently under review at Ecology and Evolution. Contributing to the project in the following ways: Supervision, waiver for the article submitted, investigation, conceptualization, paper writing and editing.

Geisa Naiara Silva Santos was my field assistant and accompanied me in all of the field activities.

Maíra Benchimol, PhD, co-advisor. Contributing to the project in the following areas: Supervision, help to write proposals for funding, investigation, conceptualization, paper writing and editing.

Matthew Phillips is a researcher and lecturer at the Queensland University of Technology (QUT), in Australia. As he is a native speaker, he contributed to the article's editing in English.

Kethellen Ferreira Gomes is an undergraduate student from UFAM who was trained to extract some variables that will be used in a further step of the project.

Thaís Lorrane is an undergraduate student from UFAM who was trained to extract some variables that will be used in a further step of the project.

10. Any other comments?

Thank you so much for this second grant and for the support to participate in the Rufford conference in Recife in 2022. Rufford was also the only foundation that supported this project with a grant! Therefore, this work would not have been possible without Rufford's support! I feel so grateful to have the opportunity to work in the largest fluvial archipelago in the world, with an outstanding diversity and in one of the most beautiful places, I have ever been. I hope I can continue working with Rufford's support in the same study area on this project in the future. I really appreciate your help in saving Amazon!