Final Evaluation Report

Your Details	
Full Name	Renato Richard Hilário
Project Title	Conservation of red-handed howlers in Amapá: geographic range, occurrence sites and the factors affecting their occurrence in forest patches
Application ID	22322-1
Grant Amount	£ 5000,00
Email Address	renatohilario@gmail.com
Date of this Report	October 28th, 2019

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
Locate populations of *A. belzebul* and describe its biogeographical limits				We interviewed 72 locals and gathered information about presence-absence in 52 forest patches. We sampled 22 of these patches with playback and confirmed interview reliability. Then, we located 21 patches with presence of *A. belzebul* (13 confirmed with playbacks).
Evaluate landscape and ecological characteristics that influence the occurrence of these primates in forest patches				We finished the identification of the patch and landscape drivers of the species presence, identifying distance to the city, distance to a large block of forest, amount of forest, savanna and anthropogenic environments in the matrix, patch shape, forest height were important predictors. We recently submitted a paper to Biodiversity and Conservation with these results. We finished sampling the vegetation in 38 forest patches in April 2019 and found that the density of palms along with the size of the forest patch were the main drivers of the occurrence of the howlers. We are preparing a manuscript to publish these results.
Establish a strategy of communication with locals, disseminating knowledge and using participative tools to create a conservation strategy for the species in				We visited 108 households, spread across six municipalities in the study region to interview locals about mammal occurrence within forest patches and hunting activities. We distributed 48 hunting calendars to volunteer hunters that wanted to

the state of Amapá				contribute to a programme dedicated to monitor hunting levels over all native game species, including the red-handed howler monkeys. We also carried environmental education activities in three rural schools in the study area, where we carried 3-day-long activities with children from 8 to 15 years-old. A total of 139 children participated in those activities.

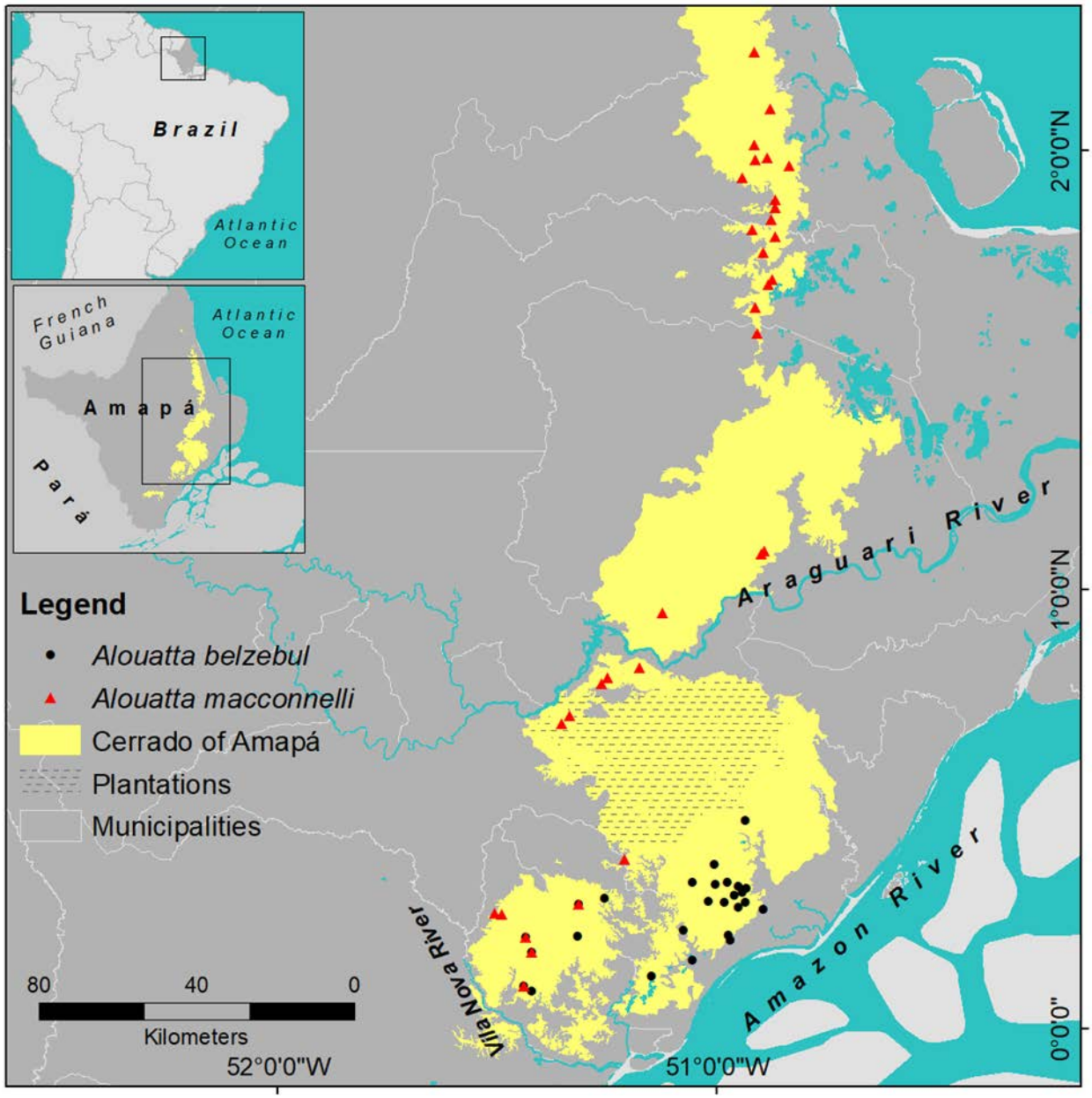
2. Please explain any unforeseen difficulties that arose during the project and how these were tackled.

Our first problem was actually receiving the funds since we had a problem with the bank that manages the project's account. We only received the funds in another account more than 3 months later, what delayed the project start. Indeed, we were able to start fieldwork only in October 2nd of 2017.

We finished our activities related to environmental education, which were carried out in three schools located in African descendant communities or *Quilombos*. During these activities, we presented topics like "Amazonian biodiversity", "threatened species", and "sustainability" through videos, storytelling, and games (see more details below). However, although we observed some improvement in the answers of the quiz game after the activities (right answers raised from 55,3% to 62,1%), this increase was not significant. We felt the 3-day-long activities were not enough for increasing children's knowledge and we should have continued these activities for a few more days. Unfortunately, our time schedule and budget did not allow for the extension of these activities at this time.

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

A. **Species distribution and occurrence:** We drew a map of the species distribution using information from the interviews with locals and identified the Araguari River as the northern limit and the Vila Nova River is the Western limit for *Alouatta belzebul* (see map). Additionally, we have confirmed the presence of howlers in 13 forest patches with playbacks and registered reliable evidence of the presence of *A. belzebul* in other 8 forest patches through interviews. The area of occupied patches ranges between 8.8 and 228.5 ha (mean 68.3 ha), totalizing 1434.1 ha.



B. **Drivers of presence:** We found out that *A. belzebul* occurrence is positively related to the patch size and amount of forest in the landscape, and negatively related to the amount of savannas, water bodies and anthropogenic covers. *Alouatta belzebul* presence probability is higher away from the city and closer to a large block of continuous forest. Moreover, the species presence is favoured by irregular patch shapes (more edges) and higher densities of palm trees, at the same time that it is unfavoured by forest height. This knowledge will allow us to identify patches with higher probability of *A. belzebul* presence for future searches. Also, management actions and conservation plans may use this information. For example, the rapid spread of soybean plantations over the region is a threat for the species, since anthropogenic cover reduces the probability of the species

presence. Therefore, the creation of protected areas to avoid this problem is an important conservation action.

C. **Communication**: another important component regarding our strategy of communication is related to the use of social media to communicate to the general public about the project activities:

Website (https://labecoap.wixsite.com/projetoguariba-ap),
Facebook (523 followers) (https://www.facebook.com/projetoguariba.ap/),
Instagram (572 followers) (https://www.instagram.com/projetoguariba.ap/),
YouTube (42 followers) (https://www.youtube.com/channel/UCOA6sRWLq6vvGxi1MxoMh-g/videos).

We made a video documentary about the project, the red-handed howler monkeys, its environment, and the need for environmental conservation. We showed the documentary to the communities and the feedback was very positive. The video was uploaded in YouTube and had 742 views and 65 likes by the time we concluded this report. Note that this is an underestimation of the total number of people reached, since many locals downloaded the video and shared it in their communities through messaging apps (i.e.: WhatsApp) which is not quantifiable.

With this divulgation, the "brand" *Projeto Guariba AP* have been recognised locally. Besides to social media, we participated in a local symposium about Amazonian Education and Culture, where we presented our activities of environmental education. We also participated in interviews in a local radio station three times.

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

When we submitted this project to The Rufford Foundation, we were asked about how we would access the effects of our environmental education activities. This made us include a method to access the level of hunting in the study area. We interviewed locals and distributed hunting calendars to local hunters that volunteered to mark the days in which they hunted and some basic information on the species that they killed (i.e.: species identity, sex, quantity, and distance from their household to the catchment area). This created a proximity relationship between the project and the communities, which is reinforced by each new visit required by the project. Many people became aware of the fact that red-handed howler monkey is a threatened species. Generally, locals appreciated receiving hunting calendars acknowledging that they should know how much they are hunting. Out of the 48 hunters that volunteered to participate of the monitoring programme, 10 were not able to provide valid information due to a number of reasons which varied from simply not filling up the calendars to having to leave the state. After 12 months we obtained reports from 38 hunters, although not all of them provided reports of the whole period of the calendars, we still gathered information on 690 hunted animals from at least 36 species. *Alouatta belzebul* accounted for 2.5% (n=17) of those hunting records. The data is currently under analysis for the profile and temporal

patterns of hunting in the region. We have also assessed the drivers of hunting in the region on a manuscript that was accepted for publication in the *Oryx* journal. These findings should guide our future actions towards reducing hunting levels on threatened species in this region.

We also carried environmental activities in rural schools of three communities, in which we presented threatened species that occur in the region, explained the importance of the environment and biodiversity, and that hunting needs to be sustainable in order to conserve the local biodiversity and guarantee the food security of local communities in the future. We interacted with a total of 139 children from 8 to 15 years old. Our environmental activities were carried playfully and were very appreciated by the kids. We distributed quiz games (cards with questions) to the schools, so the teachers may use them with the children to reinforce the subjects that we approached. We also gave a booklet to each child. The booklet tells the story of an infant red-handed howler monkey that had his mother killed by a hunter. At the end of the story, the hunter learns that he cannot hunt indiscriminately, that he should avoid hunting threatened species or pregnant/lactating females.

Since most of the hunters in the region are young men, we expect that our intervention may have some effect in a few years. We also expect that children must influence their families to some extent. Therefore, with all these actions, we hope that hunting becomes more sustainable and do not target threatened species anymore, benefitting the communities that rely on bushmeat for subsistence.

5. Are there any plans to continue this work?

Yes. Regarding red-handed howler monkeys, we recently found out a methodology that relies on passive acoustics and may allow us to estimate the density of red-handed howler monkeys in the study area (flooding and patch shape make line transects unfeasible). So, we plan to estimate the density of the species in some forest patches and identify its drivers. Knowing the density of the species will also allow us to estimate population sizes and viability.

Another important step will be to study the diet of the species, identifying important plant species. This knowledge may be used in possible management actions, increasing feeding sources. We plan to start a study of population genetics and parasitism to access the health of the populations. Moreover, we intend to establish a dialogue with environmental organs of the local government to implement a conservation plan for red-handed howler monkeys based on the results of the present project. Regarding mammal conservation and the conservation of Amapá's savannas itself, we plan to increase our knowledge about hunting in the study area by installing sound recorders at the forest patches and record shot sounds. Furthermore, we intend to continue the hunting calendar approach and environmental education activities.

We also plan to start a fauna monitoring project in collaboration with local communities, in which community members will be responsible for changing batteries and

downloading data from storage cards of camera traps. This monitoring scheme should last at least five years to detect trends in populations of hunted species. This should make the community more willing to agree with behavioral/attitude changes if we detect negative trends in some populations.

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

We are going to publish our results in international scientific journals. Indeed, the first paper is accepted for publication in *Oryx* and identifies the factors that influence hunting prevalence and intensity within the study area. Another paper is currently submitted for *Biodiversity and Conservation* and identifies the landscape, patch and socio-economic drivers of presence and richness of primates in the study area. We will soon submit an additional paper about the vegetation drivers of primate presence in the study area and another one about priority areas for conservation in Amapá's savannas based on primates. We are going to present the project's results in the Brazilian Primatological Congress, in November 2019, and we also plan to attend other national and international scientific conferences and congresses. Finally, we also shared the results with local communities explaining what we found and the conservation consequences, through our social media (see above).

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

The interviews started in October 2017 were concluded in February 2017, 1 month later than expected. The visits to and sampling of forest patches started in July 2018 and were concluded by April 2019. Due to limitations related to permission to access some of the properties, we had to exclude five patches, thus we sampled 38 out of 43 previously selected forest patches. Because of this, this stage was finished 1 month earlier than we predicted in our previous report. Periodic visits to the hunters with hunting calendars were predominantly conducted during travels to conduct sampling of forest patches or other activities related to this project.

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
Communications	64	64		

Food	1,666	1,045	-621	
Accommodation	425	97	-328	Local communities have provided free accommodations to our team on most of our field trips.
Field assistants	2,363	1,961	-402	
Car rental	482	1,833	+1,351	We have spent more resources than previously expected on car rent because field activities due to variations in the rent prices and because we had to pay for small damages on the car paint caused by their extensive use in dirt roads. Since we spent fewer resources on accomodation and field assistants, it was possible to redirect resources to car rental.
Total	**5,000**	**5,000**		

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

To promote the conservation of red-handed howler monkeys, three approaches are important. The first one is to guarantee the conservation of the species habitat. Since Amapá's Savannas are threatened by agriculture expansion, we are making biodiversity inventories throughout the region to support the creation of a protected area that protects Amapá's Savannas and red-handed howler monkeys. Therefore, one next step is to conduct a survey of large and medium-sized mammals in the region, which also hosts other six species of threatened mammals. By pointing out some areas in which we can find red-handed howler monkeys together with other threatened species we could get enough support for the creation of this protected area.

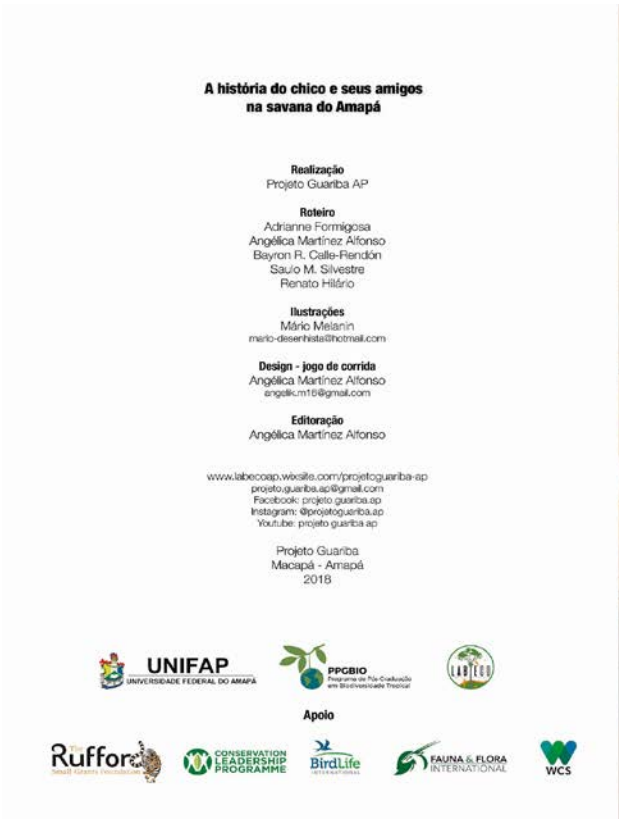
The second approach is to reduce hunting levels on red-handed howler monkeys. To achieve this, we plan to develop a monitoring program involving the community to assess whether populations of hunted species are in decline. The involvement of the community in the monitoring programme should make it easier for we to promote any necessary behavioral/attitude change if we detect population declines. Concomitantly we will keep in contact with the communities, telling hunters about the threatened animals and the importance of conserving them.

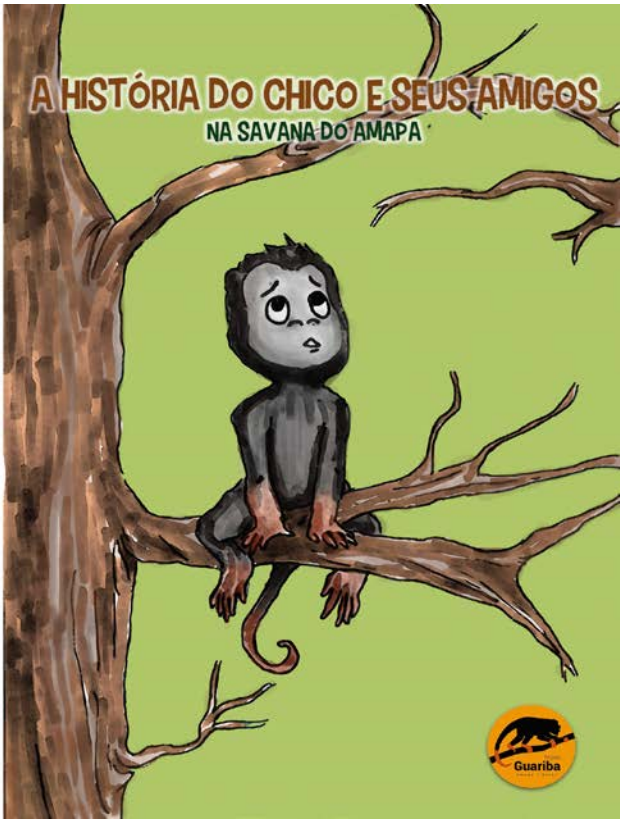
The third approach is to improve our knowledge about the conservation status of red-handed howler monkey populations. Therefore, we plan to survey the species density in several patches and identify the drivers of density. This may allow us to estimate the total population size and population sizes of individual patches, allowing us to assess the

viability of these populations. We also intend to verify the effects of hunting and genetic flux on the population viability. Moreover, we intend to collect fecal samples to assess the genetic variability of the populations, and also parasitism levels, indicating whether these populations are healthy or not.

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?

We developed educational materials to promote the conservation of red-handed howler monkeys (a booklet and a quiz game) in which we included The Rufford Foundation logo (see photos below). We also included the logo in a poster that we made to spread information about red-handed howler monkeys and the need to preserve the species throughout its occurrence area. Furthermore, we always include The Rufford Foundation logo in any presentation we make about this project and in the project's website (see prints below). Lastly, we also included The Rufford Foundation in the acknowledgment section of the one published paper (Hilário et al. 2017, The Fate of an Amazonian Savanna: Government Land-Use Planning Endangers Sustainable Development in Amapá, the Most Protected Brazilian State. Tropical Conservation Science, 10:1-8. DOI: 10.1177/1940082917735416), in the paper that was accepted in *Oryx*, and in the paper, we submitted to *Biodiversity and Conservation*. The Rufford Foundation will also be acknowledged in other future products of the project.





Booklet telling the story of an infant red-handed howler monkey that had his mother killed by a hunter. Note: The Rufford Foundation logo in the back cover of the booklet.

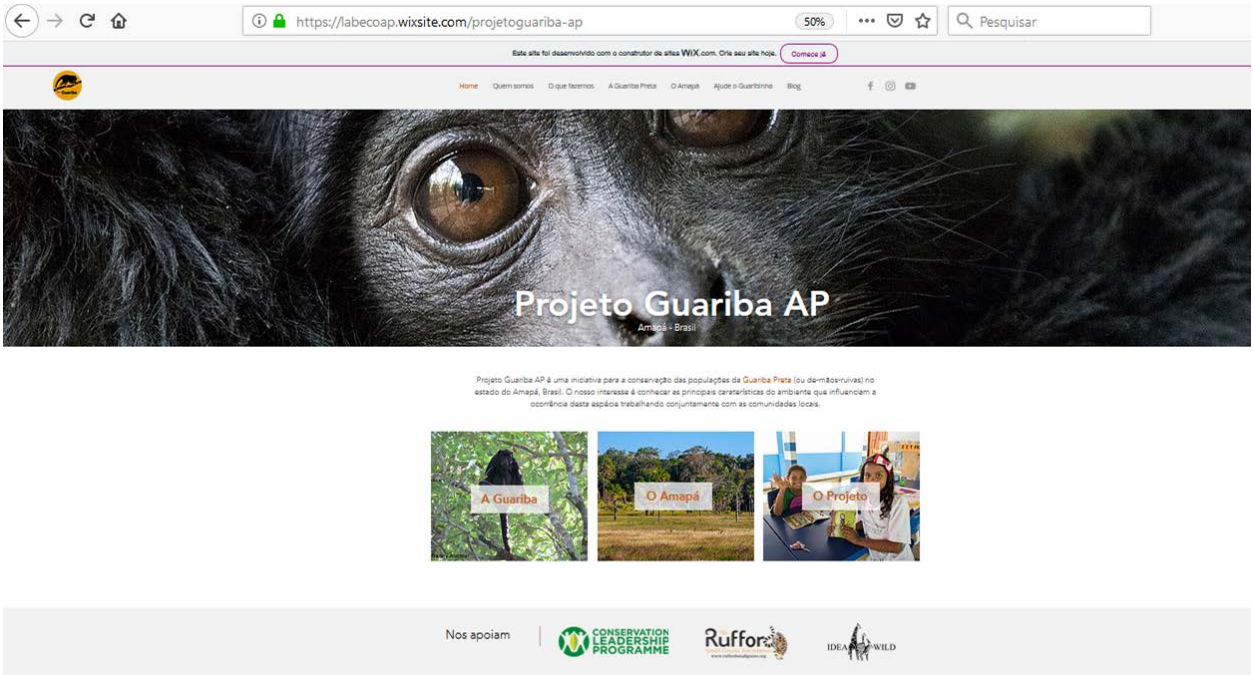
Quiz game developed to test the children knowledge about the surrounding environment, threatened animals (including red-handed howler monkeys), and conservation attitudes. Note: The Rufford Foundation logo in one of the cards.

Realização: PPGBIO Programa de Pós-Graduação em Biodiversidade Tropical; LABECO; UNIFAP Universidade Federal do Amapá

Apoio: Conservation Leadership Programme; BirdLife International; Fauna & Flora International; WCS; The Rufford Small Grants Foundation; CPB ICMBio-MMA

Poster developed to spread information about red-handed howler monkeys and the need to preserve the species. The Rufford Foundation logo is in the bottom part of the poster.

Poster attached to a wall at one of the schools where we developed environmental education activities



Our web page used to share information about the project, the species, and its environment. Note the Rufford Foundation logo, as a supporter of the project.

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

Adriane Formigosa. Contributed in the elaboration of games and questions carried out in the local schools.

Angélica Martínez Alfonso. Designed the educational material (posters, booklet and quiz game). Additionally, designed the project logo and created the website and all social media profiles, such as Facebook, Instagram and YouTube. She is the filmmaker (video and photography) in both field and education activities. She did the documentary about the project and participated in all educational activities in local schools as assistant and contributed in the elaboration of games and questions carried out in the local schools.

Bayron R. Calle-Rendón. Did interviews with locals to gather information about presence-absence of howler and information about hunting in the study site. He also carried playback within forest fragments to confirm the presence of howlers and verify the accuracy of the interviews. He participated in all educational activities in local schools and contributed in the elaboration of educational material.

Saulo Meneses Silvestre. Did interviews with locals to gather information about presence-absence of howler and information about hunting in the study site. He also carried vegetation structure surveys to identify the drivers of howler's presence in forest patches. He participated in all educational activities in local schools and contributed in the elaboration of educational material.

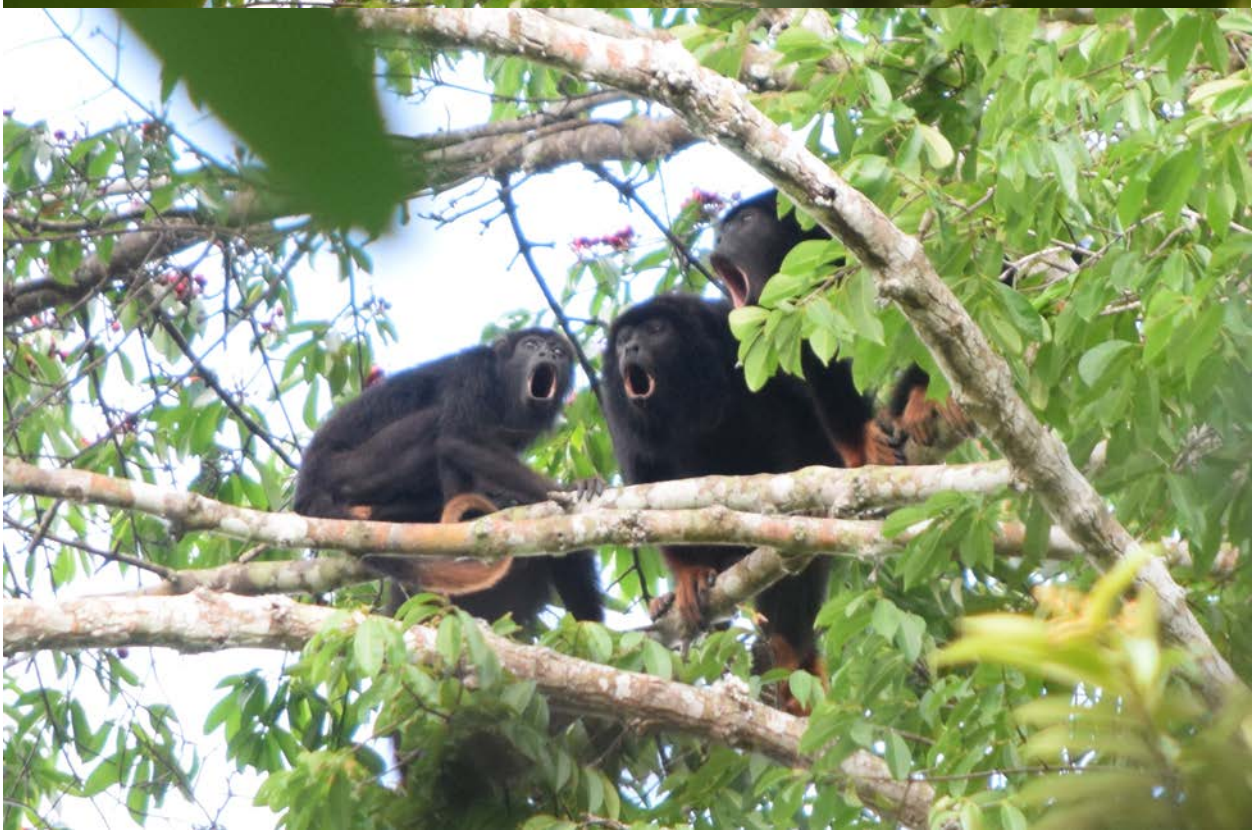
Renato R. Hilário. Coordinated the project, supervising the fieldwork and elaboration of educational material.

José Julio de Toledo. Is the academic advisor of Bayron and Saulo.

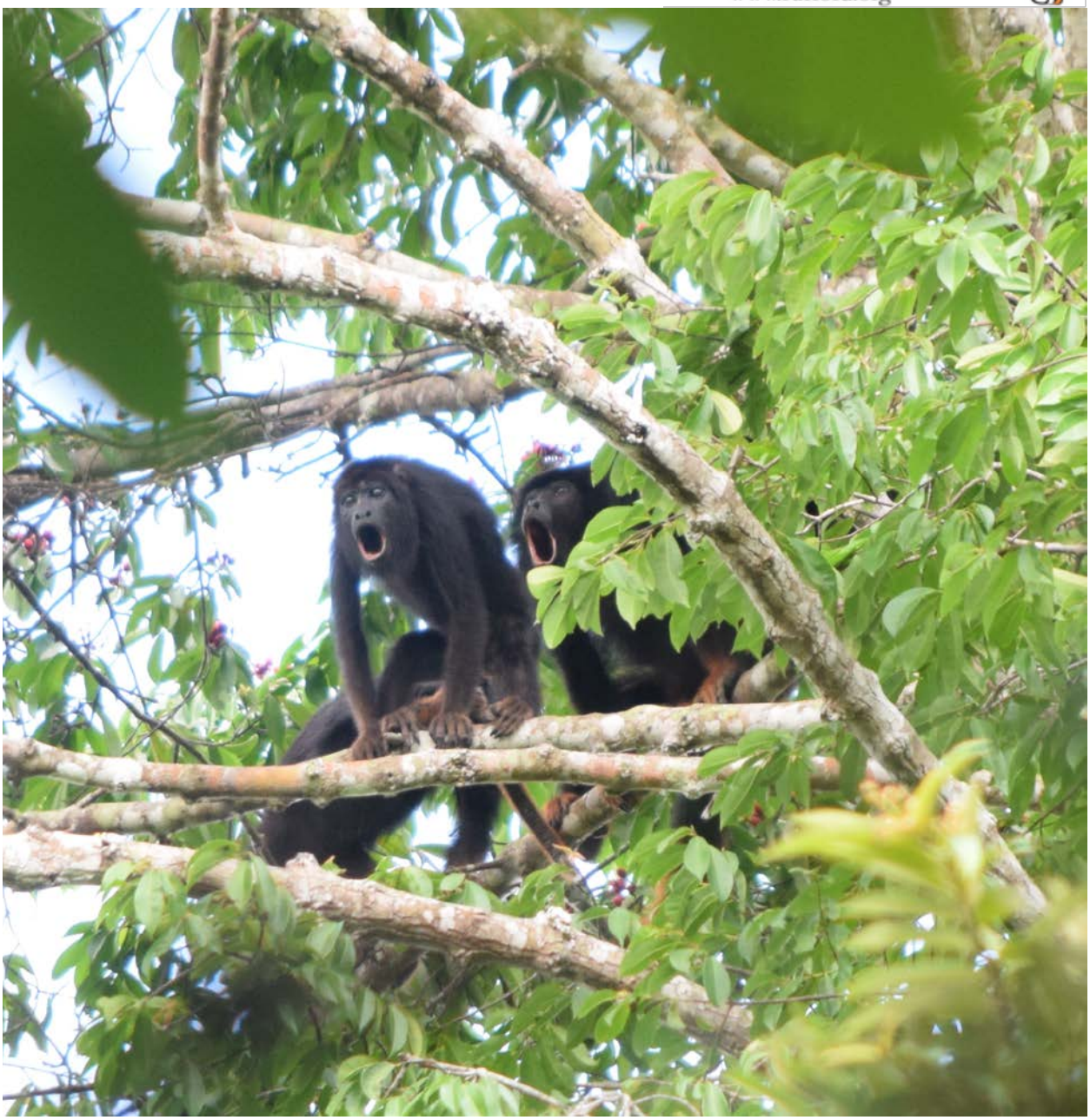
12. Any other comments?

Here we include some photos of *Alouatta belzebul* that we took during fieldwork.

The Rufford Foundation
www.rufford.org



The Rufford Foundation
www.rufford.org



The Rufford Foundation
www.rufford.org

The Rufford Foundation
www.rufford.org