Final Evaluation Report

Your Details	
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Project Title	Barriers that connect: evaluating the role of wildlife corridors in mitigating noise and improving habitat quality in an Amazonian city
Application ID	37915-2
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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
Evaluate the effect of topographic and vegetation variables on noise attenuation within an urban forest fragment		x		We estimated the environmental variables of the areas where the autonomous recorders were placed. Environmental variables included the number of trees, tree diameters, under-canopy density and leaf litter depth. Further, we extracted from satellite images topography data from the same plots. We estimate noise both using the NDSI acoustic indices and amplitude. But we only analysed noise levels in terms of acoustic indices. We still must process the climatic data from the dataloggers and test the correlations between noise estimates (based on amplitude and acoustic indices data). Our preliminary data shows that both vegetation and topography are important in determining noise levels within the ecological corridor.
To test whether it is possible to detect pied tamarins' calls automatically using the automatic detector in urban areas.			X	We found that it is safely possible to detect pied tamarins in noisy conditions. We detected the tamarins in most of the plots where automatic recorders were installed. The method seems promising for monitoring pied tamarin populations both in urban and rural areas.
Evaluate how pied			X	We evaluated the effect of

tamarins are distributed in noisy environments.				vegetation and noise variables on the occurrence of pied tamarins and found no evidence that they prefer forests with specific features or that they do not occur in noisy areas. Thus, the species seems to be relatively generalists.

2. Describe the three most important outcomes of your project.

Based on preliminary results, we found that:

a) Noise levels (estimated with NDSI acoustic index) were impacted by environmental variables as higher levels of sounds from anthropogenic origin were found in areas closer to roads, lower abundance of trees and higher under canopy density. We also found that sounds of anthropogenic origin are more likely to be detected in valleys.

b) We tested the impact of vegetation on pied tamarin occurrence in urban areas and found that the species uses forests with different features in terms of tree density, under canopy density and tree diameters. Apparently, pied tamarin populations have no preference for any specific type of vegetation, at least in urban fragments. From a conservation perspective, it shows that any green areas in urban places may be important for pied tamarin habitat connectivity and long-term species persistence.

c) We tested the impact of soundscapes and the distance of fragment borders and roads on pied tamarin occurrence. We found that noise levels do not impact pied tamarin occurrences at a population level.

d) We tested the impact of vegetation and soundscapes on the pied tamarin long call propagation and found that call frequency features are impacted by distance from the sound source as well as under-canopy density. Call amplitude features are associated solely with distances from the sound source, while sound duration is associated with distance, but also tree diameters. We also found that frequency-modulated calls are more likely to propagate better in noisy conditions, but we still do not know if pied tamarins choose to emit more modulated calls in noisy conditions.

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

I initially had difficulty buying the equipment, which delayed the project. However, with the Rufford's deadline extension, we could begin the project. During the time span of the project, I had a temporary position as a professor at the Universidade

Federal do Amazonas which reduced my time available for fieldwork, therefore I couldn't sample all forest fragments initially planned only a large 700 ha forest fragments and four fragment patches, near places where the Projeto Sauim-de-Coleira, which I am part of, installed crossing bridges for the species and planted trees.

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

Since the project was conducted in a very large city with many residents and industry areas, it was not possible to make direct contact with all of them during the project's time span. However, once the final results are available, we expect to divulge the results in the media to reach as many people as possible.

It is worth mentioning that at least five local students were trained to use emerging technology in the conservation of an endemic species. Such capacity building is essential, especially in a biodiverse area with limited human resources as the Brazilian Amazon.

5. Are there any plans to continue this work?

I am planning to continue using acoustic monitoring for the pied tamarins, but now I intend to expand to the newly created Conservation Unity "Refúgio da Vida Silvestre (REVIS) Sauim-de-Coleira" (Lagroteria et al. 2025). The reserve is a result of the intensive hard work of many stakeholders and institutions, including universities, NGOS and public sectors, mainly guided by the National Plan for the Conservation (PAN Sauim-de-Coleira). After 13 years of hard work by the group, the reserve was finally created, though we do not have a clear idea of the population status of the primate species in the REVIS Sauim-de-Coleira area, even if it was created to protect the pied tamarin. In the near future, I would like to assess the pied tamarin population status at the reserve using acoustic monitoring.

Lagroteria, D., de Azevedo, R. B., Gordo, M., Coelho, L. F., Röhe, F., Campista, D., Noronha, M., Lima, N.L., Spironello, W.R., Costa, E.R, Medeiros, A,, Sobroza, T.V, Souza, L.L., Castro, P.H.G. & Jerusalinsky, L. Pied Tamarin Wildlife Refuge: first federal protected area for the Critically Endangered *Saguinus bicolor*. *Oryx*, 1-2.

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

To divulge our results, we plan to publish at least three scientific papers. We are sharing our results with ICMBio, an environmental organ responsible for the Action Plan for the Pied tamarin Conservation. Maria Clara, an undergraduate student who holds a scholarship from ICMBio and is studying pied tamarins, has mediated this communication. Once the results are published, we also expect to publicise the results in the local media to reach as many Manaus citizens as possible.

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

Now that we know that indeed the forest provides important services to tamarins and people, it is interesting to divulge these results to reinforce the importance of urban forests for the well-being of both human and non-human primates. Also, now

that we know that passive acoustic monitoring is useful to detect tamarins even in urban areas, I intend to continue and enhance monitoring efforts to evaluate the effectiveness of crossing areas of the ecological corridor to evaluate if the species will keep on using such corridors in the long term.

In addition to that, it will be important to assess population status and people's perceptions on pied tamarins in the newly created Conservation Unity "Refúgio da Vida Silvestre Sauim-de-Coleira. In this area, which is a rural area where people use the land, it is important to increase communication with local people and strengthen partnerships with local to achieve conservation while also valuing their way of life and promoting sustainable agriculture.

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

Two students used the Rufford logo in their project defence presentation.

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

Anilton Neto – collaborator who was essential during with fieldwork and at many steps of data collection.

Diogo Lagroteria – ICMBio employee that also supervised Maria Clara during analysis and is part of the National Action Plan for the Pied tamarin Conservation.

Gabriel Duarte - the student who performed part of the experiment on the propagation of noise and pied tamarin calls.

Juliana Costa – student who made data curation and performed part of the pied tamarin detections, and evaluated the effect of noise levels on tamarin occurrence.

Julia Zahara – data curation, equipment maintenance and organization for fieldwork.

Marcelo Gordo - coordinator from the Projeto Sauim-de-Coleira, where the Project took place. Helped with project conception, sampling design and logistics.

Maria Clara Mendonça – student who made data curation, performed part of the pied tamarin detections, and evaluated the effect of vegetation on tamarin occurrence.

10. Any other comments?

The equipment we bought with this project is also being used in other projects that aim to do long-term monitoring of primates in other areas of the Amazon along the BR 319 road (a place with extreme deforestation pressure) and at the RDS Rio Negro, a sustainable reserve where some of the primates are game species. Currently, three

students are working on acoustic detections of Titi monkeys, Night monkeys, and Howler monkeys in such places. Therefore, the benefits of the Rufford Funding have gone beyond the current project that focused on pied tamarins.

Once again, I would like to thank The Rufford Foundation for supporting this and previous studies on pied tamarins and their habitat. Rufford is an amazing institution with noble principles that contribute to conservation efforts worldwide. I am also thankful to TRF for the opportunity to organise the Amazon Learning Event in Manaus and for the chance to work with other grantees, such as the amazing Eloisa Brum, Mariam Weston and the Rufford staff. Once more, Rufford allowed me to learn. I learned from the pied tamarins, in the field; I learned by teaching and supervising students that are now conservationists as well; I learned from my mistakes, as I had to adjust some of project methods do make it more feasible and robust; I learned from the instructors of the learning event and I learned from hearing the experience of other grantees. Thank you very much for this!