Final Evaluation Report

Your Details	
Full Name	Camila Vieira Molina
Project Title	Viral Survey in Free-Ranging Non-Human Primates in Metropolitan Area of São Paulo City, Brazil
Application ID	32104-1
Date of this Report	September 16, 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
Capture and sample collection of wild groups			■	
Sample collection from captive animals			■	
Laboratorial screening for pathogens		■		still being done

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

a). The samples collected are extremely valuable and rare. They will be used for various research projects, which can be both in pathogen surveillance and genetics-based research that can generate important data for future population management. Samples (swabs, tissues, blood) were collected from a total of 423 individuals - among free-living collections and animals that arrived alive or dead in Rehabilitation Centres for Wildlife.

b). A relevant outcome was about the endangered species *Callithrix aurita*. With our search in the regions, it was possible to describe that in the urban areas of São Paulo we only found hybrids - mainly *Callithrix jacchus*, *Callihtirx penicillatta* but also hybrids with some phenotypic traces of *C. aurita*. *C. aurita* has only been found in more preserved areas or small fragments outside the city of São Paulo. In this period, after our capture of two groups in a fragment (the RPPN Capuavinha - a Genetic Heritage Reserve in Mairiporã/SP) where we collected samples, microchipped and were able to identify the individuals and mark them for observation from a distance - doctoral student Márcio Port-Carvalho was able to assess the behaviour and dynamics of these animals that live very close to the human population in a local neighbourhood. We work in contact with the local population, and the feeding of the animals by people has decreased - we have not seen it anymore. This work also gave us the opportunity to provide samples for the Master's degree of Camila Shyu (Unesp - Botucatu), she will perform the genetics of these *C. aurita* - the animals seem to be pure by the phenotype, but only the genetics will tell us and also the degree of inbreeding of these individuals. Future management plans for this population are being discussed with ICMBio (Ministry of Environment) - maybe translocate animals or even bring some to the captive reproduction programme. Because we maintain contact with the local population, one sick individual and one maintained by a private one was correctly sent to the Guarulhos Zoo, which maintains a captive breeding programme for the species.

c). Now laboratory analyses are being carried out. It is hoped that we will obtain results that allow us to discuss the health of these animals from urban areas. We hope to generate data that will be relevant to discussions on the control and management of invasive primates in these areas. We are currently exporting some

of the samples to the Institut für Virologie at the Charité Universität in Germany, which has several standardised tests and serologies and will allow for a rapid and extensive search for pathogens. There will be important data in discussions with public authorities, to support the relevance of future investments in projects and management of these animal populations.

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

The biggest problem (not foreseen by me) that I faced was doing the captures alone. I had collaborators and interns, but unfortunately, they could not be with me all the time. Also, although I had some experience in capturing marmosets, the work was not flowing quickly. With his unique experience, we were able to capture 15 groups of marmosets (83 individuals) in 2 months (July and August 2021). Between December 2020 and August 2021 samples were collected from 20 groups of marmosets (102 individuals). With the biologist, the captures were more accurate mainly in capturing entire groups and not just some individuals of the group. Thus, all the effort of setting up the capture and collection day (with all the field material) was better used, and we captured more individuals with each capture.

This was only possible because the Rufford Foundation accepted that I reallocated part of the money to pay and maintain the biologist for this period. With the biologist with me we were able to go into more "dangerous" areas around the parks and not just stay within the parks.

Other minor unforeseen events such as high fuel costs (political inflation in Brazil and due to the pandemic) could be circumvented. The exchange value when converted to Brazilian currency was a good value for the execution of the entire fieldwork.

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

As mentioned in point 2, the communication with the local population from where the isolated groups of *C. aurita* were, was one of the main points that concern us in the conservation of this site. It was done with the baits - from our knowledge-, and the animals can move a little further from the area of the houses, where in addition to the issue of pathogens, predation of dogs and cats also occurred in the past. The community acts as an alert, they get in touch if they find an injured animal or even notice a strange situation. The population likes these animals, and it was possible for them to understand that animals do not need us to feed them, that it is best that we do not.

At the same time, we contacted the Mairiporã city hall. In the region there are many abandoned dogs and cats, and we are trying with the city hall to take greater action in the area. This can take some time and depends on the will of the public power in the present days.

The contact with park managers and employees was also relevant, highlighting the importance of the health issue, The One Health, the importance to guide visitors to not feed the animals, we also had discussions about the invaders in the parks - it's a real great problem nowadays, but still no actual solution has been taken. And we also make ourselves available for training, education and mostly for future discussions about managing the invasive non-human primates - in those cases, the *Callithrix* and *Sapajus*.

5. Are there any plans to continue this work?

Now I'm dedicating myself to the laboratory; there are many samples and a lot that can be done. The doctoral student Marcio Port-Carvalho and I are in constant contact with the RPPN region (of isolated *C. aurita*), and we have future plans - but now we are waiting for the answer that genetic analyses can give us. We plan a next capture on the spot, to mark the individuals that were born. Something that happens is that these two groups have few females, 80% of the groups are made up of males - this can be a deleterious factor for this population, so we continue to monitor them. There is a management proposal to remove one or two individuals to compose the captive population, but we are still analysing it. We recently found a third group in the region, but we still don't know if the areas of use overlap - allowing genetic exchange. The capture of this third group would also be important for microchipping and identifying the animals.

Regarding the issue of invasive species in the parks, this is something that we intend to continue discussing with the authorities. The management options are quite complicated, there are many animals. Castration of those animals would be an option, but it is very expensive and long-term, also does not necessarily have great effects. Euthanasia is not discussed in Brazil. Meanwhile, we are gathering data that demonstrate how deleterious these species can be for conservation and public health.

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

In congresses and meetings with professionals working in the area, from parks, Rehabilitation Centres for Wildlife and authorities (such as ICMBio, Health and Environment Departments).

In conversations with the local population of the RPPN Capuavinha and with the Mairiporã city hall.

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

Continuing to follow the RPPN Capuavinha is essential. If any hybrid *Callithrix* is noticed, it should be removed from the area. The population must also be managed so that the genetics is not lost, of course, the results of the genetic analyses will be extremely necessary.

Of course, something more in the future - invasive species management plans.

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, in lectures on the topic of invaders, primate conservation, diseases of primates and on the project held for: 1. Study Groups of Wild Animals (areas: Veterinary Medicine and Biology) at the University of São Paulo, Faculdade Anhanguera and UNEASA Petrópolis. 2. Lecture given at the Pasteur USP Scientific Platform. 3. A on demand poster at the Conference of the American Society of Primatologists 2022 Denver (poster name: Coronavirus surveillance in Callithrix, Sapajus and Alouatta from urban areas of São Paulo, Brazil).

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

Professor PhD Edison Luiz Durigon and Post-doc PhD Angélica Cristine de Almeida Campos - doctoral guidance on collection protocols and laboratory analysis.

PhD Cecília Kierulff - guidance on free-living primate captures.

MSc. Márcio Port-Carvalho - guidance on capture locations, bureaucracy and contacts with the parks. Monitoring and carrying out a project to monitor the animals of the RPPN Capuavinha. Contact with local authorities.

Bianka Heimeshoff Schulz - monitoring animals at RPPN Capuavinha.

Fábio Ferrão Videira - contact with the areas of the Military Police of São Paulo.

Tiago Ferreira da Silva - field biologist, collaborated in the field for location and capture of free-living marmosets.

CRAS PET Team (Rehab Center in Parque Ecológico do Tietê - São Paulo) **- Lilian Sayuri Fitorra; Bruno Petri; Harold Furuya; Liliane Milanelo -** collaborating in the capture of free-ranging capuchin monkeys, and in the collection samples from animals received at the Center.

CEMACAS Team (Rehab Center in Anhanguera Park - São Paulo) **- Luana Rivas; Mayra Frediani; Thais Carolina Sanches; Ticiana Zwarg -** collection of samples from animals delivered dead or who died at the Center.

Claudia Igayara - contact of the Zoológico de guarulhos, provided samples of animals she received and guidance on procedures and management of C. aurita from the RPPN Capuavinha, she is the species' Studbook Keeper.

Ivone Yumi Kuribara; Fabiola Setim; Eduardo Gasparini junior; Adriano de Alvarenga Júnior; Hélio Tomás Ramos - collaborated during the capture and collection of samples of free-living and captive animals.

Ralyria Mello; Danielle Bastos Araujo; Luiz Gustavo Bentim Góes; Marielton dos Passos Cunha - collaboration with laboratory analyses.

10. Any other comments?

The organisation, logistics and execution of the field work was difficult and laborious. But with the great collaboration of everyone involved, everything went well, in all captures and sample collections. All captured animals recovered well and were released in the same locations on the same day. The work would not have been feasible without Rufford's collaboration and Grant. The logistics of finding the animals and setting up a field lab was costly and complex.

We were not able to plan an event with the local population due to the pandemic at the time of the fieldwork. The conversation with the locals was more individual. However, we are in contact with the Mairiporã City Hall to start an environmental education project and also, mainly, in relation to domestic animals (cats and dogs), which are many in the region and will need to be castrated. This did not happen in the time we would have liked, but it is something for the long term, and we will continue to contact the City Hall and demand some action from them.

I am extremely grateful to Rufford, without this grant, the fieldwork would not have been possible. To gain funds in Brazil for this kind of work is hard at the present day, where science and conservation are not a priority. I also thank you for understanding and being able to make some changes in the initially planned use of grant, it was extremely important due to the unforeseen situations that emerged.