

Final Evaluation Report

Your Details	
Full Name	Facundo Robino
Project Title	Genetic traces of the great American predator: a history of fragmentation and a connectivity diagnosis for the southernmost jaguar population
Application ID	27265-1
Grant Amount	£5,000
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Date of this Report	24/06/2020

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>1) To evaluate if the Upper Parana Atlantic Forest (UPAF) jaguar population is Structured by (i) population structure parameters based on heterozygosis and levels of gene flow between subpopulations of different native forest remnants, and (ii) genetic detection of migrants between these patches.</p>				<p>A significant number of jaguar samples were genotyped from the northern zone of the Misiones Green Corridor, Argentina (MGC). We built a genetic database of this population that will allow us to calculate the proposed genetic parameters. However, we were able to obtain fewer number of samples from the other populations, both in the southern zone of the MGC, and from the remaining UPAF patches in Brazil.</p>
<p>2) To understand how the process of habitat loss and fragmentation affects the genetic structure of the UPAF jaguar populations. In particular, (i) to know the changes in UPAF landscape connectivity in the last 40 years from satellite images from 1973, 1988 and 2004, and (ii) to relate these changes to potential population bottlenecks, current gene flow among subpopulations and correlations between genetic and geographic distances.</p>				<p>The changes in landscape connectivity at UPAF were analysed by Dr. Julia Martinez Pardo. With the genetic data obtained, we will be able to calculate genetic connectivity and potential population bottlenecks during the next coming months.</p>
<p>3) To compare the effectiveness and cost of molecular methods vs camera-traps for population estimation of the effective size of the southern Jaguar's population in the UPAF. We will use capture-mark-</p>				<p>This task has been successfully completed. The same jaguar population was surveyed using camera traps and a systematic search for faeces. So far, the only thing left to do is to make population density estimates for each set of data.</p>

recapture (CMR) methods using the coat pattern in photographs and genetic CMR based on multilocus genotypes from indirect samples.				
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2. Please explain any unforeseen difficulties that arose during the project and how these were tackled.

Throughout 2019, Argentina's economic situation worsened dramatically. Between April and December 2019, the value of the dollar rose by 44%. Unfortunately, the grant was credited in Argentine pesos. Because of this, laboratory supplies (in dollar prices) were prioritised over field campaigns in the southern area of Green Corridor. Otherwise, the remaining money from the grant would have been spent in the remaining field trips and I would have not been able to analyse the data in the lab. We believed this strategy would ensure the fulfilment of some of the most important objectives of the grant.

From March 20th, the government established a total quarantine; therefore, the remaining lab work (approximately 20%) will be finished once this measure is lifted.

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

- 1) Big cat faeces sampling: From a total of 243 collected faeces, we identified 18 jaguars corresponding to at least 15 different individuals. By evaluating the sampling effort systematically, this database will allow us to estimate the population density of jaguars in the northern part of the MGC from genetic capture-mark-recapture.
- 2) Analysis of landscape connectivity in the UPAF and genetic representation of the jaguar population in the northern MGC: we shed light on the process of loss of functional connectivity among UPAF jaguar populations over the last few decades. We also have a genetic database of more than 30 wild jaguars belonging to the MGC. With all this information, we will be able to evaluate if the isolation of the MGC jaguar population is in line with the recorded population genetic parameters.
- 3) Maintenance of the participatory monitoring network: we managed to strengthen links with more than 40 network participants. There was a both ways transmission of knowledge between the team and the members. They reported events of cattle predation, as well as scats and faecal observations that were useful for the project.

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

Throughout the project, we maintained a close relationship with many members of our participatory monitoring network. We made multiple periodic visits to ranchers,

farmers and protected area staff. They shared with us their problems with the jaguar, their local knowledge of this species, and gave us some samples of footprints and faeces that they detected. On the other hand, we made use of these meetings to transmit our knowledge about the species, our perspective as scientists on the importance of the jaguar and its threats in the region. In addition, in cases of predation of livestock we offered technical assistance to corroborate the facts to present the claim to the Ministry of Environment.

5. Are there any plans to continue this work?

At the end of this year, I intend to present my PhD thesis. The two fundamental objectives to finish my project will be: 1) to obtain jaguar genotypes from different patches remaining from Brazil UPAF; and 2) to genotype jaguar samples from the two other ecoregions of northern Argentina (Yungas and Chaco). We will accomplish the first goal through a collaboration with two research groups from Brazil. Once the preventive isolation by COVID-19 is finished in both countries, we will carry out a brief residency in their laboratories to homologate the genetic databases. When the pandemic is behind us, I will soon finish the genotyping of the jaguar samples from Yungas and Chaco. Then, I will carry out the population genetic analyses of the entire dataset.

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

Once we complete data analyses, we will share the results with the public through our social networks (<https://www.facebook.com/proyaguarete>; <https://www.instagram.com/proyeyaguarete/>) and our website (<https://www.proyeyaguarete.com.ar>). The information gained from this project will be also reported to official decision-makers with varying levels of responsibility, in particular the Department of Wildlife and Biodiversity of the Argentine Ministry of Environment.

This year I would have liked to present the results obtained in two scientific meetings: the 2nd International Symposium on the Ecology and Conservation of Jaguar (Foz do Iguaçu, Brazil), and the Argentine Mammalogy Meeting 2020 (Puerto Iguazú, Argentina). Unfortunately, due to the COVID-19 pandemic both events have been postponed without a defined date. Due to this, the exposition of the results will surely take a little longer than expected.

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

The grant was used approximately at the proposed time: from April to August 2019 the field work was carried out. The active maintenance of the participatory monitoring network involved expenditures throughout the second half of 2019. On the other hand, from April 2019 to January 2020 the funds were used to maintain the stock of laboratory supplies. These reagents were used from August 2019 to March 2020

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
Field Supplies	100	100		
Laboratory supplies	500	750	+250	More DNA extraction kits were purchased than expected. Most of the genetic samples were obtained from faeces. Many of these samples required two DNA extractions with specific DNA extraction kits. Therefore, more DNA amplification reagents were purchased in order to perform the DNA extractions from all the samples collected.
Other laboratory needs	1200	1500	+300	The analysis of amplified DNA fragments (MACROGEN) was more expensive because the number of samples used was higher than expected.
Participatory network materials	200	400	+200	In this item, bus passages of volunteers of the participatory monitoring network were included.
Food	1300	1000	-300	
Field vehicle Gas and Maintenance	1700	1250	-450	Due to logistical and especially budgetary difficulties, laboratory expenses were prioritized at the expense of the field work planned for the southern zone of the MGC.
TOTAL	5000	5000		Exchange: 1 pound = 35.4 Argentine peso (April 2019); 1 pound =51 Argentine Peso (December 2019)

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

In order to make the project successful and to establish a basis for its continuity, it will be necessary to fulfil the last two proposed success indicators: (5) estimation of genetic structure parameters, and (6) publishing the results and their presentation in scientific or conservation conferences. We believe that both indicators can be met

satisfactorily in the coming months. Finally, we also believe it is necessary to transmit the results obtained to the decision makers. We hope that our contribution with a solid scientific basis will be considered in management plans for the conservation of jaguars in Argentina.

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?

The logo was used in seminars within my institution, and expositions in the genetics group of the Argentine Museum of Natural Sciences. It is planned to disseminate the logo in the works to be presented in congresses the following year and in scientific divulgation activities.

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

Members	Role
Agustin Paviolo	Collaboration in planning of field activities, logistics, statistical analysis. Advisor of project.
Patricia Mirol	Collaboration in planning of laboratory activities, statistical analysis. Co-Advisor of project
Julia Martinez Pardo	Collaboration in the analysis of changes in the connectivity of the UPAF landscape
Carlos de Angelo	Collaboration in the analysis of changes in the connectivity of the UPAF landscape
Francisco Robino	Collaboration in a participatory monitoring network. Communication with the local community
Lucia Cariola	Collaboration in a participatory monitoring network. Communication with the local community
Esteban Pizzio	Field assistant
Sebastian Costa	Field assistant

12. Any other comments?

The entire team is grateful for the support of the Rufford Foundation. 2019 was a very difficult year in Argentina, especially for science. Their contribution was fundamental for the project to continue.