Final Evaluation Report

Your Details	
Full Name	Juan Carlos Huaranca
Project Title	Conservation of the Andean cat: Assessing the effects of llama grazing in the Sajama National Park, Bolivia.
Application ID	24434-1
Grant Amount	4990 £
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Date of this Report	April 15, 2021

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 effects of llama grazing on the occurrence of the Andean cat in a gradient of intensity of llama grazing.				Our results indicate that llama grazing in the Sajama National Park does not directly affect the Andean cat occurrence or the use of habitat. However, llama herding affects the occurrence of vizcachas, which may have an indirect effect on the preference for the habitat use of Andean cat, with the Andean cat being in areas with higher vizcacha records. Also, I developed an analysis about the effect of llamas on the occupancy of Andean cat and pampas cat in the sampling area.
Effects of llama grazing on the Andean cat habitat.				We found that cattle grazing affects the vegetation cover, especially the extent of grasslands, the main food of the vizcacha, this rodent is part of up to 70% of the Andean cat's diet. Although we have not identified a direct negative effect of cattle ranching on the habitat of the Andean cat, this activity (grazing) can modify the use or intensity of use habitats most altered by llama herding.
Effects of llama grazing on the richness and abundance of small mammals and mountain vizcachas.				Our results showing that llama herding in Sajama National Park negatively affects the community of small mammals and the frequency of captures of the vizcacha.
Evaluate the effect of llama grazing on the activity patterns of the vizcacha and the Andean cat.				Our results show that in places where the intensity of cattle grazing is higher, it modifies the hours of activity of the vizcachas - they increase their nocturnal activity. However, we were unable to evaluate the effects of cattle grazing on the Andean cat activity

				patterns due to the low number of captures in the sampling stations.
Estimate the maximum number of llamas that can graze in the study area without affecting the Andean cat populations				The livestock grazing gradient in our sampling stations ranged from 0 to 590 head of cattle, with a mean of 177.2; SD = 145.9 cattle heads. With a mean density of 0.2 camelids ha^{-1}. However, due to the low capturability of the Andean cat, it was not possible to correlate the abundance of Andean cat with the abundance of camelid livestock, so we could not estimate the maximum number of camelid livestock that does not affect the abundance of Andean cat.
To develop workshops to disseminate the results to local communities				We developed training workshops with park rangers at the beginning and end of the project - the first to train in the use of camera traps and the second to analyse and discuss the results of the project. In November 2020, four workshops were held with local communities to explain the results obtained in the project.

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

In the development of this project there were three unforeseen events. The first was the theft of two trap cameras - these were apparently taken by local shepherds; one was recovered and the other was not. This was achieved through dialogue with the people who could have taken the cameras. The second was that between October and December 2019, Bolivia experienced a period of political instability, which prevented the development of programmed activities, mainly the development of workshops with local people and the protected area. Third, the closure of all protected areas including the Sajama National Park due to the Covid-19 pandemic, which ended the last week of November 2020. These last two difficulties could not be solved since they were beyond the decisions of the project. On November 30th 2020, the workshops could be held with the local inhabitants at a meeting of the management committee of the protected area, where representatives of the five livestock farming communities participated. Between December 1st and 2nd 2020, the workshop was held with the park rangers and administration of the Sajama National Park (Figure 1 and 2).

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

1. The presence of an important Andean cat population in the Sajama National Park was registered. Even though there were records of their presence in the park, an evaluation had not been made of the conditions that favour or affect the presence of the Andean cat in the area.

2. According to our results, traditional llama and alpaca grazing directly affect the space use of the Andean cat (Figure 3), a habitat and diet specialist, but does not affect the pampas cat a generalist in the habitat use and diet. These two species are sympatric small cats that inhabit the high Andes. Also, the llamas and alpaca grazing affects indirectly the habitat use of the Andean cat, mediated by the reduction the abundance of mountain vizcacha (*Lagidium vizcacia*), the main prey of Andean cat (See Figure 4). Therefore, the increase in traditional llama and alpaca grazing in the high Andes of Bolivia could negatively affect the survival and viability of the populations of Andean cat.

3. We could also show that, although there is no direct persecution on Andean cat by the local inhabitants, the persecution exerted on the puma (*Puma concolor*) due to the high rate of predation, can affect negatively and indirectly the population of Andean cat, due to the use of traps and especially the use of poison to eliminate pumas. Also, affecting all other species of carnivores that can feed on this poisoned meat, including the Andean cat.

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

Our results have been successful due to the support of local residents, llama and alpaca herders, and rangers who are also local herders, which was established at the beginning of the project. This project benefits the local inhabitants in two aspects. First, the information on the presence of the Andean cat (with the use of camera trap photographs) as an emblematic species of the Sajama National Park, and attractive potential for visitors to the protected area. Second, about the study of negative effects of camelids (llamas and alpacas) on the Andean cat. This study was shared through a report on the need to increase protection measures on Andean cat populations. The latter was included in the report presented to the Sajama National Park management committee (Figure 1), for inclusion in the next Sajama National Park management plan that will be developed in 2021.

5. Are there any plans to continue this work?

We have identified the need to develop a monitoring plan for the Andean cat populations and their main prey, and the events of puma predation on the llama and alpaca herds. This information will be crucial in order to develop a conflict mitigation plan between camelid herders and puma. To achieve this purpose, we will present a continuity project to The Rufford Foundation.

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

Initially, our results have already been shared with the local inhabitants and the administration and park rangers of the Sajama National Park, direct beneficiaries of the information produced in this project. In addition, two scientific papers were submitted to the *Biological Conservation* journal and the manuscript in review that we plan to submit to *Oryx* to publish our results and disseminated to the academic world. These two papers are part of my PhD thesis in the University of Los Lagos, Chile, that I hope to defend in June of 2021.

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

The Rufford Foundation funds were used between February 2019 and December 2020. Without a doubt, this period was much longer that the estimated in our proposal due the restriction conditions due the Covid-19 pandemic. But as we explain and as it is Known, this was due to unforeseen events in Bolivia due the closure of Sajama National Park to visits and researchers.

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
Administrative	350	294	56	Este item comprende los costos de transferencia intenacional e impuestos a la ta de cambio de moneda extrangera
Transportation	1350	734	616	El costo de transporte hasta el area de estudio y dentro del area de estudio. Este disminuyo gracias al apoyo logistico de trnasporte del AP Sajama
Equipment and material	1440	1445	-5	LA compra de material de campo, camaras trampa, memorias SD, baterias y otros insumos.
Food and Hosting	1400	847	553	La alimentacion y hospedaje se cobrio parcialmente por otros fondos.
Communication	250	456	-206	El costo presupuestado de comunicación se incremento debido a la necesidad constante de cordinar con el

				area protegida de las actividades del proyecto.
Payment to guide and Field work assistant	200	1206	-1006	Este item no estaba contemplado con un gasto mayor, se realziazo el pago de un salario de Eliana Flores debido a la necesidad de permanecer largos periodos de tiempo en el area protegida para monitorear el funcionamiento de las camaras y la captura de pequeños mamiferos.
Total	**4990**	**4982**	**8**	

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

During our research we identified the high presence of conflicts between puma and the cattle ranchers - this conflict indirectly affects the Andean cat and the pampas cat due to the fact that local people use poison to eliminate the Andean puma and fox. This activity also affects indirectly to Andean and pampas cats because some can feed on poisoned animals. Due to these results, our next steps are to develop strategies to mitigate conflicts with pumas, and other carnivores such as the Andean fox, for them we are preparing a proposal that will be presented to 2nd Rufford Small Grant.

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?

Yes, Rufford Foundation logo was used in the presentations and final reports of the project presented to the five local communities, to the administration and park rangers of the Sajama National Park, to the Servicio Nacional de Areas Protegidas de Bolivia, to the Direccion General de Biodiversidad y Areas Protegidas (scientific authority for the authorisation of research projects). Rufford small grant name is also included in the acknowledgments of the manuscript of the article resulting from this research submitted for publication in Biodiversity and Conservation.

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

Juan Carlos Huaranca: Coordinator and project leader, has developed the interviews with the community members, the installation, revision and uninstallation of camera traps for cats and mountain vizcacha. Also developed the habitat and vegetation evaluation transects.

Eliana Flores: Responsible for the trapping of micro mammals, capturing and identification of the specimens captured during the development of the project. She assisted in checking the cameras.

Alejandra Morales y Pablo Butron: Volunteers in the two trips to fieldwork principality in the camera trapping and small mammal's capture. Both are biology students in the Universidad Mayor de San Simon in Cochabamba, Bolivia

Alejandra Torrez: Coordinator and collaborated in the preparation of workshops with local residents and authorities of the protected area. Also support in the elaboration of technical reports

Lilian Villalba: Support in the coordination and request of authorizations for the development of the project. In addition, support in the administration of the funds, through the coordination of the Andean Cat Alliance.

Carlos Valdivia: Developed the follow-up of the investigation, support in the elaboration and revision of the reports presented to the local inhabitants and the submitted scientific article.

Andres Novaro: Advisor of project, support in the writing and revision of the submitted scientific article.

12. Any other comments?

This project had the active participation of three local people who accompanied us during the field work. In addition, there was the constant support of the park rangers in the development of the project. The park rangers received training in the use and installation of camera traps for monitoring large and medium mammals.

During the development of the research, the use of poison to reduce the predation of puma has been recorded. This event is critical, due to the direct effect on the intention to kill the puma and indirectly on the poisoning of raptors and especially the Andean condor. Furthermore, due to similar events in Argentina, smaller carnivore species such as the Andean cat, the pampas cat, the Andean fox, skunks and grison, are also killed by the consumption of poisoned meat. This motivates us to present a second stage of this project to mitigate the use of poison and reduce the effects of predation.

Due to the events of social conflicts in Bolivia in October and November 2019 and the restrictions of the Covid-19 pandemic in 2020, this project was delayed in its execution.

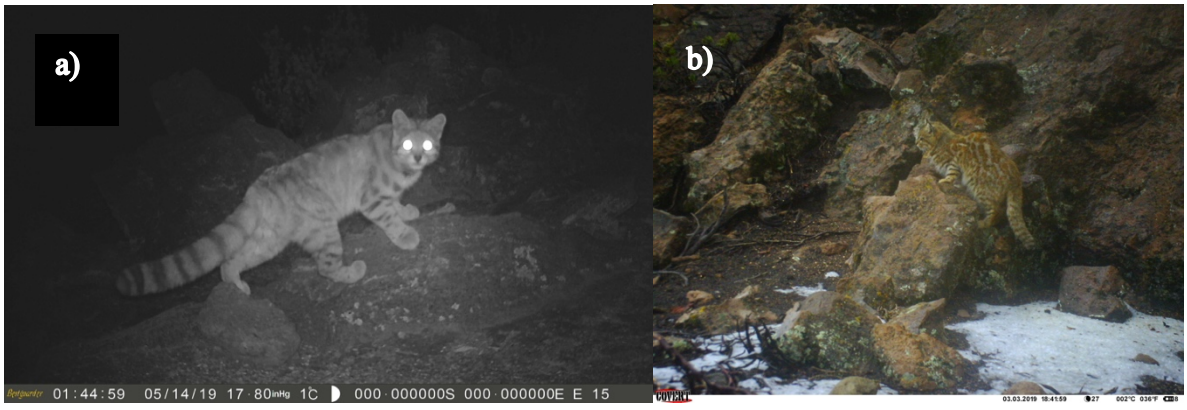

Figure 1. Photographs obtained in the camera traps of a) Andean cat and b) of a pampas cat in Sajama National Park

Figure 2. Meeting with the original authorities, the Park's management committee and the local inhabitants to present the results of the investigation.

Figure 3. Meeting with the Director and park rangers of the Sajama National Park for the presentation and evaluation of the results of the investigation and planning of future actions, especially in the mitigation of conflicts.

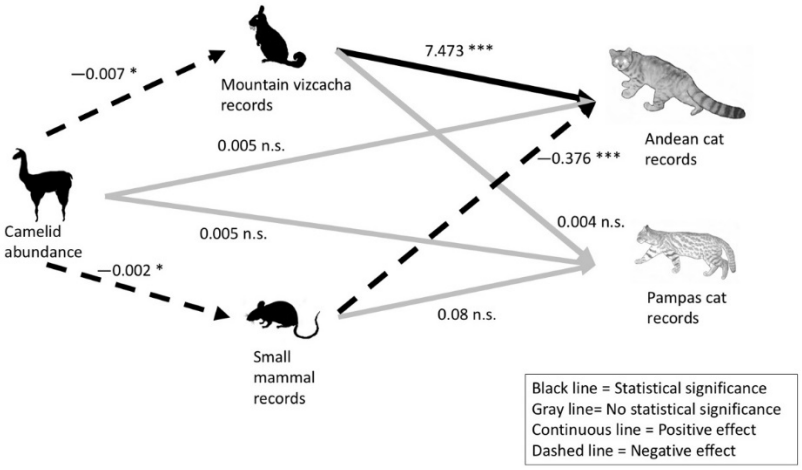

Figure 4. Summary model of the association on habitat use of camelid abundance with the Andean cat and the Pampas cat and their main prey. Black lines represent significance association between explanatory variable and response variable, gray lines indicate lack of significance. Continuous lines represent positive association, and dashed lines represent a negative association between the explanatory variable and the response variable of the model.

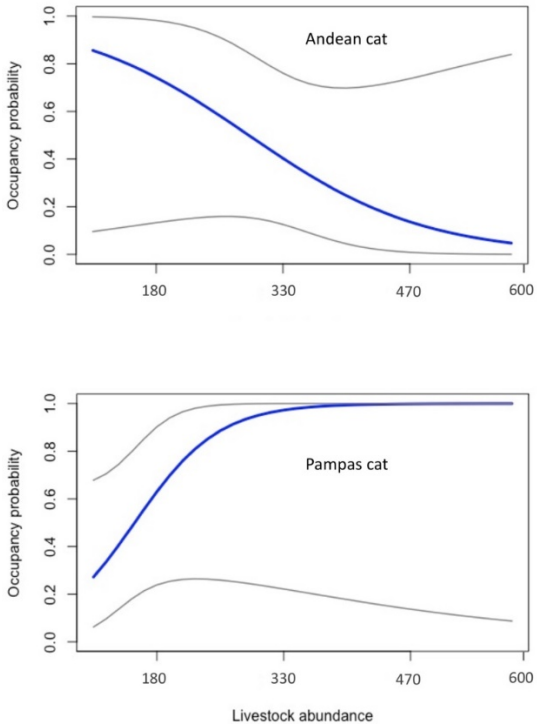

Figure 5. Probability of occupation of Andean cat and pampas cat as a function of the grazing intensity gradient of camelids in the Sajama National Park. The values of the grazing intensity gradient range from zero to 580 head of cattle. Confidence intervals are represented by the gray lines.