



## The Rufford Small Grants Foundation

### Final Report

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Congratulations on the completion of your project that was supported by The Rufford Small Grants Foundation.

We ask all grant recipients to complete a Final Report Form that helps us to gauge the success of our grant giving. We understand that projects often do not follow the predicted course but knowledge of your experiences is valuable to us and others who may be undertaking similar work. Please be as honest as you can in answering the questions – remember that negative experiences are just as valuable as positive ones if they help others to learn from them.

Please complete the form in English and be as clear and concise as you can. We will ask for further information if required. If you have any other materials produced by the project, particularly a few relevant photographs, please send these to us separately.

Please submit your final report to [jane@rufford.org](mailto:jane@rufford.org).

Thank you for your help.

**Josh Cole, Grants Director**

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Grant Recipient Details	
Your name	Maria Laura Gelin
Project title	Conserving Top Predators in Patagonian Landscape with Wildlife Migrations
RSG reference	17647-1
Reporting period	June 2015-July 2016
Amount of grant	£4995
Your email address	mlgelin.s@gmail.com
Date of this report	August 17 <sup>th</sup> , 2016

1. Please 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 puma density across summer and winter ranges of guanacos, and assess how densities change with guanaco migration.		Field work was fully achieved. I have almost completed the analysis of camera data for puma density.	I expect to fully achieve this objective by September.	A total of 140 camera traps were placed in a two grids located in the summer and winter range of guanacos. I am now using the most recent techniques (spatially explicit capture recapture models - SECR) to estimate puma density. Molecular analysis of puma scats to identify individuals is being conducted by the American Museum of Natural History. Results should be available by the end of September.
Evaluate whether pumas incorporate more livestock/native prey in their diet when guanacos migrate.		X	I expect to fully complete this objective by the end of August.	Together with another researcher we collected 173 puma scats during the field season. I washed and sundried the samples for lab analysis of hair and bones of consumed prey. I have produced a series of photographs of the structures of hair of prey species in my study area and am currently analysing the prey remains in the puma scats.
Identify native		X	I expect to	To date, I have identified

prey that might buffer predation on livestock.			fully complete this objective by the end of August. (See previous.)	six species of native prey in the scats, in addition to guanacos and livestock (see outcomes below).
Obtain data on the relative abundance of small cats.		X	I expect to fully achieve this objective by December.	I obtained 25 independent photographs for Geoffroy's cat and 12 for pampas cat. Density estimations will be conducted once I finish with puma analyses.
Contribute an ecological foundation to on-going work by the Wildlife Conservation Society, resource agencies, and local herders focused on evaluating and implementing non-lethal deterrents to prevent carnivore predation on livestock.		X	A full report will be available by December, followed by scientific publications.	A report with results obtained to the date was distributed to these stakeholders in Patagonia. Final results will be distributed when project is finished. In addition, I have frequent discussions with staff of the Wildlife Conservation Society regarding my results and keep them informed as I progress. Also, I am distributing my work more broadly to research scientists and managers involved in resolving conflicts related to carnivore predation on livestock through presentations at international meetings (see plan for distributing results below).

**2. Please explain any unforeseen difficulties that arose during the project and how these were tackled (if relevant).**

Field work started two months later than I expected. I had to wait until all funds to buy field equipment were released. Also, because of problems with the vehicle and the long distances in the area, it took me almost 2 months to place the 140 camera traps in the field. Because of these issues, I extended my field season until January 2016.

Another difficulty that arose during the project had to do with the batteries for the cameras. I planned to bring the batteries from the US to Argentina but the airlines did not allow me to travel with the amount of batteries that I needed. Because of this, I had to buy new batteries in Argentina where they are much more expensive than in the US. This added an additional cost of £346 to the project.

A third and last difficulty was with memory cards for cameras that I purchased. Some of the cards for the brand that I got (Transcend) were not compatible with the brand of camera traps (Browning). The cards that I checked in the US worked with the cameras, but many cards did not work when I attempted to use them in Argentina. The camera company was not aware of the problem with different cards and, thus, considerable time was required to figure out why the cameras were not working. I had to get new memory cards in Argentina (Kingstone brand). For these items, prices also were much higher than in the US. Therefore, I decided to buy 8 Gb cards instead of 16 Gb (as I purchased in the US) but then I had to check cameras more frequently.

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

*1) Evaluate puma density across summer and winter ranges of guanacos, and assess how densities change with guanaco migration.*

To obtain density estimates for pumas with the guanaco migration, I deployed 69 camera trap stations in the field, organised in two grids (north grid – summer location of guanacos, south grid – winter location of guanacos). Cameras were deployed for about 7 months (late winter through summer), and 56 % of them registered the presence of pumas (*Puma concolor*) with a total of 221 independent (i.e., non-consecutive) photos.

By analysing natural marks on pumas, I identified 18 adult individuals and two kittens and obtained 95 photos of these individuals. Individuals in the remainder of the photographs (126 independent photographs) could not be identified individually.

Data from identified and unidentified animals are being analysed jointly with spatially explicit capture recapture models (SECR). Based on initial analyses, as predicted puma density appears to increase in the north of the reserve when guanacos migrate to this area (summer). However, in the south of the reserve, density of pumas was lower, and we detected no changes in puma density when guanaco density increased in winter. Numerous factors potentially could explain these results, including the following, among others: a) pumas may not move into the winter range of guanacos in the south because guanacos are concentrated in large herds during this time of year, and pumas may not be highly effective in preying on guanacos; in contrast, during summer guanacos on the north grid occur in smaller groups (family groups or bachelor herds) and may be easier to kill, b) pumas in the south could exhibit stronger territoriality and thus prevent the entry of other pumas into the area when guanaco densities increase; however, a priori, we have no indication of a reason that territoriality should be stronger in the south, and c) human-induced mortality may be higher for pumas in the southern part of the reserve because this area includes large amounts of private land and is poorly protected compared to north part of the reserve. We expect that human-induced mortality might be particularly important in explaining the differences in puma density in the north and the south. This points to the need to monitor puma populations with methods that can be used to detect mortality (e.g., telemetry) and to work with private landowners to reduce mortality of pumas.

## 2) *Identify native prey that might buffer predation on livestock.*

To date, I have developed a reference collection of photographs of the structures of hair of prey species in my study area to be used as a basis for identification of prey and initiated analysis of scats collected during the summer. So far, native prey identified in the diet of pumas, in addition to guanacos, includes vizcachas (*Lagostomus maximus*), Patagonian mara (*Dolichotis patagonum*), Pichi (*zaedyus pichiy*) and small rodents. Livestock (goats, *Capra hircus* and cows, *Bos taurus*) also have been detected. From analysis of our small sample of scats to date, puma diet appears to follow the predicted pattern, with pumas feeding mainly on guanacos in the north grid during summer when guanacos are very abundant, whereas the diet of pumas in the south grid includes more alternative prey (e.g. armadillo, plains vizcacha) when few guanacos are present in the area. We have not analysed scats from winter (or most of our summer samples) yet. Based on shifts in guanaco density with their migration, we would expect guanacos to increase in the diet on the south grid in winter and decline on the north grid. Alternatively, if effectiveness of puma to kill guanacos in large groups is low, the frequency of guanacos in the puma diet may not increase in the south grid in winter even though large numbers of guanacos are present. Potentially pumas on the south grid may rely on alternative native prey

and livestock throughout the year, whereas pumas on the north grid may only incorporate these alternatives during the part of the year when guanacos are scarce. Thus, we hypothesise that predation on livestock in the north part of the study area may be limited to winter when guanacos are not abundant, but that livestock predation may occur throughout the year in the southern part of the reserve because of the low density of guanacos (summer) and the difficulties of preying on guanacos in large groups (winter). If our hypothesis is correct, strategies to reduce livestock predation by pumas in the south part of the reserve are needed for the entire year, not just during the time that guanacos are absent. I expect to finish the diet analysis by the end of August, and at that time will be able to make stronger conclusions about this problem.

3) *Obtain data on the relative abundance of small cats (e.g., Pampas cat, Geoffroy's cat, and the endangered Andean cat).*

Although rigorous density estimates have not been obtained yet, Geoffroy's cat (*Leopardus geoffroyi*) appears to be much more abundant than the pampas cat (*Leopardus pajeros*; 25 versus 12 independent registers respectively). Occurrences of both species were surprisingly low, and potentially a cause for concern in the reserve. Cameras did not detect Andean cat (*Leopardus jacobitus*), the species of most concern in the area, which was documented once near Payunia. More intensive surveying is needed for this species in the rocky areas of the reserve occupied by mountain vizcachas (the main prey of this species).

I believe that it is important to increase sampling effort for these species in Payunia, not only to obtain better estimates of their densities but also to fill in information gaps that exist for these small felines throughout their distribution (e.g. spatial ecology, habitat use, interactions among these species, etc.).

**4. Briefly describe the involvement of local communities and how they have benefitted from the project (if relevant).**

With assistance of park rangers and Wildlife Conservation Society Argentina, I had the opportunity to meet local residents, who gave me permission to deploy cameras and search for scats in their private landholdings (which are part of the reserve). I explained the purpose and impact of my project and most of them showed interest and will be waiting for the results. This information will help improve programs that ranchers, WCS and the provincial government together have been conducting to reduce rancher conflict with large carnivores.



Park rangers also collaborated with this project during the field season. They assisted in the collection of pumas and small cat scats. By participating in the project, park rangers learned about design of field sampling and acquired training with camera trap techniques. They are now conducting a seasonal monitoring of condors for which they will incorporate camera traps to obtain data throughout the whole year. I also acquired a meteorological station for the reserve and taught the park guards how to set up and run this station with a data logger and computer download of data. This will be useful for future research that requires meteorological data as well as for the management of the protected area.

Fourteen volunteers (including recent graduates and students from Argentine universities, students from the provincial park ranger school and a student from the US) assisted with this project. They learned about conservation issues in the region and field skills. Specifically, I trained them with camera trapping techniques, use of GPS, and scat collection and analysis. Some of them have continued contacting me to acquire more information. They showed great interest in pursuing research on carnivores in other areas of Argentina.

##### **5. Are there any plans to continue this work?**

Yes. Once I finish my MSc degree, I plan to continue with the analysis of the data that I did not have time to analyse during this year. Specifically, data obtained for other medium-large sized species from my camera traps (e.g., other carnivores and herbivores). I'm interested in assessing occupancy models for other species and see how this is related with guanaco seasonal migration. Because most species in my study area are poorly studied, this work will provide important baseline data for monitoring of wildlife.

Also, I expect to conduct my PhD in Argentina under the supervision of one of my Wildlife Conservation Society (WCS) collaborators, who is on faculty at one of the universities in Patagonia and a research scientist with the Argentine National Research Council (CONICET). I will apply for a CONICET research scholarship next year. Based on the results I obtained to the date, I hope to assess what is occurring with pumas in the north and south of the reserve by following their movements and mortality patterns with satellite collars. I plan to apply to a variety of sources of funding that might be interested in expanding knowledge of the ecology of carnivores in Patagonia as well as in reducing carnivore-human conflict, an issue that has become increasingly problematic recently in southern Argentina. I expect to share these results with WCS and the resources agency in Mendoza and get support from them to continue with this project.



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

Some preliminary results were already shared and future results will be presented at different audiences in Argentina and abroad.

- Preliminary results of this project were presented in poster format at the 14<sup>th</sup> annual Latin American Studies Field Research Clinic, conducted at the University of Florida on February 15<sup>th</sup>, 2016.

- A report of preliminary results was sent to Wildlife Conservation Society Argentina, the Renewable Natural Resources Department of Mendoza Province and to the Delegation of Park Rangers of the area. A final report will be sent to the same stakeholders at the end of this year.

- A poster was presented at the XII Congreso Internacional de Manejo de Fauna Silvestre en la Amazonía y Latinoamérica (12<sup>th</sup> International Congress of Wildlife Management in Amazonia and Latin America) in Ecuador in August 2016, where special sessions were held on wildlife conflict. This meeting included research scientists and natural resource managers.

-In addition, I will present a poster at the VI Reunion Binacional de Ecologia (Binational Ecological Congress of Argentina and Chile) to be held in Argentina in September 2016. Through these meetings, my results will be made available to a large audience of conservationists, managers, and research scientists throughout Latin America.

-This project will also be published at a peer-reviewed journal early next year.

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

Most of the RSG was invested to get field equipment before my arrival to the field. Because of the difficulties that arose, I also used some of the funds to solve those problems (batteries and cards). The equipment purchased was used from July 2015 to January 2016, i.e. the duration of my field work. Project is still running and expenses are being covered by other sources such as my scholarship and part of a grant designated for it. RSG duration matched with what I planned for the budget during my field season.

8. Budget: Please 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.

Item	Budgeted Amount	Actual Amount	Difference	Comments
Remote cameras and data cards	4488	4142 (47 camera traps @ 70) (70 memory cards @ 6 in US) (70 memory cards @ 4 in Argentina) (Shipping @ 152)	+346	Because I bought a large quantity of cameras, I was able to get a very good price. Therefore, I was able to buy 47 camera traps and 70 memory cards in the US (instead of 33 of each as I budgeted). With this amount I also paid for equipment shipping (which was not budgeted and cost \$52) and I got the 70 new memory cards in Argentina. The difference (\$346) was used to get more batteries in Argentina.
Batteries	320	666	-346	
Battery chargers	27	90 (3 @ 30)	-63	Because of the number of cameras I got, I decided to get 2 more battery chargers than the one I budgeted.
Silica gel bags (20 @ 8)	160	99 (9 @ 11)	+61	I used this difference to pay for the two extra battery chargers
<b>TOTAL</b>	4995	4997	-2	

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

The identification of individual pumas from photographs is challenging. In fact, from a total of 221 registers of puma that I obtained, 95 were identifiable. I believe that



the next important step of this project is to derive density estimates from molecular analyses (currently being conducted by the Museum of Natural History with my scats) and compare these density estimates with puma density estimation obtained from camera trap pictures. This will serve to crosscheck for my estimates of the numbers of pumas in different parts of the reserve.

As I mentioned, following this for my doctorate, I hope to capture pumas and attach satellite collars so that their interactions with domestic livestock (the cause of conflict) and the guanaco migration can be evaluated more thoroughly. Also, we need data on mortality of pumas, which we should obtain with satellite collars.

**10. Did you use the RSGF logo in any materials produced in relation to this project? Did the RSGF receive any publicity during the course of your work?**

Yes. The RSGF logo was used for the poster presentation at the 14<sup>th</sup> annual Latin American Studies Field Research Clinic at the University of Florida. It was also included in the poster presentation for the conference in Ecuador and will be for the poster presentation in Argentina. I will acknowledge RSGF in any written material produced from this project and will continue mentioning RSGF in future oral/poster presentations.

**11. Any other comments?**

This funding was very important for me to be able to conduct field research and complete my Master's degree, which is a key step in my career.

