The Rufford Foundation
Final Report

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

We ask all grant recipients to complete a Final Report Form that helps us to gauge the success of our grant giving. The Final Report must be sent in **word format** and not PDF format or any other format. 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. Please note that the information may be edited for clarity. 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.

Thank you for your help.

Josh Cole, Grants Director

Grant Recipient Details	
Your name	Nicolás Fernando Lagos Silva
Project title	Understanding the relationship between the Andean cat and its habitat in the high Andes plateau: Implications for its long term conservation
RSG reference	15593-1
Reporting period	2015-2017
Amount of grant	£ 4986
Your email address	nlagos@outlook.com
Date of this report	May 15th, 2017

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
To recognize the factors affecting the Andean cat distribution in the dry puna of Chile and predict its potential distribution				We were able to build a distribution model for the Andean cat in the study area, allowing us to predict its potential distribution in non-surveyed areas
To evaluate the actual protected status in the area and their threats				Species distribution model for the Andean cat in the study area was developed. In parallel, a Human Influence Index map was made, considering the main threats affecting the species. Al analyses were made through a fine scale resolution (30 m pixel)
Propose priority areas for the conservation of the species				Based on the three maps (Species distribution, Human Influence Index and protected areas), a prioritization of 4 major zones were made. Those were areas of interest for the conservation or to conduct further studies of the Andean cat.
To develop field training and workshop for park rangers working in the area				We developed an interregional workshop between 21-22nd July, 2015 in Pampa del Tamarugal Natural Reserve, where 12 park rangers of 6 different protected areas of 4 Chilean districts attended
To develop a workshop with local communities, government agencies and relevant stakeholders in the area				While the project was developing, we started to develop meetings with CONAF (the agency in charge of the protected Areas in Chile) with the purpose of generate a National Conservation Plan for the Andean Cat. During this meetings, local communities, government agencies, NGOs

				and other relevant stakeholders were invited, we were able to share the advances of the project and to engage them in the conservation of the species and its ecosystem.
To measure the genetic structure of the Andean cat populations				DNA extraction and sequencing services were more expensive than we expected, so we hadn't enough money to complete the microsatellite analyses. Besides, considering only 12 of the 112 faecal samples belonged to the Andean cat, the genetic structure at population scale is impossible. We still need more samples to fulfil this analysis at population scale. However, we expect to continue working with DNA from faecal samples as part of the Andean cat Alliance projects, so we expect to increase this number of samples in order to perform this analyses in the future.

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

One difficulty we had was during the workshops for the community and stakeholders. While we had an important participation of government agencies and local NGO's, the assistance of local communities in the workshop were poor, with only two representants of two different communities. We expect to solve this problem by working directly with the communities in local towns. For this, the Andean Cat Alliance is working in a project funded by Disney to work directly with communities, where we will be able to share the results of this project and to engage them in the conservation of the Andean cat and the puna ecosystem. We actually developed a workshop in one locality, involving community members, developed between May 18th and 21st, 2016. Since several members of the community attended the meetings and workshops, their participation in the discussion was poor; none of the community members wanted to talk and share their thoughts. We'll need further work with the communities in order to generate an environment of confidence that encourages them to freely talk about their feelings and thoughts about the conservation of the Andean cat and its ecosystem. We're planning to continue working with this community in the near future, and expand this workshops with communities in other areas.

Another difficulty we faced was during the camera trapping campaigns. Weather conditions during the first campaign (January-February 2015) were hard, the altiplanic winter came with strong rains and some of the roads were blocked. We had to rearrange the sampling design in order to deploy all cameras in the field in safe areas. Also, we had malfunction problems with 14 of the cameras, who didn't work properly during the whole period, being active for less than one month. A couple of the cameras stopped working and we weren't able to use them again, so we had in total 96 different sites instead of 100. Additionally, 14 of the cameras didn't worked well during the whole period, being active for less than 30 trap/nights. Considering this, we had finally 82 different camera trap sampling sites instead of 100. In the places where we had problems with the cameras, we increased our faecal sampling effort in order to obtain more samples (at least 2 and in some cases 3 samples per site).

Finally, our last difficulty was related with the budget of the project. Genetic analyses costed more than we expected, especially DNA extraction kits and sequencing services for the faecal samples. Besides, of the 112 faecal samples collected in the field, only 12 were positive to the Andean cat. This number is not enough to perform a genetic analysis at a population scale, to show genetic structure of different populations we still need more samples. To carry out population analyses and with the objective of obtaining robust results, this type of studies suggests a minimum number of samples per locality or sampling point, at least 10 samples per locality. This could not be obtained and therefore any analysis with microsatellites in this context would not have provided information that could be used to delimit conservation units or make plans in short term. Despite this, we are still collecting faecal samples in our different Andean Cat Alliance projects, in order to increase this number and to perform those population scale analyses in the future.

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

Through both methodologies considered in this project: DNA scat analyses and camera traps, we were able to obtain a total of 30 occurrence records (12 from faecal samples and 16 prom camera traps) of the Andean cat in 24 new localities. This increased the known localities of the species in the study area from 42 to 66.

A habitat suitability map for the Andean cat in the northern area of its distribution in Chile was generated. This area is of special interest for the conservation of the species because it gathers the higher concentration of Andean cat records in the country. The study confirmed this: the positive Andean cat records were concentrated in the northern area of the dry puna (our study area). We contrasted this Andean cat habitat suitability map with the map generated from potential threats for its populations and the actual protected areas and defined a total of 4 major zones for the Andean cat conservation (Maps are attached in separate files).

We were able to train 12 park rangers working in different protected areas. Some of them were actually working with camera traps, so they were able to improve their field skills through a set of recommendations, who included the correct design of their studies according to their objectives, ensuring correct camera trap placement

and programming and improving their data analyses through the use of the DataAnalyze software. This module of the workshop was leaded by the developer of the software, Jim Sanderson.

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

As said before, this was one of our main difficulties. Involving local communities takes time, especially if we are working with communities of the high Andes. They are very shy and distrustful, so an important step before starting any conservation program with them is to gain their confidence. This implies being constant with the visits, and takes a lot of time. Since we worked in a vast area, it was difficult of us to maintain visits to the community's constant, and trying to encompass several different communities, far away one from each other is unrealistic. We learned this during this project, and this is the reason why we selected one of the communities inside the study area, in the locality of Enquelga, were we expect to maintain a more constant work in order to engage them with our conservation project.

5. Are there any plans to continue this work?

One of the main outcomes of this project was a map showing a prioritization of four different areas for the Andean cat conservation. Those areas are zones with high probability of presence of the Andean cat and who highly threatened due to anthropogenic activities. In a further stage, we expect to direct our conservation efforts in those hot spots. On those areas we expect to develop population level research and programs focused on the mitigation of the threats for the Andean cat populations, working with local communities, engaging them to take active part in the conservation of the species and its surrounding ecosystem.

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

The main results of this project will be sent for its publication in a scientific journal. This will allow to share this works with other colleagues and scientists. Besides, we're actually working with CONAF in the elaboration of a National Conservation Plan for the Andean cat. The information of the priority areas for the conservation of the species will be available for this government agency and others, helping to direct the activities and conservation efforts in those high priority areas.

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

The grant was used mainly for the fieldwork of the project and the DNA lab analyses. The fieldwork was carried out between January and December 2015, the lab analyses started in mid-2015 and ended in October 2016. This took longer than we expected, delaying the GIS analyses, which also took a long time, preparing layers and refining the modelling approaches in order to have a reliable final distribution model for the Andean cat in the study area.

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
Meals (fieldwork + workshops)	344	353	-9	
Lodging (fieldwork)	270	0	-70	Lodging were provided by CONAF for free
DNA extraction kit (for extraction of difficult samples, i.e. faeces)	480	678	-198	Kits were bought in US and needed to be sent via courier to Chile, increasing the paid amount
Materials for DNA extraction (Supplies for collecting and storing DNA, e.g. Falcon tubes, ethanol, eppendorf tubes)	60	84	-24	
PCR reactives (Reactives for PCR reactions and electrophoresis like Taq polymerase, dNTPs, ultrapure water, agarose, and DNA ladder)	490	531	-41	
Primers for PCRs (Unlabeled primers for mitocondrial sequences and microsatellites)	60	0	+60	Primers were provided by the Laboratory of Evolutionary Biology
Sequencing service (External service for sequencing mitochondrial PCR products)	300	792	-492	Sequencing service were more expensive than we expected, since we had first to standardize the extraction protocol and duplicate the sequence of some samples
Genotyping service (External service for reading fluorescent labeled microsatellite markers)	600	0	+600	Microsatellite markers were not used because we hadn't enough budget for this and because it wasn't
Primers for microsatellites (Fluorescent labeled primers for microsatellites)	620	0	+600	
AA Batteries (for camera	192	134	+58	

traps)				
16 GB SD Cards (for camera traps)	100	99	+1	
Airfares (Roundtrip Santiago-Arica-Santiago)	620	890	-270	
Gasoline	350	1655	-1305	We had to buy the vehicle in Santiago, who is located about 2.000 km away from our study site. This means that we had to make two trips, at the beginning and the end of the study in order to take the jeep to the field and then bringing it back to Santiago. Besides, the option we had considering our budget was a gasoline vehicle, which doubles the price of diesel. Moreover, the performance of this kind of vehicle is very low compared to a diesel engine.
Vehicle maintenance	500	2258	-1758	Unexpected malfunction of our vehicle forced us to make several repairs out of our budget.
Bank Commission	0	35	-35	Not included in the budget
Totals	**4986**	**6866**	**-1970**	

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

Since the Andean cat is an extremely rare and endangered species, little is known about its ecology, especially at population scale, so studies in this line are still needed. Besides, applied conservation work is needed. The main results of this study presents priority conservation areas for the Andean cat in Chile. We now need to work and establish conservation strategies inside those priority areas, working both in ecological studies of the species and in apply conservation programs in collaboration with local communities and government and non-government agencies.

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

Yes, all the workshop material for the park rangers training included the RSGF logo. Also, the project received coverage in web pages of the University of Chile and the Master web page, where we thanked the grant obtained by RSGF:
http://www.uchile.cl/noticias/112365/investigadores-desarrollan-proyecto-para-conservacion-del-gato-andino

http://mascn.forestaluchile.cl/buscan-establecer-acciones-para-conservar-al-gato-andino-en-el-extremo-norte-de-chile/

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

Jaime Hernández (Forestry, PhD): Director of the Laboratory of Landscape and Geomatics in the University of Chile. He is the advisor of my Ms Thesis, he helped throughout the study in its conception, the sampling design for the fieldwork and as advisor in the GIS analyses.

Magdalena Bennett (Geographer, Ms, PhD(c)): She helped in the Andean cat distribution model, providing important suggestions to improve its results.

Jorge Valenzuela (Veterinarian): He helped in the conception and development of the workshop for the park rangers. As part of CONAF staff, he leveraged the realization of meetings who led to the generation of the Andean cat Conservation Plan.

Cristian Sepúlveda (Natural Resources Engineer): Helped in the field campaigns obtaining faecal samples for the DNA analyses and in the deployment of the camera traps.

Claudio Correa (Biologist, PhD): Standarized the protocols for DNA extraction from faecal samples.

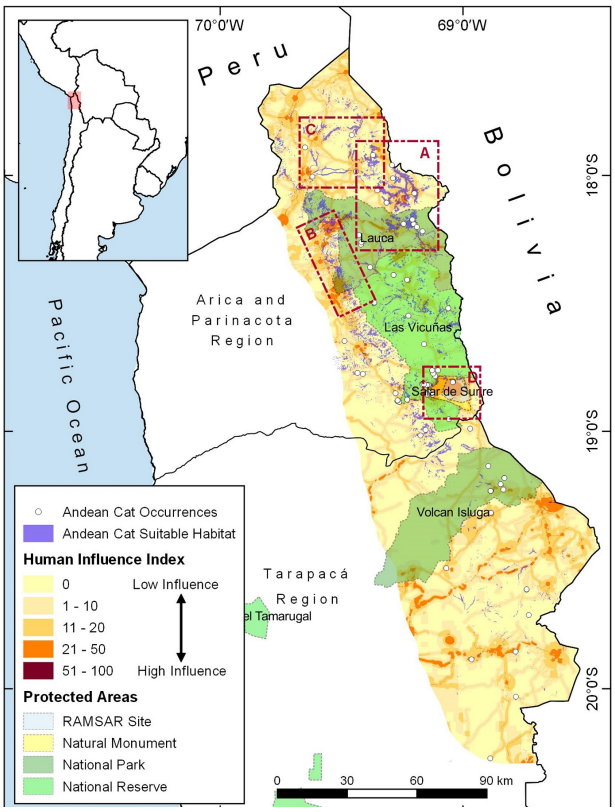
Eduardo Palma (Biologist, PhD): Research Assistant of the Laboratory of Evolutionary Biology, Pontificia Universidad Católica, Chile. He supervised and leaded all the lab analyses of faecal samples.

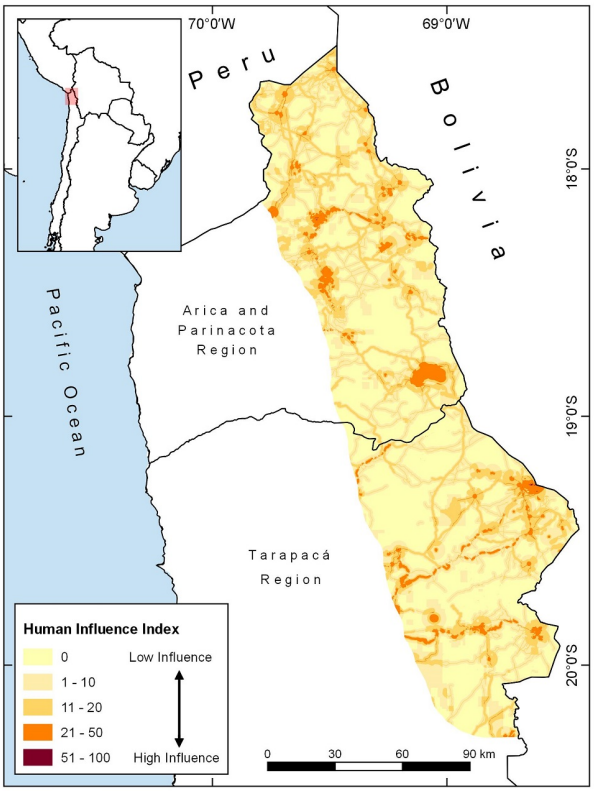
Francisco Gonzalez (Biologist): He did the laboratory work, mainly DNA extraction and amplification.

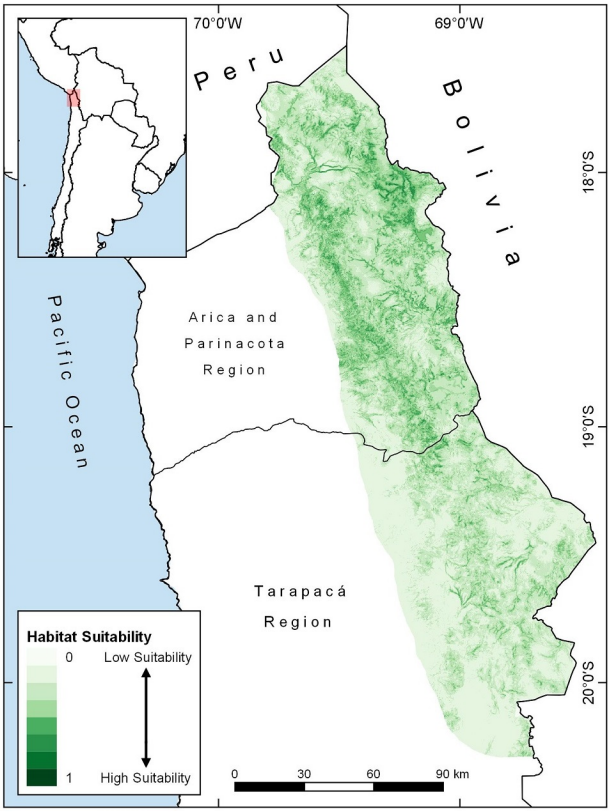
Dayana Vasquez (Biologist): She analysed the data obtained from the DNA and species determination.

12. Any other comments?

I really appreciate the patience of the RSGF team, considering the long delay I've had in this project. Since its conception, the project had several difficulties mainly in the time spent in the DNA and GIS analyses. Besides, I've my work in the field hasn't allowed me to fulfil the analyses as I expected, so I appreciate your understanding. This is appreciated especially considering that in most cases the projects need to overcome difficulties or unforeseen activities, implying a delay in its completion.







Top left: Prioritization areas. Top Right: Threat map. Bottom: Andean cat suitability map.