

Final Evaluation Report

Your Details	
Full Name	Paula Leticia Perrig
Project Title	Effect of a disease outbreak on the conservation of the threatened Andean condor
Application ID	39580-2
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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 changes in the use of carrion by Andean condors before and after the mange outbreak via monitoring experimental carrion stations with camera traps.			X	We monitored with camera traps 18 experimental carrion stations.
Estimate changes in the diet of Andean condors and pumas from pellets and scats, respectively.		X		We collected 35 puma scats. Unfortunately, we did not find condor active roosting sites to collect pellets. Yet, we collected 12 Andean condor feathers in feeding sites and park rangers will continue to search for additional feathers. By comparing the stable isotopic signatures of molted feathers before the mange outbreak (Perrig et al. 2017) and afterwards, we will evaluate changes in the diet of condors.
Evaluate changes in the absolute and relative density of large and medium-sized herbivores (camelids, rheas, and exotic hares) through vehicular surveys.			X	We conducted 3 diurnal and 3 nocturnal vehicular transects (each replicated 3 times) to estimate the density of camelids, rehas, and hares.
Evaluate changes in the relative density of pumas using sign transects.			X	We conducted 83 on-foot transects to register signs (scats and tracks) of pumas.

Offer workshops to personnel of regional offices of the Argentine National Park Administration (APN) to discuss the development and implementation of disease prevention programs.			X	Although I initially proposed collaborating with personnel from two regional offices of the Argentine National Park Administration (APN), we ultimately worked with one office via 2 workshops and 1 online meeting. We are now working collaboratively in a disease monitoring program for all national parks in Argentina.
Disseminate the information collected.			X	To disseminate our findings, we (1) submitted a report to APN, (2) gave an oral presentation in the II Argentine Symposium on South American Wild Camelids, (3) discussed findings in workshops with wildlife managers, and (4) explained our findings to the public in a radio show. We will continue disseminating our results.
Build local awareness on the impacts of mange on condor conservation in the region			X	We participated in a local radio show and visited an elementary school of the closest town to our study area to explain the importance of preserving native camelids and pumas to sustain condor populations.
Survey local communities and understand their perceptions towards wildlife, the mange outbreak, and whether there has been increased sightings/issues with condors since the outbreak			X	We conducted 55 surveys in the 5 towns closer to our study area.

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

The three most important outcomes of this project are:

a) We collected sufficient field data to assess whether condor-puma-camelid trophic interactions remain disrupted nearly a decade after a mange outbreak began decimating native camelids in San Guillermo National Park (SGNP). In particular, we found that camelid density has not recovered, and we did not observe sufficient densities of rheas or exotic hares to compensate for their loss as main prey items of predators and scavengers. Our data indicates that puma density decreased in the area, and that pumas now primarily consume exotic hares, small rodents, and birds. This confirms that the puma-camelid trophic interaction does not provide the safe and consistent large carcasses that they used to provide to Andean condors. Despite extensive efforts, we could not locate active condor roosting sites in SGNP, and there were no signs of condor use at previously identified roosts. Local communities did not perceive an increase in condor sightings since the mange outbreak. While this suggests that condors are now feeding in areas far from SGNP, condors descended to feed in 12 out of 18 experimental carrion stations monitored, in groups of 1-13 individuals. This is likely due to the exceptional flight capacity of the species, which allows them to travel more than 350 km per day in search of carrion. These findings are key since they indicate that condors would return to forage in the area if carrion resources were restored. We included all this information in a report to APN where we recommend urgent conservation actions to restore the trophic linkages between condors, pumas, and camelids.

b) We worked with wildlife management authorities of our study area on the development of a prevention and monitoring program of mange. The first workshop was conducted with personnel of SGNP and the second with personnel of the regional office of APN that oversee all the national parks of the region. In these workshops, we (1) showed our research findings to raise awareness on the consequences of wildlife diseases for condor conservation, (2) explained the use of the Wildlife Health Risk Analysis as a key tool for the prevention and management of diseases in protected areas, and (3) focused on potential management plans for mange specifically. A follow-up, online meeting was organized with all these actors to discuss a particular protocol for monitoring and preventing mange, and these discussions are planned to continue during 2025. The goal is to generate a mange surveillance protocol that can be reglamented in all national parks of the country.

c) We raised awareness on the importance of disease outbreaks for the conservation of condors in local communities near SGNP. In particular, we participated in a local radio show (Radio La Cumbre, Rodeo, Argentina) to present our research findings and explain the interconnection between the health of humans, wild and domestic animals; the ecosystem services provided by Andean condors; and the impacts of mange on condor conservation. We also visited an elementary school to deliver a ludic activity that taught near 25 kids about direct and indirect trophic interactions of emblematic species of the Puna ecosystem (focusing especially on condor-puma-camelid linkages), and how mange affected these interactions putting condors and other species at risk. For this activity, we used a digital puppet of an Andean condor, operated by Dr. Fernando Ballejo, which interacts live with children and engages them in learning about condor biology and the ecosystem services they provide.

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

Shortly after my project began, a new president took office in Argentina triggering a rapid and unexpected surge in the prices of gas, food, and other essentials. Additionally, the APN institution —along with my own (CONICET)— faced budget cuts and staff reductions. In this challenging context, it became difficult to organize workshops to discuss long-term protocols for the management of sarcoptic mange. These circumstances required adjustments to both my timeline and budget. Most importantly, I focused resources on working closely with one regional office of APN and with SGNP personnel, with whom I had already established strong relationships, rather than attempting to engage more people through one-time workshops as proposed. Since the outcomes of these workshops can be applied across Argentine National Parks, I believe this has been a more effective approach.

Also as a consequence of the mentioned political changes, I was unable to process the necessary paperwork to import part of the field gear into Argentina on time. To resolve this, I borrowed equipment from colleagues with the agreement that they could use the gear I purchased later. This highlights the importance of academic collaborations in ensuring the success of research projects.

Finally, I was unable to find condor pellets in my study area to describe their diet. We thoroughly searched all sites where samples had been previously collected or where condor activity had been registered, even asking for logistical support from SGNP personnel to access remote locations near the park. Since no pellets were found, I shifted my focus to collecting condor feathers to evaluate dietary changes through stable isotope analyses.

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

I worked closely with SGNP park rangers, training them in our research methods and making them key participants in the project. This ensures the project's continuity in the area, e.g., rangers continued searching for condors feathers and monitoring the presence of mange in the camelids observed within the park.

This project also involved two technicians that analyzed the camera trap pictures and pumas scats, and 5 field technicians that learned all field sampling protocols.

The surveys conducted in local communities revealed a clear need for information about the causes and consequences of the disease affecting native camelids, along with dissatisfaction over the management of the disease by Argentine institutions. By participating in a radio show, we addressed some of the concerns identified in interviews. We have presented the survey responses to the National Park office both in a written report and orally, and this has incentive the planification of informative talks, directed to the community, to explain the causes and consequences of the mange outbreak. These talks should take place in 2025.

5. Are there any plans to continue this work?

I have been conducting research in SGNP for several years, and will continue to do so. Most urgently, I will search for funding opportunities to look for condor pellets in other sites of the region (farther from SGNP) to describe condor current dietary patterns and associated risks. Additionally, I plan to collaborate with APN personnel to share information about this disease outbreak with local communities near SGNP, raising awareness of the importance of conserving condors and the species they depend upon.

I will also continue to actively work on a prevention and monitoring protocol for mange in protected areas of Argentina. Further, I have joined a newly developed international working group for the control of mange in native camelids (involving researchers and wildlife managers of Chile, Peru, Bolivia and Argentina) to expand efforts to prevent this disease on a larger scale.

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

We plan to continue sharing our results with the general public through newspaper articles and public talks. Our research will generate at least two scientific contributions that we are preparing for publication, one focusing on how mange has affected condor conservation and another with the information collected surveying local communities.

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

I consider central to keep monitoring the changes that are taking place in the SGNP community due to the mange outbreak to inform management recommendations and evaluate management actions that should be implemented to recover the condor-puma-camelid trophic linkages.

Anecdotal observations of guanacos infected with sarcoptic mange have been registered southern from SGNP, indicating that the disease has spread outside this park and is already reaching southern populations of camelids. Thus, mange may be risking a central food resource for condors in Patagonia and elsewhere. I consider urgent to make effective the implementation of a plan to monitor and prevent mange in native camelids across Argentina.

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?

The RSGF logo was used in all talks given, including those given in local schools, academic meetings, and workshops. We will continue to use it in future presentations of our results.

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

Dr. Fernando Ballejo (biologist, Researcher of INIBIOMA-CONICET), not included in the original proposal, has been key for the development of this project. We have worked together in interviewing local communities and in conducting outreach activities.

Dr. Guillermo Wiemeyer (doctor in veterinary medicine, Researcher of INIBIOMA-CONICET) worked with me in delivering all workshops mentioned, and we will continue to work together in the prevention of mange in SGNP and other protected areas.

Dr. Pablo Gregorio (Professor at the University of Comahue and Researcher of INIBIOMA-CONICET) helped them with summarising and presenting research findings.

I was able to accomplish this work thanks to 5 field technicians. Further, 2 lab technicians helped me with processing the camera trap pictures and analyzing the scat samples.

I also received support from Dr. Emiliano Donadio (wildlife ecologist at Fundación Rewilding Argentina), Dr. Arthur D. Middleton (Professor at the University of California, Berkeley), Dr. Justine Smith (Professor at the University of California, Davis), and Dr. Julia Monk (Postdoctoral researcher at the University of California, Berkeley), who provided their expertise and logistical support, including a truck for conducting most fieldwork and covering the majority of its maintenance costs.

10. Any other comments?

I found local and international interest and motivation to work on protecting the condor-puma-camelid trophic linkage. I am very thankful for the opportunity to bring my research to the local community and wildlife managers. I present herein some pictures of the activities conducted.



Picture 1. Our fieldwork in San Guillermo National Park (San Juan, Argentina) involved conducting vehicular transects to estimate the density of native camelids (photo on the left), and searching for puma scats (on the right).



Picture 2. We installed 18 experimental carrion stations to monitor Andean condor presence in our study area via camera traps.



Picture 3. Our outreach activities included participating in a local radio show (photo on the left) and visiting an elementary school to do a ludic activity conducted by a digital puppet of an Andean condor created by Dr. Fernando Ballejo.