Final Evaluation Report

Your Details	
Full Name	Camila Rocca
Project Title	Understanding exotic wild boar (Sus scrofa) impacts for the conservation of natural environments of the Buenos Aires coast
Application ID	29650-1
Date of this Report	May 2023

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
Estimate wild boar density	■			We didn't achieve this objective because we couldn't buy the thermographic camera for the drone; its cost increased c. 50 % and it became impossible to buy.
Estimate the appearance/disappearance of disturbed patches			■	This estimation was performed with a combination of transects, permanent plots and drone images where it was impossible to walk through.
Determine if disturbances affect other vertebrates		■		We bought the camera traps on time but the supplier took several months to deliver them. Thus, we could only put them in one site.
Determine disturbances dynamic			■	Different plant succession sampling and experiments were developed in three protected areas, which yielded valuable and novel results. Thus, I decided to extend its duration and keep sampling until full recovery is achieved.
Evaluate plant diversity and ecosystem functions with an experiment			■	After 2 years of experimentation, we satisfactorily evaluated several ecosystem functions (bare ground cover, diversity and abundance of flower resources, litter accumulation, green biomass production and decomposition).

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

a) In the first place, and contrary to our expectations, we found that after a few months, wild boar disturbances enhanced plant alpha and beta diversity. This likely occurred because salt marshes and the surrounding grasslands are dominated by a few plant species. Thus, opening a gap in the vegetation provides an opportunity for subordinate species. This is particularly important in the Mar Chiquita grassland, which is strongly invaded by *Festuca arundinacea*, an exotic plant species that reduced the diversity of native species. In fact, we also found that a small native herbivore (wild guinea pig, *Cavia aperea*) interacts with wild boar, since they feed in open patches, and that the combination of both herbivores can maintain plant diversity in this highly invaded grassland. Results were so promising that we designed new samplings/experiments for the coming years. We plan to continue evaluating how these disturbed areas recover in longer timeframes, and if they eventually reach their original composition or if they reach an alternative stable state.

b) With the photos taken by camera traps we could not detect any direct interaction of wild boar with native fauna. However, we were able to determine rush hours for wild boar digging activities, which occurred mainly during the night (between 18:00 and 01:00). We could also determine that these activities mostly took place in small groups of three to five individuals (Figure 1). Although several native mammals were seen in areas previously used by wild boar, we could not be sure whether they were using these areas for feeding or just passing by. We did a video, linking several photos of wild boar disturbing an area, that show how they create bare patches while searching for food (see the video attached). We will continue using the camera traps to address the same questions at other sites.

c) Finally, I want to highlight that in Campos del Tuyú National Park, National Park rangers started a management action to benefit the pampas deer (Venado de las Pampas, *Ozotoceros bezoarticus*), a native species with a conservation status of Near Threatened. Pampas deer prefers short grasses to feed, hence park rangers manage some areas cutting grass to eliminate the dominant species and enhance biodiversity. Concerning the potential undesired effects of this management on wild boar activities (i.e., whether this action may attract wild boar too, and thus increase negative interactions with the pampas deer), we started sampling in those managed areas and in adjacent not-managed areas. Preliminary results (four samplings between 2021 and 2023) showed no differences in wild boar use between managed and control areas. Our idea is to continue this sampling over time, to evaluate longer time frames.

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

Overall, I believe that the key parts of the project were satisfactorily accomplished. However, there were two unforeseen difficulties that reduced the amount of auxiliary data that I intended to have. First, two unpredicted COVID-19 outbreaks led to temporal lockdowns and movement restrictions that reduced our field trips. In addition, an economic crisis led to currency depreciation and import limitations which made impossible to buy the thermographic camera for the drone. To tackle these difficulties, I increased the research effort on each field trip (more people and longer field trips), which allowed me to gather information not only for salt marshes but also for grasslands, which are the neighbouring ecosystem upwards. These extended field trips allowed us to tightly interact with park rangers, starting an evaluation of wild boar impacts on managed salt marsh and grassland areas. Thus, although some aspects of the original proposal were not achieved, I believe that the outcome of this research project exceeds its original expectations.

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

We are constantly interacting with local park rangers, communicating our results and discussing different projects. This interaction drives into new samplings, to reach common objectives (for example, samplings within non-managed areas and managed areas for the pampas deer). Moreover, their comments and observation

always drive into interesting questions to answer. With our results, they can select zones where wild boar focuses their activity and take management actions localised to those zones.

5. Are there any plans to continue this work?

Yes, my plan is to extend these samplings in time as well as to expand the number of variables measured. I would like to increase the frequency of within-year observations to understand the timing of wild boar disturbances. I also would like to measure a longer time frame to understand interannual dynamics and potential drivers of wild boar activity and impacts.

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

During 2021, I presented my main results during a series of talks about Mar Chiquita, organised by Administración de Parques Nacionales, Fundación Verdepampa and Escuela de Guías Naturalistas del Sudeste Bonaerense. I talked about wild boar effects and impacts in this area. It was intended for the general public. I was interviewed by a local TV show to explain my project and some of my results. I was also one of the speakers at a series of institute seminars on the impacts of exotic species.

Moreover, I am about to submit (in mid-May 2023) a manuscript about outcome "a" to Journal of Vegetation Science, and I will present outcomes "b" and "c" later this year in the Aregentinean Ecology Meeting (Reunión Argentina de Ecología, RAE).
Also, we are in close contact with authorities of the three sites, communicating the results and discussing which could be the next steps of the project.

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

First, I find essential to determine wild boar disturbance impacts on habitat use by other vertebrates. Hopefully I will have data to address this issue in the coming months. I believe that the most important next step for conservation purposes is related to the coming management plan in Campos del Tuyú National Park to reduce wild boar population. The data I have been collecting over the last year would be an ideal baseline condition to evaluate the consequences of this management. In addition, longer time monitoring and experimentation could allow to identify whether wild boar disturbances, by promoting diversity also increase the chances of establishment for exotic species, speeding up invasion processes already documented in these sites.

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?

Whenever I presented talks about this project (see "6"), I always used The Rufford Foundation logo. Although I didn't assist to scientific meetings yet, I certainly will this year at the Aregentinean Ecology Meeting (RAE), and I will use the logo there too. Moreover, I always explain to the local community (park rangers, landowners,

tourists, and through interviews) what we were doing there, and where the funding comes from.

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

Camila Rocca (PhD student): Leader of the project. I designed the project, organized the field trips, carried out the experiment, processed samples in the lab, and analysed results.

Juan Alberti (PhD): He helped in the design of the project, assisted on the field, and helped with data analysis.

Pedro Daleo (PhD): He assisted with fieldwork, and processing samples in the lab.

Martin Bruschetti (PhD): He assisted with fieldwork.

Jesús Pascual (PhD): He helped in the organization of field trips, with fieldwork and processing samples in the lab.

Nicolás Chiaradia (PhD): He was the responsible of flying the drone.

10. Any other comments?

We would like to thank The Rufford Foundation for the grant received. We are really grateful with the help given to carry out this project, something that would have been very unlikely given current funding limitations in Argentina. With these results, we can discuss with the authorities and provide them information to define the best action management strategies to preserve salt marshes, surrounding grasslands and their associated diversity. We would like to highlight that all equipment bought with this grant will be continuously used not only by me but also by colleagues working on related topics.
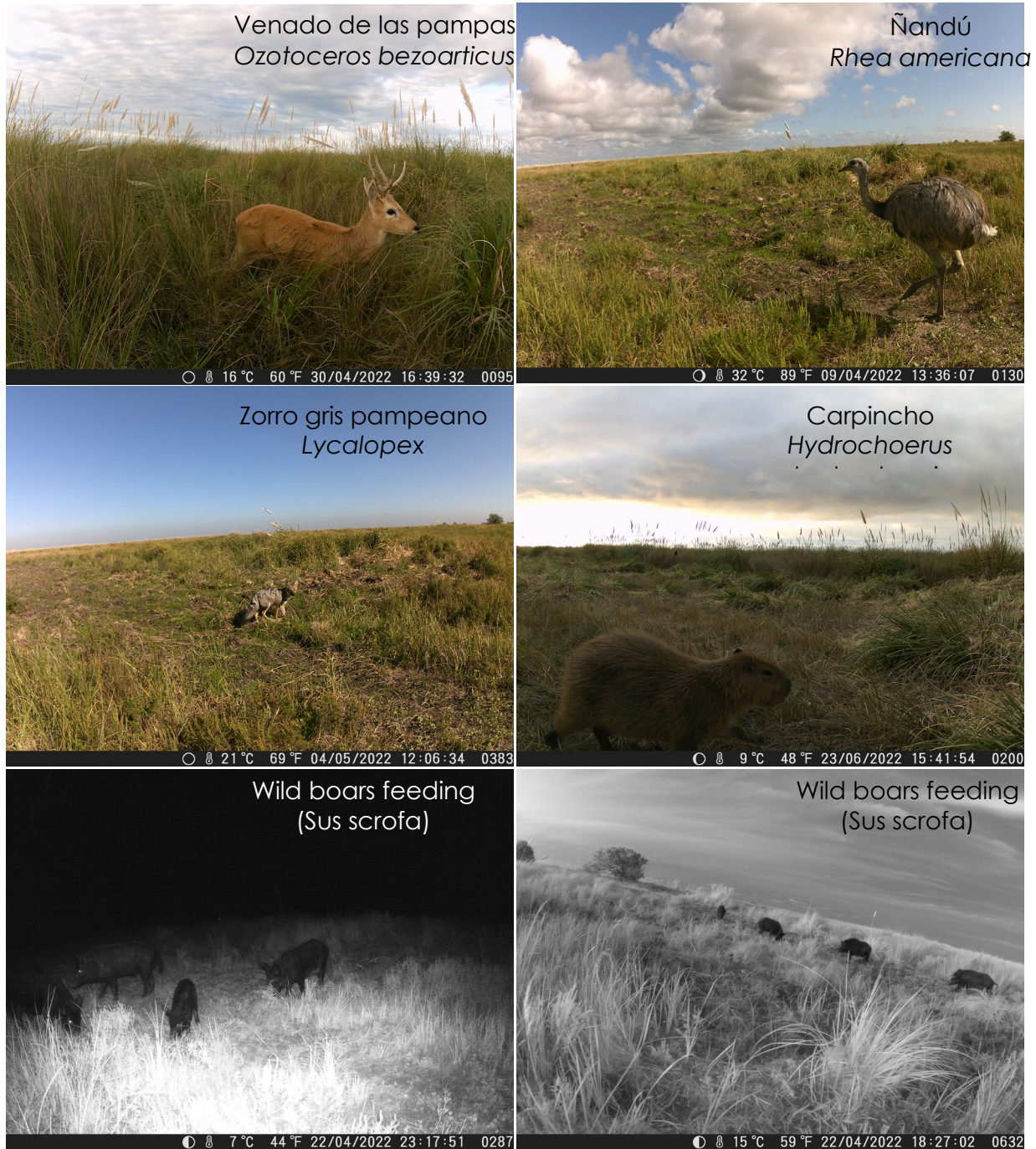
Figure 1: A few photos of wild boars and native fauna taken by the camera traps.

Figure 2: Camera trap.

Figure 3: Large disturbance.

Figure 4: Wild boars feeding.