

## Final Evaluation Report

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Your Details	
<b>Full Name</b>	Yamil E. Di Blanco
<b>Project Title</b>	Movement patterns and habitat requirements of Giant armadillos ( <i>Priodontes maximus</i> ) in the Chaco region of Argentina
<b>Application ID</b>	30218-2
<b>Date of this Report</b>	27/10/2022

**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
Capturing armadillos	Giant				<p>I planned to capture three to six giant armadillos, but we captured two, the first in the Chaco region and in Argentina, which I consider as a great success. I was only able to conduct four field campaigns during the reporting period due to limitations to travel and to purchasing the budgeted equipment in time. The first campaign, in June 2021, was focused on recovering camera traps left behind in the field due to the COVID-19 pandemic. However, during this field trip I surveyed, together with a field assistant, different roads and trails within the study site to identify possible capture sites for giant armadillos. In the second campaign, carried out from August 6-24 2022, my team and I made the first attempt to capture giant armadillos, according to my proposal. To compensate for some of the lost time, this fieldtrip was a major effort, with a team of 7 to 8 people (Fig. 1) with three vehicles, which tripled the work effort of searching for giant armadillo burrows (Fig. 2). We were joined by park rangers from the Loro Hablador Provincial Park, whom we assisted with fuel for their vehicle, and park rangers from Copo and El Impenetrable National Parks (Fig. 3, 4). Our team also included the coordinator of a network of local collaborators of the Proyecto Yaguareté (<a href="http://proyectoaguarete.org.ar">proyectoaguarete.org.ar</a>) in the Chaco region, who transmitted our interest to their key informants in the region to help detect the giant armadillo burrows during the survey. In</p>

			<p>addition to the 2000 km distance needed to reach the study sites from our residence place, each vehicle travelled over 2000 km more over roads in search of burrows to capture animals, in addition to several km of pathways surveyed on foot. This great effort paid off and we found potential active burrows (i.e., with a giant armadillo inside) where we placed the trap for capture (Fig. 5, 6). However, these capture attempts were not successful. In the first case, after 3 days of waiting we decided to remove the trap as per the pre-established protocol, since, although the animal may naturally spend several days in the burrow, in the event of a disturbance this period may be longer than usual, perhaps with negative consequences for the animal. In the second case, the animal left the burrow by making another exit, thus avoiding the trap (Fig. 7). On this field trip we trained and instructed park rangers and local inhabitants to identify and report if they found any active giant armadillo burrows, in which case we would travel to the site to make a capture attempt. This is how the third campaign came about, carried out from September 17-20<sup>th</sup> 2022, when we captured and tagged the first giant armadillo in Argentina after a local resident alerted park rangers to the presence of an active burrow on his land. The first giant armadillo captured and tagged is an adult female named Rosenda, weighing 33 kg and 1.53 m in length. The GPS-VHF tracking device was successfully attached externally to the animal's carapace while the animal was anaesthetised (Fig. 8). Once all procedures were completed and the complete recovery in the containment box, the animal was transferred and released in the same burrow where it had been found (Fig. 9). A camera trap was also placed near the burrow to</p>
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			<p>monitor the animal's exit. The animal left its burrow on September 20 (Fig. 10). In the following, and last, campaign in October 10-18, we were trying to locate Rosenda, and found a new active burrow, with another individual inside. We placed the trap and captured a second female, called Vilma (Figs. 11, 12).</p> <p>In relation to captures, previous to our first attempts, one of the veterinarians of my team participated in a training campaign with colleagues from the Giant Armadillo Conservation Program in the Pantanal of Brazil (<a href="http://www.giantarmadillo.org">www.giantarmadillo.org</a>), with whom he collaborated in the capture of an individual (Fig. 13). Another veterinarian from my team will be participating in the same activity during the next year.</p>
<p>Assessing Giant armadillo's movements and habitat selection</p>			<p>Since I still do not have the necessary information, I could not assess movement patterns of giant armadillos. In November 2022 I will recover the information stored in the GPS devices of the first's giant armadillos of the Chaco region. These data will provide us with unprecedented information on how specimens of this species move in this region and in Argentina. In addition, I devoted part of my time to analyse the data collected during previous field surveys and lead an article where we evaluated giant armadillo's habitat use and selection patterns using signs of the presence of the species. The article was recently published in the Journal for Nature Conservation (Di Blanco et al. 2022). Our results showed that the probability of occurrence of giant armadillo is much higher within forests, within or near protected areas, and increased with the distance to rivers, to grasslands, and to transformed areas. Thus, the maintenance of large surfaces of native forests and the consolidation, improvement, and connectivity among protected areas</p>

			seem to be essential for the long-term survival of this endangered species in Argentina.
Analyses and recommendations			<p>We identified the importance of protected areas for the species, as well as the threat that the transformation of the habitat implies for the species (Di Blanco et al. 2022).</p> <p>These results were shared with national and provincial authorities and were published by the local and national press (Fig. 14). The tagging of the first giant armadillo was also shared in our social networks and was well received by the entire community. In addition, during fieldtrips, informal talks were engaged with local people (around 20 families distributed along study areas; Fig. 15) to promote better understanding of this species and to inform about its associated conservation problems.</p> <p>I prepared reports to national and provincial authorities, where I summarised the main findings of my project. These results will be also presented at the "XXXIII Conference of Mastozoology of Argentina" that will be held in November 2022.</p> <p>During the last field surveys, we were visited by the Chaco province authorities in our field base, in Loro Hablador Provincial Park (Fig. 15) where we talk about starting a collaboration to produce a management plan for the species in the province of Chaco, since the giant armadillo is listed as a Monument species in this province.</p>

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

- a). This long-term project continues to grow.
- b). An article that shows the situation of the species, the role of protected areas for it, and the negative effects of the transformation of its habitat.
- c). The successful tagging of the first giant armadillos in Argentina and the unprecedented information it will generate.

This was thanks to the great effort of colleagues and friends, park rangers and local inhabitants, who collaborated in an intensive field campaign to achieve the objectives of this work. Although we were not successful in capturing a minimum of three giant armadillos as we proposed, we were able to capture and tag two of a severely endangered and little-known species in the country (see figs. 8-12), which gives us hope that we will achieve our goals, even if it takes a longer time. Finally, the collaboration of colleagues, park rangers, local people, and even decision makers in this work showed to me its importance and that it can generate real changes in the situation of this endangered species. I personally became more experienced and related with the problematic of the giant armadillo and the Chaco region of Argentina.

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

Without any doubt, one of the biggest difficulties was the COVID-19 pandemic that provoked a delay in field activities due to the suspension of activities, in addition to the closure of roads and provincial limits, preventing access to study sites until mid-2021. Another serious difficulty was the Argentine Government's limitations on purchasing equipment abroad, due to an economic crisis. Since 2020, any product purchased abroad must pay 65% tax on its value, seriously limiting the equipment budgeted. It is possible not to pay the totality of these taxes for equipment that is destined to research, but this requires a series of procedures that took me and my institutions more than a year to solve. This, added to the pandemic, made the fieldwork highly limited and delayed. On the other hand, when the funds came into our Argentine account, in February 2021, they were converted into the local currency, which resulted in the devaluation of the funds received due to the inflation that Argentina is currently suffering in relation to foreign currency. One sterling pound was equivalent to AR\$ (Argentina Peso) 78.47 in February 2021, while today it is equivalent to around AR\$162 (not including taxes). However, with Rufford funds we were able to recently purchase most of equipment proposed and carried out a multiple effort field campaign to compensate the time lost, including the use of three vehicles and several people working in the field, in addition to park rangers and local inhabitants collaborating with us. This was achieved also thanks to the collaboration of other funding sources, such as those from the Fund for Scientific and Technological Research (FONCYT) of the National Agency for the Promotion of Science and Technology of Argentina.

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

Local communities are essential for this project, as well as for the conservation of the giant armadillo, since they are the ones who are coexisting with the species. To capture, study, and protect giant armadillos it is necessary to work along with local inhabitants, which was demonstrated by our experience. The first capture was thanks to a local resident who alerted park rangers to an active burrow in his field. In each field trip we interact with landowners and people that lives and work in the field. Along with the "Proyecto Yaguareté" ([proyectoyaguarete.org.ar](http://proyectoyaguarete.org.ar)), that have a net of local informants that notify about the presence of the critically endangered

jaguar (*Panthera onca*), we added the giant armadillo as a focus species, thus we are actively interacting with local inhabitants to monitor these species. Furthermore, their lands will play an important role for the creation of conservation corridors that connect existing protected areas in the region, one of the main objectives of this work. The giant armadillo is listed as a Monument in the province of Chaco and is starting to be considered as a flagship species in the Chaco region of Argentina. The involvement of local communities in the protection of this species, such as being part of conservation corridors, should, in the future, benefit or compensate them in some way for the use of their lands. This is not yet stipulated, but we hope that these issues will be included in management plans for the giant armadillo, both at the provincial and national level.

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

Absolutely, the study of the spatial ecology of the giant armadillo is the second stage of a planned long-term project. I am starting this stage with my new position as Adjunct Researcher at CONICET (this is the second level as Researcher among the four existing hierarchy levels), and the study and conservation of the giant armadillo is the main activity approved to be carried out in this position. In addition, I've got national funding from the National Agency for the Promotion of Science and Technology of Argentina (<http://www.agencia.mincyt.gob.ar/frontend/agencia/instrumento/24>) to work for a period of three years (2022-2025), which ensures the continuity of the project for at least this time. For this period, along with several research working in genetics and other important species from northern Argentina (jaguar, white-lipped peccary *Tayassu pecari*, tapir *Tapirus terrestris*, and giant armadillo), we have funds also from the ImpacAr programme from the Ministry of Science, Technology and Innovation of Argentina ([www.argentina.gob.ar/ciencia/sact/impactar](http://www.argentina.gob.ar/ciencia/sact/impactar)) to collect samples for genetic analyses during the captures of giant armadillos.

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

Since the beginning of my project with the giant armadillo in 2017, results were shared in research articles, press, reports, and personal communications with local people and authorities (Figs. 14, 15; Quiroga et al. 2017, Di Blanco et al. 2020, Di Blanco et al. 2022). I have prepared and am preparing reports to National and provincial authorities, where I summarised the main findings of my project, especially those published in my last article (Di Blanco et al. 2022). These results will be also presented at the "XXXIII Conference of Mastozoology of Argentina" ([jamiguazu.com.ar](http://jamiguazu.com.ar)) that will be held in November 2022. Within the next month, along with Chaco province authorities we will start the writing of a provincial management plan for the giant armadillo since this species is listed as a Monument in this province. Once I finally collect movement data of several giant armadillos, I will use this information to write a comprehensive report which includes analysis of potential mitigation measures applicable to giant armadillos in Argentine Chaco region. I will attend meetings to present these documents and materials to all relevant authorities (National Parks Administration, provincial authorities) to finally develop corridors to connect main protected areas. I will coordinate a workshop with local and national authorities to establish guidelines and responsibilities for the

developing of a management and conservation plan for the giant armadillo in Argentina. I will also produce more scientific publications and presentations in national and international scientific and conservation meetings. I will keep posted the project page in my institution ([ceiba.org.ar/proyectos/proyecto-tatu-carreta](http://ceiba.org.ar/proyectos/proyecto-tatu-carreta)), Facebook and Instagram pages where I share all activities and news of this project ([www.facebook.com/TatuCarretaChaco](https://www.facebook.com/TatuCarretaChaco), [www.instagram.com/tatucarretachaco](https://www.instagram.com/tatucarretachaco)).

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

My next step is to finish the year of survey, with a field campaign in November 2022 to recover the GPS devices and download location data. I plan to capture at least three more individuals within 2023 during field campaigns every 3 months. I already count with funding for these activities. To analyse data and starting to know the movement patterns of this species in the Chaco region will be essential to plan conservation corridors for the giant armadillo and other species of large areas requirements. Preliminary results of the first individual will be reported to protected areas, provincial and national authorities, and after having information on four to six individuals, it will be published in a peer-review journal, as also presented in a conference or scientific meeting. The realisation of the management plan for the giant armadillo in the Chaco province as a first step to the one at the national level will be an important next step.

### **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?**

Since I had the support of The Rufford Foundation from the beginning of my work with giant armadillos in Argentina in 2017, I have used the logo in every formal and informal presentation of my work. I will soon be using the logo in the "XXXIII Mastozoological Meeting", organised by the CelBA and IBS, in Misiones province, Argentina, in November 2022. The reference number of this project and the first Small Grant were used in the publication in "The Journal for Nature Conservation" (Di Blanco et al. 2022).

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

**Yamil E. Di Blanco.** Team leader. Member of CelBA and Researcher at the IBS.

**Ezequiel Vanderhoeven.** Veterinarian. Member of CelBA and Postdoc at the IBS.

**Juan Pablo Arrabal. Veterinarian.** Member of CelBA and Proyecto Yaguareté, and Postdoc at the IBS.

**Sebastián Costa.** Veterinarian. Member of CelBA and Proyecto Yaguareté, and Technician at the IBS.

**Verónica Quiroga.** Member of the CelBA and Proyecto Yaguareté, and Researcher at the Instituto of Animal Ecology (IDEA) of the Nacional University of Córdoba.

**Agustín Paviolo.** Member of the CelBA, leader of Proyecto Yaguareté, and Researcher at the IBS.

**Lucero Corrales.** Park ranger. Member of the CelBA and coordinator of the net of collaborators of Proyecto Yaguareté at the Chaco region.

**Débora di Francescantonio.** Member of CelBA and Proyecto Tatu carreta, Researcher at the Facultad de Ciencias Forestales of the National University of Misiones.

**Mario Di Bitetti.** Member of CelBA, Researcher at the IBS, and former Advisor of the activities of Y. Di Blanco.

### **10. Any other comments?**

Thank you very much. I couldn't have continued and consolidate this project without the help from both Rufford Small Grants. Once this stage is advanced, I hope to be able to apply for a third Rufford Foundation grant. Anything else you need, please don't hesitate to ask me.



**Part of the work team of the last campaign dedicated to the search for Giant armadillo burrows.**



Working team observing a recent Giant armadillo burrow on a road in the Chaco region of Argentina.





**The team with park rangers in El Impenetrable National Park, in the province of Chaco, Argentina.**



**Setting up a trap to capture a Giant armadillo for the fitting of a GPS device, together with a provincial park ranger, in an unprotected area of the province of Chaco.**



Yamil Di Blanco, team leader, in a burrow with a trap set to capture a Giant armadillo for the fitting of a GPS device for its study in the Chaco region of Argentina.



Sequence of photographs taken by a camera-trap in a Giant armadillo burrow with a trap to fit it with a GPS device for its study and conservation. It can be observed how the animal avoids the trap by making a new exit to its burrow.



First Giant armadillo being tagged with a GPS device in Argentina.



Female Giant armadillo being released in the burrow where she was captured, after being tagged with a GPS device.



Camera-trap record of the Giant armadillo leaving its burrow after being tagged with a GPS device. The date and time can be seen at the top right of the photograph.



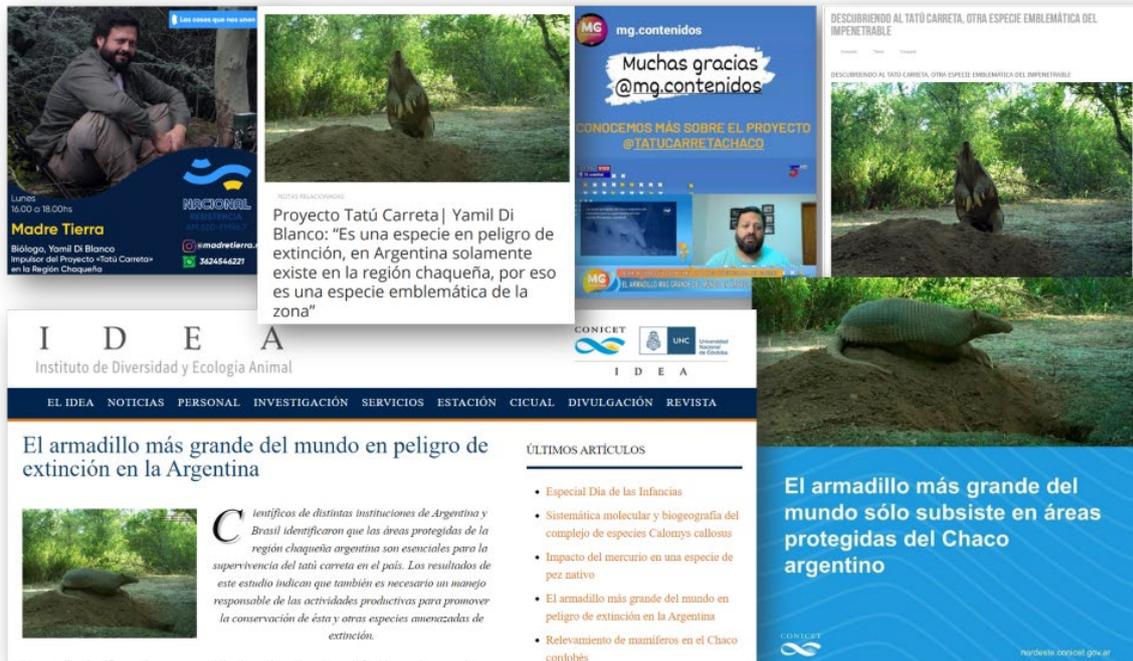
Second female giant armadillo being tagged with a GPS device.



Second Giant armadillo being released in the burrow where it was captured, after being tagged with a GPS device.



Team veterinarian Ezequiel Vanderhoeven with a Giant armadillo captured in the Brazilian Pantanal for its marking, study and conservation.



Some of the radio and newspaper reports showing the results of the study on the Giant Armadillo in Argentina.



Team members, park rangers and authorities of the province of Chaco in the Loro Hablador Provincial Park.



**A team member talking about the Giant Armadillo with a local inhabitant of the Chaco region of Argentina.**

## References

Di Blanco, Y. E., Quiroga, V. A., Desbiez, A. L., Insaurralde, A., & Di Bitetti, M. S. (2022). High dependence on protected areas by the endangered giant armadillo in Argentina. *Journal for Nature Conservation*, 68, 126228.

Di Blanco, Y. E., Desbiez, A. L., Di Francescantonio, D., & Di Bitetti, M. S. (2020). Excavations of giant armadillos alter environmental conditions and provide new resources for a range of animals. *Journal of Zoology*, 311(4), 227-238.

Quiroga, V. A., Di Blanco, Y. E., Noss, A., Paviolo, A. J., & Di Bitetti, M. S. (2017). The giant armadillo (*Prionomys maximus*) in the Argentine Chaco. *Mastozoología neotropical*, 24(1), 163-175.