

## Final Project Evaluation Report

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Your Details	
<b>Full Name</b>	Maria de las Mercedes Guerisoli
<b>Project Title</b>	Designing a diverging stimulus strategy ("push-pull") to mitigate damage by marsh deer ( <i>Blastocerus dichotomus</i> ) in commercial forestations of the Lower Delta of Paraná River.
<b>Application ID</b>	25758-1
<b>Grant Amount</b>	4,940 £
<b>Email Address</b>	<a href="mailto:mariadelasmercedesguerisoli@gmail.com">mariadelasmercedesguerisoli@gmail.com</a>
<b>Date of this Report</b>	May 2019

**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
<p>Characterize the damage caused by marsh deer to plantations, by understanding the economic and social impact.</p>				<p>Through semi-structured and anonymous interviews (from April 2018 to August 2018) I could collect reliable information related to the conflict with marsh deer in the study area. Interviews were personal and during workshops with local forest producers. This information was necessary for the planning of the mitigation techniques tested during this year. Figure 1 and 2.</p>
<p>The evaluation of the effectiveness of an odoriferous repellent to reduce the level of damage caused by the marsh deer on forest species with commercial value in the study area.</p>				<p>We tested two odoriferous repellents during this year. We first studied the effects of human and dog hairs in order to avoid the deer's bark rubbing. We didn't achieved conclusive results with this repellent, because it's was difficult to evaluate in the field its effectiveness. The second repellent tested was coffee ground and soap. We started to test this in semi-captivity and we obtained very promising results. This type of repellent could be use to avoid browsing and bark rubbing by deer. Figure 3 and 4. See video.</p>
<p>The study of the effectiveness of visual stimuli as repellents for the marsh deer in plantations of the study area.</p>				<p>Although we proposed these stimuli to be tested in the study area, after we completed a worldwide review of the different deer repellents and their efficiency we decided not to used "low efficiency" repellents and concentrate our resources in repellents with "high success". The preliminary results of this review were presented during the XXI Argentine Mastozoology Congress, plus we are finalising the scientific article with the complete information. Figure 5.</p>
<p>The evaluation of an "alternative rubbing</p>				<p>We study the possibility to use as "alternative surfaces" the Salix's</p>

<p>surfaces" (i.e., surfaces used to remove the plush remains of the antlers) artificially designed for the marsh deer, offered as an alternative to the poplar trunks (<i>Populus</i> spp.).</p>			<p>discard material. We talked to forest producers and they were not convinced of this solution since the logistically could be difficult to implement. Thus, we started to study if the odoriferous repellents (see objective 2) were efficient to minimise the proximity of males to poplar trees. Figure 6.</p>
<p>The identification of willow varieties (<i>Salix</i> spp.) which are most affected by deer in plantations of the study area, in view of their use as an attractive stimulus in a divergent stimulus system.</p>			<p>We completed several counts in nurseries of the study area which presented different willow varieties. In each nursery we counted deer bites per willow variety. Although we achieve this, we believe that we are still missing to sample other nurseries in the study area to make more robust the data collected. Figure 7.</p>

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

During this year we faced several difficulties, mainly related with the repellents tested. Before starting fieldwork we completed a worldwide review on the repellency systems applied and their success in order to understand deeply with which repellents were convenient to start our trials. Since repellents with predator scents were very promising, we started to test human and dog hairs (inside nylon socks) to avoid the proximity of male deer to poplar trees. Although we used camera traps in the trials, it was really difficult to understand the rate of "re-visits" of male deer to the sites. We registered the new damage on the tree barks, but since the antler rubbing occurs, mainly during one season, studying, on the field, the real effect of this repellent was quite challenging.

At the beginning of 2019 we had the chance to start our tests with semi-captivity marsh deer. We studied the effect of the casein (12%) on the diet supplies provided. We found that deer eat less the food with casein, compared with the "control food", but we needed to stop the trials because two individuals started to show clinical signs of gaseous meteorism. Thus, although in the field trials this repellent showed a significant repellency, we couldn't statistically determined if the response recorded in semi-captivity was significant.

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

The three most important outcomes were:

1- The identification of one successful repellent (ground coffee with bar soaps) which showed rejection from male and female deer. This repellent not only diminished the time of feeding but also preventing their proximity. This repellent could prevent (or minimizing) not only browsing of deer but also their antler rubbing.

2- The recognition of one preferred willow variety (yaguareté) by marsh deer. This finding is very important since represent the “pull” part in a “push-pull” system. The identification of a preferred variety could guide forest producers to use this as an attractive source near nurseries that need to be protected. We are performing further analyses in order to understand why this variety is preferred and which chemical compounds are found, in view of improving its genetic selection.

3- During this year we widely promoted this project through social media (Facebook, Instagram) reaching several forest producers of the delta community. In fact, through social media, producers contacted us asking which repellent we were using and how we were applying it. I believe that reaching the local community, the one “suffering” and coexists with marsh deer population, is the most important outcome since we are trying really to improve this conflictive coexistence. On 14th May 2019 we completed the first workshop of on deterrence strategies of “herbivores problem” in the study area (Figure 8). During this event, we presented the first results of the different repellent tested and of the preferred varieties sampled.

#### **4. Briefly describe the involvement of local communities and how they have benefitted from the project.**

The main objective of this project is to benefit the coexistence between the forest producers (mainly medium and small) with the population of marsh deer in the delta of Paraná. Since this deer population is vulnerable and hunting is one of its main threats, it is fundamental to change local community's perception, and thus their tolerance towards *B. dichotomus*. Local communities were involved from the beginning of this project, during the interviews session completed in 2013 and in 2018. The first repellency tests were performed in forest producer's properties of the delta (Figure 9). The first workshop completed in May 2019 (Figure 8) is the first step towards a series of workshops that will be held in the study area with the objective of involving local producers in meetings with field technicians working with deer repellents and preferred willow varieties.

Local communities will be directly benefitted since marsh deer generate economic losses in their plantations, and thus, in order to avoid negative attitudes towards this species, the application of successful repellent or a future “push-pull” system will minimise their losses. Also, from the first results provided by Proyecto Pantano (Project responsible Juan Francisco Tellarini, also with a Rufford Small Grant), there are registers that the exotic deer *Axis axis* is increasing its presence in the delta, and we believe that the repellents will be useful also for this invasive species.

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

Yes, of course! We are on a half way of completing the work. We aim to build up a successful “push-pull” system. Until now, we identified a successful repellent and an attractive willow variety. The next step is to start working on a “push-pull” system on the field and studying how make it work. We need to set field variables, such as

distances (between the push and the pull sites) and re-application of the repellent. So, we have quite a challenging and a fun work to do!

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

The results of this project ARE needed to be share with the local community of the delta, since they are an important gear of this work. So, during these months we started to share the activities that we were completing and from now on, we will start to share the results of the repellents used and how are needed to be applied.

Since we aim to build up a “push-pull” system, probably we will share the “whole package” once we will understand how this effectively works (see question number 5).

Parallel to this, we are completing the submission of one scientific manuscript entitled “Deer damage in agricultural-forest systems: a review of the methods to reduce the impacts” and, one we finishing of analysing the data related to the repellents we will complete a second scientific manuscript.

Anyway, all the updates related with this project are uploaded every 2 months in the Facebook page of Proyecto Pantano.

So, the results are share with forest producers (through workshops and fieldwork), with the scientific community (through congress presentations and manuscripts) and with a “more general public” (through Facebook and Instagram).

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

The grant was used from May 2018 until May 2019. As announced in question number 5, our plans is to continue with this project since we have still an important objective to complete (the “push-pull” system). Sadly, the economic situation in Argentina is quite problematic, and this grant was the only economic support with which this project could achieved all the objective described in this report. This is why we believe that this small grant benefited 100% the local community of the delta and the marsh deer population. Still, in order to achieve the final goal, the purposed is to apply for a second grant with the hope that we have the support to finishing what we have started. We achieve a lot of novel information but we have still a path to complete.

#### **8. Budget: 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. It is important that you retain the management accounts and all paid invoices relating to the project for at least 2 years as these may be required for inspection at our discretion.**

*The local exchange used was an average of the value between the exchange in May 2018 (1 GBP → 27.9 ARS) and May 2019 (1 GBP → 56.10 ARS) = 42 ARS.*

I have all the paid invoices written in an xls file and the tickets from the expenses. Despite of this, some of the expenses have been without tickets (e.g. boat rental and guide).

Item	Budgeted Amount	Actual Amount	Difference	Comments
Food and accommodation	414	195	-219	We were lucky with the food! During the trials in semi-captivity food and accommodation were free!
Vehicle gas & maintenance	1037	864	-173	
Other transportation needs	1950	2250	+300	
Vehicle rental	1449		-1449	Finally I had the opportunity to use a vehicle from INTA.
Repellent and field supplies	50	92	+2	
Alternative rubbing surface (Discarded woody material)	5			
Visual stimulus (Supplies coloured flags, strips or other reflective objects, biodegradables)	35			
Camera trap		266	+266	We suffered the robbery of a camera trap and thus we needed to buy one in US. The exchange used was 1 USD=1.26 GBP
National tax to receive the camera		105	+105	In Argentina exists heavy taxes applied to the products imported.
Bank cost to accept the transfer from the Foundation		28	+28	
Volunteer field assurance		5	+5	
<b>Total</b>	<b>4940</b>	<b>3805</b>	<b>-1135</b>	This amount will be used to finish the field work in June and July which comprises preference sampling of willow varieties and testing of the successful repellent in the field.

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

As announced before, we want to successfully set a “push-pull” system in the delta in order to prevent damage from marsh deer in nurseries and forest plantations. The “push-pull” system will offer to deer the avoidance an important economic source (with an economic and bio-degradable repellent, e.g. ground coffee) but will be attracted to an alternative (with less economic value) source. With hope, this will “modify” deer behaviour and thus will keep deer away from the “important” plantations in each propriety, and in this way, from the human presence. We believe that once we fully understand how this system will work, could be pooled to other areas of the Mesopotamia Argentina where the exotic Axis axis is causing heavily damage to natural habitats.

**10. 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?**

Yes! In every presentation completed during this year we used the Rufford logo (see Figure 5 and 8 and the video). We are planning to present the results in the next Argentinean Mastozoology Congress in Peninsula Valdés (in November 2019) and also there the Rufford Logo will appear as in the future scientific productions.

If we received a second grant from the foundation, we want to print t-shirts with the logo of the foundation as also stickers to be applied in the repellency devices.

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

**Dr. Javier Pereira:** Proyecto Pantano leader. He provided the contact with local communities as coordinates all the fieldwork activities of the main Project. He participated in several field repellency tests and is responsible of the social communication of the Facebook and Instagram pages.

**Ms. Natalia Fracassi:** Proyecto Pantano member and researcher in INTA Delta. She is one of the most important nexus between the local communities and Proyecto Pantano. She works in the study area since 10 years and fully understand the logistic and social dynamics.

**Dr. Daniel Somma:** researcher in INTA Delta. He provided the logistic materials and coordinated locally field work.

The complete team: Figure 10.

**12. Any other comments?**

We really wants to thanks the Rufford Foundation because without this grant all this novel information collected during this year it could not have been possible. Argentina is going through a difficult economic period and scientific support is really

scarce. In this context any help, mainly if is orientated to local communities and vulnerable species, is fundamental.

We want to acknowledge La Biznaga, a private propriety in Buenos Aires Province which allowed us to complete the semi-captivity test with marsh deer. Without these test it could not be possible to understand the behavioural responses of marsh deer towards the repellents. This place gave us the possibility to study marsh deer with a closer look and to collect novel information of this elusive species of the Delta of Paraná River.

Also we want to thanks to Juan Fredes who was a volunteer during field work, participating in different repellency test (Figure 11).

### Figures and tables

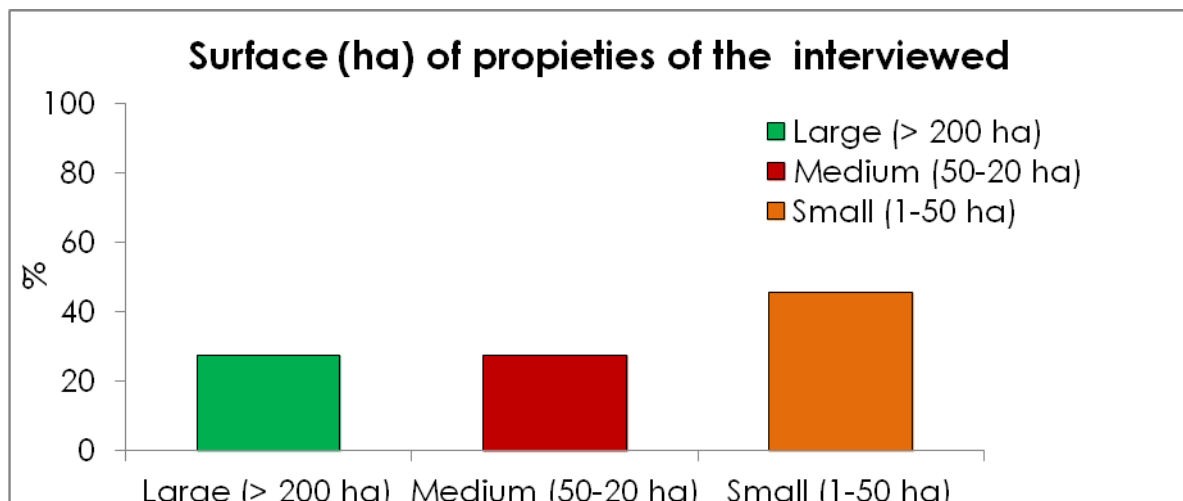


Figure 1. Surface in ha of the propieties that were included in the interviews completed between April 2018 and August 2018 in the Delta of Paraná River.

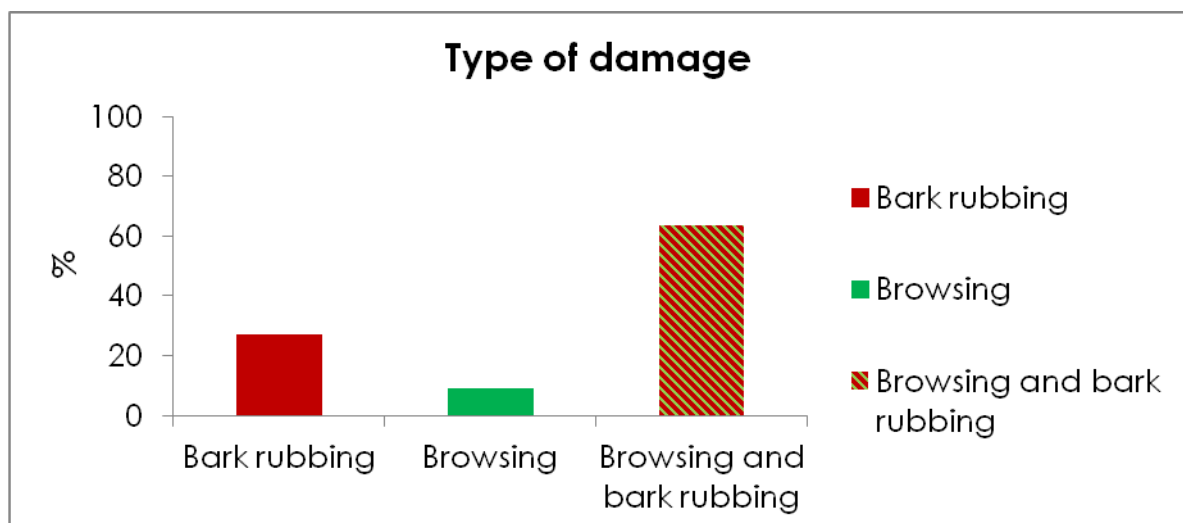


Figure 2. Main type of damage found by the interviewed in their properties.





Figure 3. Caseine is applied on the Salix spp.



Figure 4. "Coffee grounds and soap" repellent. 1- the elements we used to set the devices; 2- the soap bars were processed; 3- we used plastic containers as the external protection of the socks filled with coffee ground and the pieces of soap; 4- we offered, in semi-captivity, food supply to 4 individuals of marsh deer and above we hung the repellent devices.



Figure 5. Oral presentation made during the “XXXI Jornadas Argentinas de Mastozoología” in 2018. Here we present the first and the last slide.



Figure 6. Tree included in a repellent test. We can observed a sock with human and dog hairs hanged on the tree which was previously damaged by a male deer.  
 Figure 7. Nursery with different willow varieties. In the left side of the picture is visible the “yaguareté” variety.

**INTA** Taller sobre Estrategias de Disuasión de herbívoros problema

**PROYECTO PANTANO**

**INTA - Delta del Paraná**  
May 16 at 10:19 AM

Taller sobre estrategias de disuasión de herbívoros problema.

El pasado martes 14 de mayo se realizó en INTA - Delta del Paraná un taller interno con especialistas y extensionistas agudizado a diseñar estrategias para reducir daños por "herbívoros problema". Realizado en el marco del Convenio INTA-Arauco e INTA-FAUBA, coordinado por la Dra. Patricia Fernández y la Lic.(MSc) Natalia Fracassi, tuvo como objetivo presentar los resultados de las investigaciones de campo y laboratorio sobre herbivoría en salicáceas por parte del ciervo de los pantanos y hormigas cortadoras de hojas, y evaluar posibles estrategias de repelencia y disuasión que puedan aplicarse a escalas pequeñas de manejo (viveros, rodales pequeños y huertas). Las exposiciones estuvieron a cargo del grupo del Dr. Javier Pereira (Proyecto Pantano/MACN-CONICET), el grupo de la Dra. Patricia Fernández (INTA-CONICET y FAUBA) y el grupo del Dr. Luis Calcaterra (FUEDEI/CONICET). Se discutieron los niveles de daño económico y umbrales de daño aceptables, las opciones de manejo disponibles y la necesidad de trabajar en un programa de manejo integrado para gestionar estos conflictos (que incluya, por ejemplo, manejo del agua y de la vegetación espontánea presente en la matriz). Se espera como un paso a futuro discutir las propuestas con distintos actores del medio productivo local.

Caracterización del daño generado por ciervo de los pantanos *Blastocerus dichotomus* en las plantaciones forestales del Delta del Paraná: hacia el diseño de un sistema *push-pull*



Dra. Maria de las Mercedes Guerisoli  
14 de mayo 2019  
INTA EEA Delta del Paraná



**INTA** **Rufford** **MACN** **CONICET**

Figure 8. The first workshop of on deterrence strategies of "herbivores problem" in the Delta of Paraná River.



Figure 9. Small forest producers of poplar and willow in the Delta where repellency tests began.



Figure 10. The team members. From right to left: Natalia Fracassi, Javier Pereira, Daniel Somma and María de las Mercedes Guerisoli.



Figure 11. Juan and Maria during a repellency test with semi-captivity marsh deer.



Figure 12. Female of marsh deer.



Figure 13. Male of marsh deer.



Figure 14. Maria in the facilities where the semi-captive test were performed.