Final Evaluation Report

We ask all grant recipients to complete a project evaluation that helps us to gauge the success of your project. This must be sent in **MS Word and not PDF 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 – remember that negative experiences are just as valuable as positive ones if they help others to learn from them.

Please DO NOT fill in and submit this form until the project has been completed.

Complete the form in English. Note that the information may be edited before posting on our website.

Please email this report to jane@rufford.org.

Your Details	
Full Name	María del Milagro Torres
Project Title	Assessing ecological consequences of non-native willow management: Can we restore native riparian forests and shrublands from northwestern Patagonia?
Application ID	40869-1
Date of this Report	07/07/2025

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 the effects of manual removal of non-native willows on attributes of riparian plant communities (i.e., passive restoration).			X	We evaluated the passive restoration on two enclosed 2 m^2 subplots (i.e., micro-fences) and other two subplots under herbivory pressure (i.e., control subplots) inside plots where non-native willows were removed manually (i.e., removal treatment) and others with willow presence (i.e., control plots) during austral summer 2023 to summer 2025. Particularly, we estimated the understory and canopy cover of each plant species, measured the woody species height, and counted the number of saplings of non-native willows and woody natives. Additionally, the age of willow and timing of invasion was estimated using the increment borers. The timing of willow invasion was of 50 years approximately.
Evaluate the effects of manual removal of non-native willows on the use by non-native ungulates.			X	We recorded the number of pellets and their identification and estimated the soil rooting by wild boar in each 20 x 10 m plots during autumn 2023 to autumn 2025 (total 20 plots). In the same plots, we installed and rotated 10 camera traps to record ungulates and wild mammals' activities during autumn-winter 2024 and

				spring-summer 2025. We also estimated ungulates browsing for each woody species in the four subplots of passive regeneration during summer 2024 and 2025. We were able to estimate relative abundance of ungulates and wild mammals based on the camera-trap images. We found four native species: cougar (*Puma concolor*), Andean fox (*Lycalopex culpaeus*), Humboldt's hog-nosed skunk (*Conepatus humboldtii*), and armadillo (*Chaetophractus* sp.). We detected five wild non-native mammals: red deer (*Cervus elaphus*), fallow deer (*Dama dama*), European hare (*Lepus europaeus*), American mink (*Neovison vison*), and wild boar (*Sus scrofa*); and three domestic non-native ungulates: cattle (*Bos taurus*), sheep (*Ovis aries*), and horse (*Equus ferus*). The relative abundance of non-native species was higher than abundance of native species (95% vs. 5%). The most abundant species were cow (45%), sheep (40%) and deer (5%). Non-native species were more abundant in control than removal plots and during spring-summer than autumn-winter. The abundance of native species was similar between treatments and seasons.
Evaluate the effects of manual removal of non-native willows			X	We estimated bare soil in the four subplots of passive regeneration during summer 2024 and 2025, in

on abiotic characteristics of sites.				each plot. We conducted the final measures of luminosity and compaction of soil in the 20 x 10 m plots during summer 2025 and summer 2024, respectively.
Evaluate the effects of willow removal on the regeneration of planted native and non-native tree species (i.e., active restoration).			X	During autumn 2024, we measured characteristics regarding establishment and growth of saplings of native species (*Ochetophila trinervis and Salix humboldtiana*) and non-native willows planted within Objective A plots in winter 2022 (i.e., removal treatment and control). Finally, we removed non-native willow saplings from the sites in order to avoid their spreading.
Evaluate the effects of willow removal on the preference of ungulates on saplings of native and non-native tree species.			X	We determined the ungulates preferences by native species and non-native willows by counting the number of total and browsed branches.
Communication of findings to the key stakeholders and the scientific community.			X	We have shown the findings at various national scientific meetings (the Argentine Meeting of Ecology, National Meeting of Ecological Restoration of Argentina, Ecovalle Forum, Argentine Mammalogy Meeting) and one international scientific meeting (International Young Researchers Conference on Invasive Species). During autumn 2025, we carried out a local-regional workshop to invite the community key stakeholders, share our results, and discuss possible management guidelines for the willow invasion and restoration of riparian habitats.

				Regarding this workshop, we wrote an evaluation report and a divulgation note. We also wrote a technical report to the ranch administrators of our study sites.
Publish results in a peer-reviewed journal		X		We submitted a manuscript to the journal Restoration Ecology regarding the objective 2 of the project.

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

a) Exclusion of ungulates had a greater effect on plant community attributes than willow removal. Fencing promoted vegetation regeneration (i.e., passive restoration), especially of native woody species. In contrast, ungulates promoted the establishment of non-native herbaceous species in sites with and without willow removal. In all sites, we observed a low natural establishment of non-native willow cuttings.

b) Sites with willow removal showed a greater browsing of native woody species, while sites invaded by willow were selectively used by some wild non-native ungulates, such as wild boars and deer. Moreover, domestic non-native ungulates, such as cow and sheep, presented a notably seasonal use of the sites being spring and summer the most preferred seasons.

c) The willow removal was detrimental for the regeneration (i.e., survival and growth) of planted native species (*Ochetophila trinervis* and *Salix humboldtiana*) and non-native willow. Moreover, in these sites native species were more browsed than non-native willow, while in sites without removal the non-native willow was more browsed. These findings suggest that ungulates represent a factor of failure in the active restoration after willow removal.

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

The main unforeseen difficulty that arose during the project was the delay in acquiring equipment purchased abroad, which mainly affected the monitoring of wild mammals with camera traps. In order to import the equipment within the country and obtain a tax exemption, we had to complete a procedure with the Argentina government. Due to changes in the national presidency and bureaucracy, it took longer than expected. Therefore, we had to delay the monitoring of wild mammals using camera traps to austral autumn-winter 2024 (we initially planned to start it during spring 2023-summer 2024). Although this caused a delay, the activity was completed during spring 2024-summer 2025.
Another difficulty was the loss of purchasing power due to inflation in Argentina, which mainly affected the budget available for field trips. The costs of fuel and vehicle maintenance increased considerably. Therefore, we had to look for other

alternatives to travel to the field such as vehicles that used cheaper fuels and did not have maintenance costs. Thereby, the planned field trips were completed successfully and the remaining funds were spent on additional equipment and essential activities such as organizing a local-regional workshop.

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

We organized a local-regional workshop where local communities from all the Northwest Patagonia region were involved. In this workshop, we shared our results, and discussed possible management guidelines for the invasion of *Salix* spp. and restoration of riparian habitats. The workshop was targeted to the private sector which includes owners of the surrounding ranches, the public sector including members of the National Parks Administration, and researchers who performed management of *Salix* spp. The workshop was held at the Fortín Chacabuco ranch (one of our study areas) in collaboration with Gwen Hulsegge, one of its administrators, who is interested in measures to control the willow invasion of the ranch. The workshop lasted approximately 8 hours in the conference room of Fortín Chacabuco ranch. It started with a brief introduction of the work team and the different participants. Then, we presented an introductory speech about the *Salix* spp. invasion, their impacts on riparian habitats, and its management. After this, some participants and our team presented talks regarding different experiences of *Salix* spp. management in different sites of the Northwest Patagonia region (e.g., Esquel, Aluminé, Junín de los Andes, and Fortín Chacabuco ranch). The other participants also shared their experiences related to the invasion of *Salix* spp. (e.g., invasion problems, current uses of *Salix* spp., possible initial date of invasions, and confirmation of *Salix* spp. plantings) and its management (e.g., type of management applied, date, intensity, and area affected). In every moment, we discussed the different implications of applying the results, feasibility and disadvantages, and various approaches to adjust them to particular cases. This experience was very enriching since we collected information from different sectors and we determined the feasibility of making practical use of our findings.

The workshop facilitated the writing of a technical report with the discussions and conclusions of the meeting which was sent to the attendees to ensure communication, and a short communication that will be published in July in a popular science magazine (Desde la Patagonia Difundiendo Saberes, link: https://desdelapatagonia.uncoma.edu.ar/) targeted mainly to schools to ensure communication to local communities ("Sauce no nativo en Patagonia: entre el valor local y el impacto Ambiental" - M. A. Relva et al.). We are also maintaining the contact with the workshop participants to share advice and plan future activities together.

During the project, we were constantly in contact with Gwen Hulsegge, Nicolás Rodriguez, and Justo Jones (Fortín Chacabuco and Nahuel Huapi ranches administrators) to organize the field samplings, and with members of The Nature Conservancy (TNC) NGO which is also a co-owner of the Fortín Chacabuco ranch. We shared them the preliminary findings of the project with a technical report.

5. Are there any plans to continue this work?

Yes, we plan to continue this work by exploring other research lines emerged during results interpretation and discussions with others during the conferences and workshop. For example, there was a great interest in the restoration with the native humboldt willow (*Salix humboldtiana*), a regionally endangered species with high conservation value, which had a limited success in our and others works. Therefore, systematically recording past restoration efforts and testing alternative treatments (e.g., nurse plants, hydrogels, fencing) in future small-scale trials could help identify strategies to enhance restoration success with this species. During the workshop, the need to monitor the effects of willow removal at different site scales arose, since several actors monitor at the landscape scale and require monitoring at the micro-site scale (such as in our project). Moreover, during the workshop, contrasting perceptions of the different key stakeholders emerged, emphasizing the need to work more collaboratively and based on their needs. Thus, we will conduct an online survey targeted to private owners of ranches from Northwest Patagonia farm to gather information about their perceptions regarding willow invasion and its management. The workshop was well received by all participants, and there was a very positive response to organizing another one in the future.

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

The results of the work were shared during the course of the project in different ways targeting both scientific and broader communities. We have shown the findings through talks at national and international meetings targeted mainly to the scientific community, and at a local-regional workshop (as mentioned previously) targeted to a broader community interested in the management of willow invasion. In addition, we shared the findings through writing materials such as technical reports targeted to the ranch owners of our study sites and TNC NGO members, a report regarding the local-regional workshop targeted to the participants, a short communication regarding the workshop targeted to a broader audience, and a book chapter regarding the second objective of this project (i.e., active restoration) targeted also to a broader audience, which was the result of our participation in the Ecovalle Forum meeting.
We also plan to share the final results (analyzed and interpreted) and survey results in different ways. We will organize talks to show our findings in national and international conferences, as well as in the "INIBIOMA colloquium", a space organized by our institute (Biodiversity and Environment Research Institute "INIBIOMA") to share projects and experiences between researchers from our and other institutes, and also national and international participants. The institute has a conference room and adequate equipment for meetings, as well as networks and web communication systems to reach large numbers of people. Researchers mainly participate in these events but they are open to the entire community. Additionally, we will organize a subsequent workshop in the Fortín Chacabuco ranch with the same stakeholders and also others who were absent in the previous workshop.
We will write reports summarizing the final results and willow management implications targeted to the ranch owners of our study sites and TNC NGO members. We sent a manuscript regarding the second objective at the Restoration Ecology journal. We will also prepare other manuscripts regarding the objective one to send to international peer-reviewed journals.

To reach a wider audience, we will participate in the event "Fortín Chacabuco Tranqueras Abiertas" where Fortín Chacabuco ranch invites schools and the community to participate in guided tours with researchers working within the ranch. Near our study sites, there are interpretation trails which we are planning to use for a guided tour. Additionally, we will write posts on our group social media platforms (https://ideasinibioma.wixsite.com/grupoideas and https://www.instagram.com/ideas.inibioma/). These communication efforts could help raise awareness about the importance of willow invasion impacts and its management on riparian ecosystems conservation and restoration.

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

The next step to take is to analyse the data of the objective regarding passive regeneration and write the main conclusions of all the objectives in different reports that will be sent to the different key stakeholders and published in different media. In addition, we will send a survey to the owner of ranches which are interested in the willow invasion to gather information regarding their perceptions of the invasion.

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?

Yes, we used the Rufford Foundation logo in the different posters and talks in which we shared the project results, and in the attendee certificates given during the workshop. Additionally, we mentioned The Rufford Foundation during the workshop and every material produced regarding the event (report, divulgation communication, and survey). In the future, we will use the logo in other talks, and we will mention The Rufford Foundation in the acknowledgment section of journal publications.

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

- María del Milagro Torres: Project leader. She participated in the project conceptualization, conducted the data collection in the field and data analysis, led the writing of manuscripts and oral talks, and collaborated with the workshop organization.

- Melisa Blackhall: She participated in the project conceptualization, collaborated with the data collection in the field, the writing and revision of manuscripts and talks, and the workshop organization.

- María Andrea Relva: She participated in the project conceptualization, collaborated with the data collection in the field, the writing and revision of manuscripts and talks, and the workshop organization.

- Rodrigo Lopes Canadell: He collaborated with the data collection in the field, revision of talks, and the workshop organization.

10. Any other comments?

We are very grateful for the funding received since allowed us to complete the project objectives, communicate the results by involving local communities in a more collaborative way, and acquire new equipment that would not have been possible otherwise. In particular, Argentine science is going through a major crisis, where obtaining funding within the country is very difficult, and budgets for research projects are becoming increasingly expensive given the economic context. Therefore, international funding like this one is key to allowing us to advance on our conservation projects based on scientific evidence. We are also grateful that the foundation provides funding opportunities for young scientists who are beginning their conservation careers. Obtaining this funding was a great incentive for me, and I look forward to applying for additional funding to pursue new projects related to the invasion and management of willows and the conservation and restoration of riparian ecosystems.

Photo 1: Participants discussing in the workshop (@Gwen Hulsegge).

Photo 2: Talk during the workshop (@Gwen Hulsegge).

Photo 3: Workshop organizing group (@Eliana Miranda).

Photo 4: Plant community protected against ungulates in a site with willow invasion (@Milagro Torres).

Photo 5: Plant communities protected against ungulates in a site where willows were removed (@Milagro Torres).

ANNEX – Financial Report

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