

## The Rufford Foundation

### Final Report

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Congratulations on the completion of your project that was supported by The Rufford Foundation.

We ask all grant recipients to complete a Final Report Form that helps us to gauge the success of our grant giving. The Final Report must be sent in **word format** and not PDF format or any other 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. Please be as honest as you can in answering the questions – remember that negative experiences are just as valuable as positive ones if they help others to learn from them.

Please complete the form in English and be as clear and concise as you can. Please note that the information may be edited for clarity. We will ask for further information if required. If you have any other materials produced by the project, particularly a few relevant photographs, please send these to us separately.

Please submit your final report to [jane@rufford.org](mailto:jane@rufford.org).

Thank you for your help.

**Josh Cole, Grants Director**

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Grant Recipient Details	
Your name	Natalie Dudinszky
Project title	Fire legacies on key habitat features of the hollow-using wildlife of <i>Nothofagus dombeyi</i> forests
RSG reference	23178-1
Reporting period	September 2017-September 2018
Amount of grant	£4,896
Your email address	natyas7@gmail.com
Date of this report	07/09/2018

1. Please 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
To assess the role of fire in the availability of tree-cavities suitable for the use of native fauna in <i>N. dombeyi</i> forests.				We were able to sample more than 1200 trees from 16 forests stands of different ages and fire severities in different areas of the Nahuel Huapi and Lago Puelo National Parks and in the Provincial Park. In each area we measured fire severity, time since fire (we extracted more than 300 core samples), number of tree cavities per tree and per area and other forests attributes, such as tree architecture, tree mortality, topographic data, etc., that allow us to determine the role of fire in determining cavity availability at tree, forest stand and landscape level. We also monitored presence of tree cavity users.
To develop useful indicators to be included in forests fire management plans aiming at biodiversity conservation, particularly regarding the maintenance of key habitat for tree-cavity users and, indirectly, to the conservation of those wildlife species.				We processed and analysed the data from fire severity, time since fire, and tree architecture in relation to the number of cavities that allowed us to determine indicators of cavity availability being fire severity and tree architecture the best indicators of cavity availability.
Determining the relative importance of tree age, size, fire severity and time since fire on the availability of tree cavities suitable for the use of the native fauna of <i>N. dombeyi</i> forests				We were able to measure all the proposed variables with the sufficient replication that allowed us to build solid statistical models to achieve reliable conclusions, resulting mature or low disturbed forests the best habitat types for cavity user wildlife. We mounted, sanded and processed tree core samples and are currently in the middle of reading the core samples for tree age determination

Participation and Implementation of Management plans in National and Provincial Parks			We contributed with our results to the development of a management plan (led by Valeria Ojeda) of the Provincial Natural Preserve Río Azul - Lago Escondido (ANPRALE) and we will continue working with the National and Provincial Parks Administration to incorporate the main results of this project to their Management plans.
Presentation of results to the local and scientific communities			The project initial results were presented in an event aimed at bringing science to elementary school kids: "INIBIOMA abierto" (In English Open INIBIOMA). I have also featured the project in the local radio: <a href="https://radiocut.fm/audiocut/entrevista-a-a-natalie-dudinszky-becaria-de-conicet-en-el-inibioma/#f=radio&amp;l=related">https://radiocut.fm/audiocut/entrevista-a-a-natalie-dudinszky-becaria-de-conicet-en-el-inibioma/#f=radio&amp;l=related</a> and we are currently finalising data analysis and preparing four manuscripts related to the project to be presented at international scientific journals.
Long-term studies on cavity availability			We were able to establish 7 permanent 0.5 ha plots of <i>N. dombeyi</i> forests stands for long-term assessment of tree cavities, forest dynamics and wildlife habitat studies. We made the first assessment and tagged all the trees in the plots for long-term evaluation (more than 900 trees)

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

We planned to assess severe, low and intermediate fire severity affecting *N. dombeyi* forests; however, we have found that most fires that have occurred in the area are of high severity and, in a few cases, present intermediate severity. On the other hand, this highlights the importance of increasing fire controls and improving fire management, because it indicates that, when spreading, it usually results in a high severity fire, and post-fire stands are the most inappropriate habitat for cavity user wildlife, not only in the short term, but also in the long-term (more than 150-200 years after a severe fire occurs).

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

(1) Fire was an important control to determine cavity availability in *N. dombeyi* forests at tree, stand and landscape level: Fire severity was the main attribute of fire

to determine cavity availability and it was relatively more important than tree size and time since fire. Number of cavities was negatively correlated with fire severity, and post-fire stands following a severe fire presented the least amount of tree cavities, particularly those of big size, independently of tree size (diameter at breast height) or time since fire. At tree level fire injuries incremented the amount of tree cavities, but at stand or landscape level fire was negatively correlated with the amount of cavities.

(2) Development of indicators: Forest architecture characterised by trees presenting upper crowns and absence of lateral branches resulted and easy indicator of scarcity of cavities and was associated with the pattern presented by post-fire stands following a severe fire. This was related with the importance of lateral branches fall to generate big hollows (and consequently, with the absence of this type of tree architecture in severe post-fire stands). As a consequence, fire severity was also a good indicator of cavity availability, because of its importance in shaping tree architecture (high severity fires associated with lack or scarcity of cavities in the short and long-term, even in post-fire stands older than 150-200 years). This happens because after a high severity fire, a massive recruitment from *N. dombeyi* seeds present in the soil seed banks usually occurs, and generates a forest stand characterised by high tree density, vertical growth, upper crowns and absence of lateral branches (due to competition for light processes).

(3). Implications for conservation and management: Mature undisturbed or low disturbed forests stands resulted the most valuable habitat types for cavity user wildlife, particularly for species of big size like *Dromiciops gliroides* (monito del Monte), *Strix rufipes* (rufous-legged owl), *Chloephaga poliocephala* (ashy-headed goose) and many other obligated cavity users. These forests presented the highest amount of cavities and also turned out to be the most diverse in terms of cavity user species. We found that this type of forest is only found in the restricted areas of the national parks and is not the most usual type of forests, as in general most *N. dombeyi* forests were of intermediate or young ages. Fire history revealed that most past fires were of high severity, which resulted in the most inadequate habitat type for cavity users in the short and long-terms. This indicates the importance of preserving undisturbed or low disturbed mature forests, increasing fire controls and increasing fire risk awareness, particularly in the areas of national and provincial parks, having higher loads of tourist/visits per year. The latter is very important in those areas that have permanent residents living and using forest resources, which is very common inside the national and provincial park, as those communities existed there even before the parks were created.

We contributed with our results to the development of a management plan (led by Valeria Ojeda) of the Provincial Natural Preserve Río Azul - Lago Escondido (ANPRALE)

**4. Briefly describe the involvement of local communities and how they have benefitted from the project (if relevant).**

There are many communities living inside the national and provincial parks that use forest resources as a way of sustaining their livelihoods (mainly through cattle and timber and/or for tourism activities during the whole year), particularly in *N. dombeyi* forests that are the *Nothofagus* species that grow at lower altitudes, particularly near lakes or rivers and that are, therefore, the most intensely used ones. Incorporating indicators and improving fire management and awareness to local and external people would help to protect and preserve these forests and increase their sustainability in the long-term. Therefore, we did not only interact with the people from the National and Provincial Parks Administration, including park rangers and people from the conservation departments, but we also worked with the local communities living inside the park and, in many cases, we sampled inside their lands.

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

Yes, the project will continue within the framework of a long term project that studies cavity availability and use in *Nothofagus pumilio* (lenga), *Nothofagus dombeyi* (coihue) and *Nothofagus antarctica* (ñire) both in standing trees and fallen wood. It will also continue as part of my long-term project proposal for entering to the scientific research career in CONICET (National Council of Scientific Research), which will be focused in the study of the impact of disturbances (mainly fire, but also grazing, deforestation and exotic species invasion) on the habitat availability and quality of native fauna. (Including birds, reptiles, rodents and some other conspicuous mammals).

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

We are currently preparing the manuscripts to submit to scientific journals. These work include (tentative titles):

(1) **Dudinszky N**, Kitzberger T, Cerón G., S. Ippi, V. Ojeda. Cavity availability for wildlife in Patagonian *Nothofagus dombeyi* (coihue) forests. What matters the most: tree profile or stand history?

(2) **Dudinszky N**. Ojeda V. Kitzberger T. Fire impacts on the habitat of hollow using wildlife in *Nothofagus dombeyi* (coihue) forests from north Patagonia.

(3) **Dudinszky N**. Ojeda V., Keune, J and Eichler. The availability of coarse woody debris and cavities for wildlife in young and old *Nothofagus dombeyi* (Coihue) forest in north Patagonia

(4) V. Ojeda. **Dudinszky N**, Kitzberger T, Cerón G S. Ippi. Habitat quality for cavity-nesting forest wildlife in the southern Andes: from stand-level to landscape patterns

- We are going to present the project to bachelor students within the INIBIOMA visita tu escuela program (INIBIOMA visits your school).

- We have to present a report about project results and implications to the National and Provincial Parks Administration in December 2018.
- We also will present the results in seminars conducted at the University of Comahue-INIBIOMA (open both to the scientific and local communities) and, if we have the opportunity, in Scientific Congresses.

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

The grant was used from September 2017 to September 2018, but the whole project started on April 2017 and will last till April 2019.

**8. Budget: Please 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.**

Item	Budgeted Amount	Actual Amount	Difference	Comments
<b>Two</b> Binoculars Nikon Action 7-15x35 Zoom CF or similar	240	209	31	There was a sale discount
GPSMAP 64 GARMIN	350	288	62	There was a sale discount
ECII D Electronic Clinometer. Inc tax	220	310	-90	We bought the Nikon Forestry PRO Laser Hypsometer/Clinometer (more complete functions)
ARAS Laser Distance Meter 40m, y(40m) or similar	50	194	-144	We couldn't find the distance meter originally budgeted so we bought the Nikon distance meter (more accurate)
Diameter tape x 50 m.	25		25	We did not get this item as instead we needed more urgently two 5 m tapes for measuring DAP
Diameter tape x 5 m	10	59	-49	We bought two diameter tapes of 5 m
Plastic Flagging Tape.	6	12	-6	Was slightly more expensive than the amount initially budgeted (We bought 12 units)
Borer 5.15mm 3 Thread: 7000mm (10-100-1044) Inc. Tax	667	641	26	I find it on an offer sale in the US
Borer 5.15mm 3 Thread: 600mm (10-100-1038). Inc Tax	460	426	33	I find it on an offer sale in the US
<b>Two</b> Borer 5.15mm 3	782	550	233	I find it on an offer sale in the US

Thread: 500mm (10-100-1036)				
Borer 5.15mm 3 Thread: 400mm (10-100-1028) Inc. Tax	223	168	56	I find it on an offer sale in the US
Borer Starter. Inc tax	36	25	11	I find it on an offer sale in the US
Pair of VHF radio	65	68	-3	Was slightly more expensive than the amount initially budgeted
Truck fuel (3 day X 4 weeks x 4 month X (60 km/day / 10 (efficiency of 10 km/lt)= Total: (approx. 288 lt x 0,8 £)	461	480	-19	Was slightly more expensive than the amount initially budgeted, because of Argentinian inflation rates
Boat fuel (2 day X 4 weeks x 4 month X (150 km/day / 10 (efficiency of 10 km/lt )= Total: (approx. 480 lt x 0,8 £)	768	790	-22	Was slightly more expensive than the amount initially budgeted, because of Argentinian inflation rates
Food for fieldwork (approx. 3d X 4 month X 4 weeks) = 80 days x 2,5 £	240	250	-10	Was slightly more expensive than the amount initially budgeted
Electric belt sander	140	137	3	Was slightly cheaper than the amount initially budgeted
Sand paper sheets and belts	50	50		
Extractor(Replacement) 600mm Inc. Tax:	56	94	-38	Was slightly more expensive than the amount initially budgeted
Extractor(Replacement) 400 mm Inc. Tax:	37		37	We finally did not need it
Densitometer		87	-87	We bought this item for the project to compensate for savings in other items and because it was essential for measuring tree canopy opening
Compass		56	-56	We bought this item for the project to compensate for savings in other items and because it was essential for delimiting sampling areas, and measuring orientation and slope.
National Bank commission and taxes		97	-97	National Bank commission for receiving the grant
Total balance	4887	4971	-\$ 104.05	We spent slightly more, because we did not considered Bank commission and taxes in the initial budget

Currency exchange rate: ARS\$ 20,6 = £1 (2017). Due to Argentinean laws during 2017, the grant was received in the local currency (ARS\$) - Bank commission and taxes

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

The most important next steps will be to publish the results in scientific journals and to work with the National and Provincial Parks Administrations to incorporate the main results of the project, particularly to improve fire controls and fire risk awareness. We will continue evaluating the permanent plots for long-term studies on cavity availability and use, not only for *N. dombeyi*, but also for the other *Nothofagus* species (*N. pumilio* and *N. antarctica*), because we also have permanent plots for these last species. We need to continue working to research how disturbances are impacting on the wildlife habitat and to carry on making fauna census, as habitat fragmentation processes continues in this area, not only because of fires, but also due to other disturbances, such as grazing, exotic invasions (both plants and animals, being mink a recent and very harmful exotic invasion in these forests) and illegal timber extraction (for fuel consumption, which is increasing due to energetic crisis in Patagonia) that sometimes implicates intentional illegal burning of the forests for extracting the timber later on. Even though all these disturbances currently affect this area, there are still very scarce studies about how they affect the habitat and the population dynamics of native plants and animals.

**10. Did you use The Rufford Foundation logo in any materials produced in relation to this project? Did The Rufford Foundation receive any publicity during the course of your work?**

Yes, we have prepared two posters for a scientific event to bring science to kids from elementary schools, "INIBIOMA abierto" (In English Open INIBIOMA). The event was featured in a regional journal:<https://www.rionegro.com.ar/bariloche/acercan-el-conocimiento-cientifico-a-los-chicos-de-escuelas-primarias-HA5200108>

We have also launched a Facebook page where we will feature and exchange information about the current projects that we are working on: <https://www.facebook.com/LaCoPa.Laboratorio.de.Conservacion.de.Patagonia/> (Patagonian Conservation Laboratory); and where we have shared the advances of this project from Rufford's Facebook page.

We will include Rufford's logo and acknowledge it in any paper or presentation in congress, events, etc. related with the project that we might presented in the future.

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

**Dr. Thomas Kitzberger** (INIBIOMA-UNCOMA-CONICET): Researcher-Advisor. He helped to design the main project, particularly regarding aspects related to forest and fire ecology and dendro-ecology, selecting the correct methodologies and visiting and selecting the sampling sites.

**Dr. Valeria Ojeda** (INIBIOMA-UNCOMA-CONICET): Researcher-Advisor. She helped to design the main project, particularly regarding helping with aspects related to the identification and characterization of tree cavities and native cavity users and

helping to select the correct methodologies for these estimations. She also helped with fieldwork.

**Dr. Natalie Dudinszky** (INIBIOMA-UNCOMA-CONICET): Main leader of the project and post-doctoral researcher. Designed the project, performed fieldwork and data analysis and writing of main reports.

**Julia Keune** and **Lisa Eichler**: Biology students (Master). Julia and Lisa are German biologists that collaborated with the project and helped with the fieldwork and to assess the availability and role of coarse woody debris in *Nothofagus* forests as part of their Master projects.

**Silvina Ippi** and **Melina Barrionuevo** (INIBIOMA-UNCOMA-CONICET): Researchers-They help with fieldwork

**Ariel Mayoral** and **Pablo Alvear** (INIBIOMA-CONICET) Technicians. They helped with fieldwork and logistics.

We also received the help of many members of the National Parks Administration (APN) for logistics and sampling (**Juan Karlanian, Juliana Nielsen, and Laura Chazarreta**, among many others).

## 12. Any other comments?

Yes, we would like to thank the Rufford Foundation for the grant received, as it was fundamental for accomplishing the project objectives with sound scientific bases. We were able to assess the role of fire on cavity availability of hollow using fauna, not only at tree and forest stand level, but also at landscape level. The equipment funded with this grant will allow us to continue researching in forest and fauna ecology in similar projects. Another important point is that Argentina is currently witnessing one of the most profound economic crisis in the last decades, that is particularly affecting the scientific and conservation sector due to the politic measures implemented to solve this crisis and, because of that, getting funding for scientific projects has become a real challenge.



Left to right: Natalie showing the Inside part of a White-throated Tree-runner (*Pygarrhichas albogularis*) Tree Cavity to the kids. (©Rio Negro Journal Archives); Natalie with a group of young students after playing the Cavity Users memory-test card Game. (©M. Eugenia Ghio) and Natalie mounting the core samples.



PATAGONIAN ORNITHOLOGY GROUP  
RESEARCH AND CONSERVATION

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WHO USES THE TREE CAVITIES IN THE PATAGONIAN FORESTS?  
Natalie Dudinszky, M. Barrionuevo, S. Ippi, V. Ojeda



MANY ANIMALS USE TREE CAVITIES FOR NESTING, ROOSTING OR SHELTERING



WE ARE THE EXCAVATORS. WE CAN MAKE OUR OWN CAVITIES!



MAGELLANIC WOODPECKER  
*Campophilus magellanicus*

STRIPED WOODPECKER  
*Venillorhina lignarius*

CHILEAN FLICKER  
*Colaptes pitius*

WHITE-THROATED  
TREERUNNER  
*Pygarrhichas albogularis*



WE NEED THAT THE TREE HOLES ARE ALREADY THERE BECAUSE WE CAN'T MAKE OUR OWN CAVITIES!



AMERICAN KESTREL  
*Falco sparverius*



CHUCAO TAPACULO  
*Scelorchilus rubecula*



MAGELLANIC TAPACULO  
*Scytalopus magellanicus*



BLACK THOATED  
HUET-HUET  
*Pteroptochos tami*



AUSTRAL THRUSH  
*Turdus falcklandii*



AUSTRAL PARAKEET  
*Enicognathus ferrugineus*



AUSTRAL PYGMY-OWL  
*Glaucidium nana*



RUFIOUS-LEGGED OWL  
*Strix rufipes*



THORN-TAILED  
RAYADITO  
*Aphrastura spinicauda*



PATAGONIAN  
SIERRA-FINCH  
*Phrygilus patagonicus*



MONITO DEL  
MONTE  
*Dromiciops gliroides*



RODENTS



HOUSE WREN  
*Troglodytes aedon*



TORRENT DUCK  
*Merganetta armata*



COMMON BARN-  
OWL  
*Tyto alba*



CHILEAN SWALLOW  
*Tachycineta meyeni*



BATS



LYZARDS

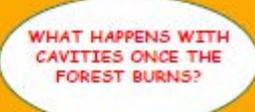
And there are many more!!!!

Poster showing Patagonian Native Cavity Users, which was exhibited to the kids at the "INIBIOMA abierto" (Open INIBIOMA) event (The poster was translated to English from the original in Spanish), (photo credits are indicated in each of the photos included in the poster. Bird drawings ©Natalie Dudinszky.


**ORNITHOLOGY GROUP IN PATAGONIA:  
CONSERVATION AND RESEARCH**  
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**FIRE IN THE FOREST**  
Natalie Dudinszky, V. Ojeda, T. Kitzberger







**WE STUDIED HOW FIRE INFLUENCES CAVITY AVAILABILITY IN COIHUE (*Nothofagus dombeyi*) FORESTS OF DIFFERENT AGE AND FIRE SEVERITY INCIDENCE**






OLD UNBURNED FOREST      OLD FOREST WITH AND OLD FIRE      INTERMEDIATE AGED FOREST GROWN AFTER A SEVERE FIRE      YOUNG FOREST GROWN AFTER A SEVERE FIRE

**IN EACH TREE WE ANALYZED:**

NUMBER, SHAPE AND SIZE OF CAVITIES      HEIGHT      DIAMETER      POSITION AND CHARACTERISTICS OF THE CROWN      CANOPY OPENING








WE CALCULATE TREE AGE      WE EVALUATE THE FIRE SCARS      BECAUSE TREES FORM A TREE RING EACH YEAR, IF WE COUNT THEM WE CAN ESTIMATE TREE AGE

WE USE TOOLS CALLED INCREMENT BORERS FOR TAKING TREE CORE SAMPLES THAT ALLOW US TO SEE THE TREE RING LIKE IF WE SEE A TRANSVERSAL CUT OF THE TREE AND THAT ALLOW US TO ESTIMATE TREE AGE.

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Poster showing Natalie's work on Fire and Cavity Availability in *N. dombeyi* Forests, exhibited to the kids during the "INIBIOMA abierto" (Open INIBIOMA) event (The poster was translated to English from the original one in Spanish, exhibited at the event). Photos and bird drawings ©Natalie Dudinszky.