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	Maria Eduarda Soares Alberti
Project Title	Population density and activity of *Leopardus guttulus* (Hensel, 1872) in its limit of distribution in southern Brazil
Application ID	41483-1
Date of this Report	December 13, 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
1) Estimating differences in species' density among sampled areas and evaluating the relationship between species' density and indices of vegetation cover, native forest, urbanization and agriculture.			X	This was the central question of my research project, and it was fully addressed. The study was carried out in ten sampling areas located in southern Brazil. Data were collected in the following years: 2017-2019 (lab's database) and 2023-2024 (Rufford Grant). The sampling was conducted during the warm seasons (summer and spring), with an average duration of 60 days (ranging from a maximum of 73 days to a minimum of 52 days). This short period of time was chosen to assume closed populations. In each area, we installed 20 to 22 camera-trap stations (sites). The total number of sites, taking account all areas, was 202 sites, and the total sampling effort of 12,738 camera trap days. As a result, we identified a total of 31 individuals of *Leopardus guttulus* across seven study areas. Our analyses indicate that the species' density, estimated using spatially explicit capture-recapture models, is influenced by the movement parameter, which differs significantly between males and females (males move more, and therefore

				their estimated density is lower than that of females). It is also significantly influenced by the detection parameter, which is markedly higher in areas with greater availability of the species' natural prey (small rodents and birds). The density parameter, in relation to landscape metrics, showed a negative (though not significant) trend, suggesting lower densities of *L. guttulus* in environments with higher proportions of managed vegetation (agriculture and forestry). The areas with the highest density correspond to those containing extensive patches of native vegetation and greater connectivity to preserved landscapes in their surroundings. In addition to *L. guttulus*, the camera traps installed during the Rufford Grant funding period recorded other key species, including the margay (*Leopardus wiedii*), the coati (*Nasua nasua*), the neotropical otter (*Lontra longicaudis*), the crab-eating raccoon (*Procyon cancrivorus*), and the globally threatened pygmy brocket deer (*Mazama nana*).
2) Estimating differences in species' activity patterns among all sampled areas and comparing them to the activity patterns			X	Our goal of defining the activity patterns of *L. guttulus* across all study areas was fully achieved. We found that the species is cathemeral (active throughout the 24-hour cycle) in preserved areas, while it tends to be nocturnal in human-modified

of their potential prey and competitors (both native and alien species).				environments. The species' activity pattern showed low temporal overlap with that of ocelots and domestic dogs, and intermediate overlap with its potential prey (small rodents and birds). We did not obtain a sufficient number of records of other potential competitors (domestic cats, other small felid species) to allow robust comparisons.
3) Creating scientific communication materials intended for distribution to the community (farms, schools, public institutions).			x	Regarding the development of scientific communication materials for the community, we were also successful. The main material produced was a small guide introducing *L. guttulus* to the community and encouraging good practices for coexistence with wild cats (this material is attached to this report). In addition, we established partnerships with conservation leaders within local communities, specifically with a protected area in the municipality of Veranópolis, which produced several online materials (informative videos, promotional posts featuring *L. guttulus* camera-trap footage, and science communication through Instagram), all in collaboration with our project and acknowledging The Rufford Foundation. As part of the environmental education outreach activities, elementary-level classes from six schools were visited. With an average of 20 students per class, these activities reached a total of

				120 students, in addition to teachers and school staff members.

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

a). We carried out the first density estimate for *Leopardus guttulus* using spatially explicit capture-recapture models, helping to fill important knowledge gaps for this globally threatened species and to inform strategies for its conservation. In 2025, my advisor Dr. Flávia Tirelli participated in the most recent assessment of *L. guttulus* in Brazil, in which the species shifted from "Vulnerable" (VU) to "Endangered" (EN) (national assessment). The data generated by my master's research were part of a broader national action plan on the species, contributing to the overall body of information considered in the reassessment.

b). During my project, I built important partnerships with conservation leaders in the communities where I worked, which was a key outcome made possible by the Rufford Grant. One of these leaders, Juliano Holderbaum, has a privately owned protected area in the highlands of Rio Grande do Sul, a region with very few protected areas. Together, we surveyed his reserve and its surroundings to obtain data on *L. guttulus*. The information collected supported the development of the area's management plan, a document required for its official recognition as a protected area by the Brazilian government. I now serve as the research coordinator for this reserve, contributing to ongoing conservation actions for *L. guttulus* and other threatened species in the region.

c). The project resulted in my master's thesis, which I successfully defended in 2025. In addition, it contributed to one of the most comprehensive datasets on *L. guttulus* in Rio Grande do Sul, providing essential information to support future research and conservation assessments. This dataset will continue to be utilized by new members of our laboratory, who have recently joined and will build upon this work by investigating the species' occupancy patterns and the effects of extreme climatic events on threatened species.

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

During the sampling period of my master's project, the state of Rio Grande do Sul experienced the most severe extreme climatic event in its history. The floods affected 80% of the state's municipalities, causing widespread destruction of infrastructure and roads. The city where I lived and conducted most of my work, Porto Alegre, was heavily impacted (Figure 1), and activities at my University (UFRGS) were suspended for an extended period. Some of the areas originally planned for sampling became inaccessible and, in some cases, unsafe to reach.

Figure 1. The city of Porto Alegre, Rio Grande do Sul, during the floods (May, 2024).

To address these challenges, I adapted the fieldwork plan to ensure both safety and continuity of the project. Sampling sites were reorganised based on real-time accessibility, prioritising areas that remained safe to reach after the floods. I maintained close communication with local partners and landowners, who provided updated information on road conditions and access routes. When university vehicles were unavailable, I reorganised logistics by using intercity buses and coordinating shared transport with collaborators. Additionally, I adjusted the sampling schedule to take advantage of periods of improved weather and stability. These adaptations allowed the project to continue despite the unprecedented conditions, ensuring that essential data were collected in time for the completion of my thesis.

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

The involvement of local communities was essential at every stage of the project, contributing with both logistical support and engagement with conservation goals.

At Itapeva State Park in Torres, RS, collaboration with the protected area's managers played a key role in shaping our sampling design. Together, we evaluated habitat features, accessibility, and recent wildlife records to identify the most promising sites for camera-trap deployment. Since wildlife monitoring is a responsibility of the park's management team, the data collected through the project also directly benefited their work, providing information that can support decision-making and improve environmental management within the park.

Figure 2. *Leopardus guttulus* in the Itapeva State Park, Brazil.

Figure 3. *Leopardus guttulus* in the Itapeva State Park, Brazil.

The park's team also conducted annual vaccination campaigns for domestic animals that circulated within the park boundaries, reducing risks of disease transmission to wild carnivores. My colleagues and I participated in these campaigns. The communities surrounding the park are composed largely of low-income families in situations of social vulnerability. They benefited from free veterinary assessments and vaccinations for their domestic animals, which also

contributed to improving public health for residents who live closely with these animals.

In addition, we carried out outreach activities with elementary schools surrounding the park. These schools benefited from science communication activities and free educational materials that provided students and teachers with accessible information about *Leopardus guttulus*, the threats faced by wild cats, the importance of habitat conservation, and good practices for coexistence with wildlife.

Figure 4. Paintings created by children during a science communication activity. The coloring pages were kindly provided by the Geoffroy's Cat Working Group, coordinated by my supervisor Dr. Flávia Tirelli.

The strongest partnership with local communities took place at Serra Parque Jaboticaba, a small, forested area owned by a local community leader who, despite not having formal training in environmental sciences, has a strong personal interest in biodiversity. During my master's fieldwork (February 2024), this area was in the process of becoming a privately owned reserve. Together, we collected data on *L. guttulus* for my project, as well as information on other species to support the development of the reserve's management plan and its subsequent official recognition by the Brazilian government. This collaboration remains active today, as I have since joined the team as the research coordinator. The area was officially recognized as a protected area on July 18, 2025 after many months of joint work. Currently, we are conducting several environmental education activities about *L. guttulus* and other threatened species for nearby schools, local businesses, and farming communities.

Figure 5. Setting up a camera trap with local community partner Mateus Giotto (February, 2024).

Figure 6. Fieldwork at Serra Parque Jaboticaba, Veranópolis (February, 2024).

5. Are there any plans to continue this work?

Yes. There remain several important unanswered questions about the ecology and natural history of small threatened felids in the southernmost region of Brazil, particularly regarding their distribution patterns, the identification of major threats, and the mapping of priority areas for their long-term conservation. In 2026, I intend to pursue a PhD to continue this line of research, deepening the investigations initiated during this project. My goal is to advance scientific understanding of these carnivores while ensuring that the knowledge generated directly informs and strengthens conservation actions for the species.

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

We plan to publish the results generated by this project in a high-impact peer-reviewed scientific journal. The findings will also continue to be shared with local communities through outreach and science communication activities, particularly in rural properties and nearby towns in the central and northern regions of Rio Grande do Sul. In 2024 and 2025, the project was presented in several events, including the 12th Brazilian Congress of Mammalogy.

Figure 7. Sharing our work through a local radio broadcast, with local conservation leader and partner Juliano Holderbaum.

Figure 9. Presenting the project's results at the 12th Brazilian Congress of Mammalogy.

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

Looking ahead, several important next steps remain for advancing our understanding and conservation of *L. guttulus* and other small cats in southern Brazil. There are still key knowledge gaps regarding their ecology and natural history, particularly their distribution patterns, population trends, and the spatial configuration of major threats across the landscape. Strengthening long-term monitoring, and identifying priority areas for conservation will be essential to guide effective management actions.

In 2026, I intend to begin my PhD and continue investigating these carnivores, with a strong focus on integrating ecological research with practical conservation outcomes. Expanding collaborations with local communities, landowners, and environmental agencies will also be crucial to ensure that scientific findings translate into real-life impact. Ultimately, the next steps involve deepening the scientific foundation needed to protect these threatened species while promoting conservation strategies that are feasible, inclusive, and firmly grounded in the social realities of the communities who share the landscape with them.

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. The Rufford Foundation logo was included on all posters presented at scientific events related to this project, as well as on the science communication materials we produced and on digital materials shared online. These materials, or their links, are listed below:

Figure 10. Science communication materials developed through the Rufford Foundation grant, distributed for free to local communities where we conducted field activities (page 1/2).

Figure 11. Science communication materials developed through the Rufford Foundation grant, distributed for free to local communities where we conducted field activities (page 2/2).

PADRÕES DE ATIVIDADE DO GATO-DO-MATO-PEQUENO-DO-SUL (*Leopardus guttulus*) NO EXTREMO SUL DA MATA ATLÂNTICA

Maria Eduarda Soares Alberti[1], Tatiane Campos Trigo[2], Flávia Pereira Tirelli[1 3]

[1] Laboratório de Evolução, Sistemática e Ecologia de Aves e Mamíferos, Departamento de Zoologia, Universidade Federal do Rio Grande do Sul (UFRGS), Porto Alegre, RS
[2]Departamento de Biodiversidade, Secretaria do Meio Ambiente e Infraestrutura (SEMA-RS), Museu de Ciências Naturais, Porto Alegre, RS
[3] Instituto Pró-Carnívoros, Atibaia, SP

INTRODUÇÃO

O extremo sul da Mata Atlântica compreende o limite de distribuição de *Leopardus guttulus* (Hensel, 1872) (Figura 1). Nesta região, a espécie está exposta a um contexto de intensas modificações antropogênicas. No presente estudo, buscamos investigar os padrões de atividade diária da espécie em seis áreas: Centro de Pesquisa e Conservação da Natureza Pró-Mata (PROMATA), Floresta Nacional de Passo Fundo (PFNF), Parque Nacional da Serra Geral (SGNP), Refúgio da Vida Silvestre Banhado dos Pachecos (BPWR), e áreas rurais dos municípios de Teutônia (TEUT) e Rio Pardo (RP)/RS (Figura 2).

MATERIAL E MÉTODOS

Os dados foram coletados através de registros de armadilhas fotográficas. As analises foram realizadas através do pacote "circular" no software R.

Figura 1. Indivíduo de *Leopardus guttulus* registrado no BPWR.

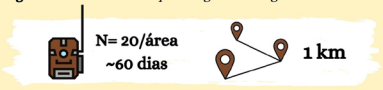

Figura 2. Áreas de amostragem deste estudo.

RESULTADOS

Contabilizamos 82 registros da espécie. A atividade de *L. guttulus* foi classificada como catemeral em todas as áreas (Figura 3). A porcentagem de atividade em relação a luz solar foi, em média, 66% noturna e 34% diurna. Apesar de não apresentar significância, *L. guttulus* teve o maior pico de atividade noturna em RP (cerca de 83%) e no BPWR (cerca de 79%). A atividade da espécie apresentou diferença significativa entre RP e PROMATA (W= 7.40, p< 0.05).

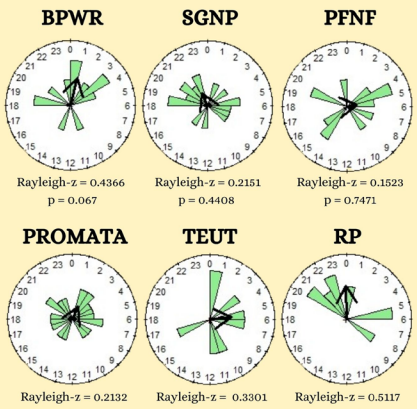

Figura 3. Padrões de atividade diária de *L. guttulus*.

DISCUSSÃO

Com base nos resultados obtidos, observamos um comportamento catemeral semelhante ao descrito na literatura para a maioria das áreas. Entretanto, a atividade de *L. guttulus* na área de ecótono foi significativamente diferente, e com maior pico de atividade noturna. RP apresenta diferenças na paisagem em relação às demais áreas, contendo mosaicos de Mata Atlântica e de campo nativo característico do bioma Pampa, além da intensa ocupação agropecuária na região. A espécie pode estar modulando sua atividade como resposta a estes fatores.

REFERÊNCIAS

TRIGO, T. C. *et al. Leopardus guttulus*. In: **Livro Vermelho da Fauna Brasileira Ameaçada de Extinção: Volume II – Mamíferos**. ICMBio, 2018.
AGOSTINELLI, C.; LUND, U. **R package 'circular': Circular Statistics** (version 0.4-93), 2017.
R CORE TEAM. **R: A language and environment for statistical computing**. R Foundation for Statistical Computing. Austria, 2020.

DENSIDADE POPULACIONAL DO GATO-DO-MATO-PEQUENO-DO-SUL (*Leopardus guttulus*) EM SEU LIMITE DE DISTRIBUIÇÃO AO SUL DO BRASIL: ESTIMATIVAS PRELIMINARES UTILIZANDO CAPTURA-RECAPTURA ESPACIALMENTE EXPLÍCITA

Maria Eduarda Soares Alberti[1], Tatiane Campos Trigo[2], Flávia Pereira Tirelli[1 3]

[1] Laboratório de Evolução, Sistemática e Ecologia de Aves e Mamíferos, Departamento de Zoologia, Universidade Federal do Rio Grande do Sul (UFRGS), Porto Alegre, RS
[2]Departamento de Biodiversidade, Secretaria do Meio Ambiente e Infraestrutura (SEMA-RS), Museu de Ciências Naturais, Porto Alegre, RS
[3] Instituto Pró-Carnívoros, Atibaia, SP

INTRODUÇÃO

Leopardus guttulus (Hensel, 1872) é um pequeno felídeo sul-americano, cujo limite de distribuição ao sul coincide com o ecótono entre Mata Atlântica e o Pampa. Dados acerca da densidade populacional desta espécie são escassos, e as estimativas realizadas até o momento empregam principalmente modelos não-espaciais. A lacuna de dados referentes a densidade de *L. guttulus* tem implicações na conservação, visto que a espécie é ameaçada globalmente, classificada como vulnerável pela IUCN. Neste estudo, realizamos estimativas de densidade da espécie em seu limite de distribuição, no Rio Grande do Sul.

MATERIAL E MÉTODOS

Seis áreas: CPCN Pró-Mata (PROMATA), FLONA de Passo Fundo (PFNF), PARNA Serra Geral (SGNP), REVIS Banhado dos Pachecos (BPWR), área rural do município de Teutônia (TEUT) e Rio Pardo (RP).

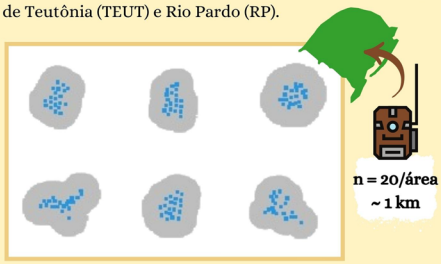

Figura 1. *State space*: Relação das armadilhas fotográficas com buffer de 3 km, nas 6 áreas de estudo.

Figura 2. Reconhecimento de indivíduo através do seu padrão único de pelagem.

Utilizando o pacote oSCR, software R, construímos modelos *single-species*, *single-season*, *multi-session* para investigar o movimento (σ), taxa de detecção (p0) e densidade populacional (D). Os melhores modelos foram selecionados quando dAIC<2.

RESULTADOS

De acordo com nosso melhor modelo (Figura 3) o sexo influenciou positivamente o movimento (σ), de forma significativa. A estimativa foi maior para machos (967.7 m) do que para fêmeas (589 m). A ocupação de cães influenciou a detecção (p0), e a agricultura influenciou a densidade (D), que variou entre as áreas (Figura 4).

Modelo: **D** ~ agricultura **p0** ~ ocupação de cães **sig** ~ sexo
AIC: 941.5499 **dAIC:** 0.0

Resumo

	Estimate	SE	z	P(>|z|)
p0.(Intercept)	-3.365	0.596	-5.648	0.000
beta.cães	-2.505	1.992	-1.257	0.209
sig.(Intercept)	6.379	0.154	41.407	0.000
beta.sexo	0.497	0.196	2.535	0.011
D.(Intercept)	-4.124	0.250	-16.481	0.000
beta.agricultura	-0.619	0.318	-1.943	0.052
psi.constant	0.849	0.472	-1.798	0.072

Figura 3. Influência das variáveis no melhor modelo de densidade.

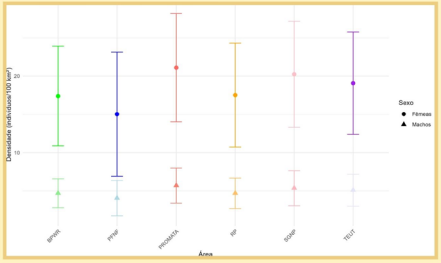

Figura 4. Densidade de *L. guttulus* nas áreas de estudo.

DISCUSSÃO

Nossos resultados demonstram uma variação significativa na densidade entre machos e fêmeas nas mesmas áreas, que é esperado pelo maior deslocamento observado nos machos. Nosso melhor modelo considerou que a detecção foi negativamente influenciada pela ocupação de cães domésticos nos sítios amostrais, e que a densidade foi negativamente influenciada pela agricultura, embora sem diferença significativa. Os resultados são preliminares, mas indicam certa preocupação em relação a esta espécie em áreas antropizadas.

REFERÊNCIAS

ROYLE, J. A.; CHANDLER, R. B.; SOLLMANN, R.; GARDNER, B. **Spatial Capture Recapture.** Elsevier, 2014
TRIGO, T. C. *et al. Leopardus guttulus*. In: **Livro Vermelho da Fauna Brasileira Ameaçada de Extinção: Volume II – Mamíferos.** ICMBio, 2018.
SUTHERLAND, C.; ROYLE, A.; LINDEN, D. W. oSCR: a spatial capture–recapture R package for inference about spatial ecological processes. **Ecography**, 42(9): 1459-1469, 2019.
R CORE TEAM. **R: A language and environment for statistical computing**. R Foundation for Statistical Computing, Austria, 2020.

Figure 13. Poster presenting initial results of the project at the 12th Brazilian Congress of Mammalogy, Rio de Janeiro, Brazil (September 2024).

Social media content (Instagram links):
https://www.instagram.com/p/DK1-wK5My80/
https://www.instagram.com/p/DEqQTz7yK8t/
https://www.instagram.com/p/DDxQd0wyyQa/
https://www.instagram.com/p/DDP0s6HyWfY/
https://www.instagram.com/p/DC7dJ_HSuw6/
https://www.instagram.com/p/C-vAlftOxUT/
https://www.instagram.com/p/C7pQgRCO82b/
https://www.instagram.com/p/C7aCSIauhZf/

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

Maria Eduarda Soares Alberti, MsC – As the project coordinator, I was responsible for conducting field activities, managing project resources in collaboration with my advisor Dr. Flávia Tirelli, performing statistical modeling analyses, writing the thesis and scientific papers resulting from the project, and overseeing science communication activities for the community.

Flávia Pereira Tirelli, PhD - My master's project supervisor, Dr. Flávia Tirelli, was responsible for assisting in the management of project resources, guiding the sampling design and field activities, and supporting the statistical analyses conducted throughout the project.

Tatiane Campos Trigo, PhD - My master's project co-supervisor, Dr. Tatiane Trigo, was responsible for supporting data interpretation and the project's analytical processes.

Mariana Guimarães Xavier da Costa, Master's student (UFRGS) – Mariana assisted with field data collection, as well as the sorting and organization of the project database.

Juliano Holderbaum - Partner added during the course of the project. Juliano assisted with field data collection in one of the study areas and participated in community activities involving rural landowners, schools, and local businesses. He is the manager of an area that was established as a reserve during the project, collaborating with the team on species conservation efforts.

Mateus Giotto - Partner added during the course of the project. Mateus assisted with field data collection in one of the study areas and participated in community activities. He played a key role in obtaining permission to deploy camera traps on private properties.

Paulo Carlos Grubler - Partner added during the course of the project. Paulo assisted with data collection in one of the sampling areas and maintained a biodiversity database at Itapeva State Park. He also participated in science communication activities and the vaccination of domestic animals in communities surrounding the park.

Danubia Nascimento - Partner added during the course of the project. Danubia assisted with data collection in one of the sampling areas and maintained a biodiversity database at Itapeva State Park. She also took part in science communication activities with local schools.

Vinicius de Moraes, Master's student (UFRGS) - Partner added during the course of the project. He is responsible for the "Felinos de Itapeva" project, coordinating vaccination campaigns for domestic animals in communities surrounding Itapeva State Park. He also assisted with field data collection.

10. Any other comments?

The project was originally planned to run for 24 months after receiving the grant, as outlined in the proposal submitted to the Rufford Foundation. We initially intended to begin fieldwork in October 2023, but the funds were officially received on 22 December 2023. For this reason, we counted 24 months from that date for the project's completion, and therefore this final report is being submitted in December 2025.

My team and I are deeply grateful to the Rufford Foundation and the Rufford Small Grants program for the support provided, which made this project possible and enabled us to generate essential data for the conservation of this highly threatened and understudied wild cat. We sincerely hope to collaborate again in the future.

ANNEX – Financial Report

[Intentionally removed]