

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	Cristian Andrés Poveda Pazmiño
Project Title	Investigating the impact and methods of control of the Smooth-billed Ani, an invasive bird in Galápagos
Application ID	48820-1
Date of this Report	14-August-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
Strategically set our study sites			X	
Monitor the territory use of 20 birds from 20 different territories during the breeding and nonbreeding seasons.		X		We tagged 19 individuals and retrieved data from 16 GPS tags. Regarding seasons, most of the devices were not found again during the nonbreeding season. Non-resighted birds may have lost their transmitters, moved, or died.
Band tagged anis and anis caught by chance			X	On Santa Cruz, we banded 35 anis (28 adults, 5 juveniles, and 2 of unknown age) from 18 territories. Moreover, on Floreana, prior to starting my official PhD research, we banded 39 anis (18 adults, 14 juveniles, and 7 fledglings) from 17 territories.
Roost search and monitoring during the breeding season			X	We conducted roost monitoring on Floreana and Santa Cruz. On Floreana, we worked in collaboration with the Galapagos National Park personnel in order to design our field approaches. In addition, as we were working mainly in the farm zone of Floreana, I had the opportunity to contact directly with farmers to ask them for permission to enter their lands as well as get some advice from them based on their empirical knowledge about the species. We contacted face to face a total of 13 farmers. It is worth to mention that Floreana has a small population of around 145 people, meaning that 13 farmers is a high number considering that they belong to 13 different families on the island. On Santa Cruz the human population is much bigger than Floreana, with around 17,200 inhabitants, and so is its agricultural zone. As on Floreana, we got in

			<p>contact with farmers from the island in order to decide our field sites. We got in touch with 9 farmers on Santa Cruz. We did not carry out systematic surveys with people, but their insights on the anis were useful in order to plan the fieldwork. For instance, they knew where anis could potentially be roosting and thus gave us a clue of where to search.</p>
Roost search and monitoring during the non-breeding season		X	<p>Due to a lack of personnel to carry out the monitoring, we were only able to gather limited data on anis roosts and territorial group composition during the non-breeding season. Unfortunately, funding for personnel during the non-breeding season was limited, which was beyond our control. However, we were able to collect data on social group composition for 16 groups during the 2024 non-breeding season, and we are currently (during the 2025 non-breeding season) resampling several of the groups recorded in previous field seasons. We are keen to share our findings from the 2025 non-breeding season as soon as we finish with the corresponding data collection and analysis.</p>
Scientific publication	X		<p>Our initial plan was to carry out fieldwork in 2024 and publish the results within the same year. However, we decided to extend the sampling period into 2025, which delayed the analysis and publication of our findings. Furthermore, to produce a more impactful study, we decided to complement the movement data with population assessments. The necessary data is still underway, and we aim to complete in Oct - Nov 2025.</p>

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

- a) One of the objectives of this research is to assess the social group composition of the smooth-billed ani (*Crotophaga ani*, hereafter anis) in the agricultural zone of Santa Cruz and Floreana, Galápagos. Anis are social birds, highly territorial, and communal breeders. Each group roosts together in a single tree. We monitored their roosts and counted the number of birds coming in and out of them in order to determine the composition of each territorial group assessed.

We collected data on anis group composition on Santa Cruz during the 2024 breeding and nonbreeding season, and 2025 breeding season. On Floreana we collected data in the 2023-2025 breeding seasons. Here, a big rodent and feral cats' eradication was carried out in November 2023, and in this context, we aimed to investigate the potential effect of the rodenticide on anis populations.

We found a significant variation in the average group size of anis in the agricultural zone of Santa Cruz between years ($z = -3.48, p < 0.001$), with groups being larger in the 2024 breeding season (8.25 ind. \pm 0.55 SE) compared to the 2025 breeding season (5.86 birds \pm 0.59 SE). Nonbreeding season data are only available for 2024. These showed that groups are composed of 7.59 individuals on average (\pm 0.84 SE).

When contrasting group composition by two sites in the agricultural zone, we found that in 2024 the groups were larger in the grassland site, namely Kastdalen (8.73 birds \pm 0.58 SE) than in the Guava and *Rubus* site, namely Media Luna (6.87 birds \pm 1.29 SE). In 2025, there were no differences in group composition between sites ($z = 0.19, p = 0.90$). Nonetheless, these differences should be interpreted with caution, given the site and year differences in number of groups assessed.

In the agricultural zone of Floreana we found that group composition increased ($p < 0.001$) between 2023 (mean = 7.56 ind. \pm 0.94 SE) and 2024 (mean = 12.04 ind. \pm 0.98 SE), with no significant changes observed in 2025 ($p = 1$, mean = 11.52 \pm 0.98 SE). Our results suggest that the poisoning on Floreana did not have a negative effect on anis populations. Rather, this could have benefited the growth of their population across the farm zone of Floreana. These results are in line with those obtained from bird censuses carried out by the Charles Darwin Foundation on Floreana. The eradication program on Floreana includes the reintroduction of locally extinct species. However, this evident increase of anis population on Floreana pose a new challenge for local authorities, as a management plan of this invasive bird should be considered before the reintroductions, in order to improve the success of this process.

- b) Another objective of this research is to understand how anis use their territories in the breeding and nonbreeding season. The main approach used to address this objective was the deployment of GPS tags on 19 anis in the agricultural zone of Santa Cruz. Anis were tagged in Kastdalen (grassland) and Media Luna (Guava/*Rubus* forest). Additionally, we banded each tagged bird using unique combinations of metal rings, so we could identify individuals and know when a bird lost its transmitter.

We obtained a total of 6,411 GPS fixes from 16 (grasslands namely Kastdalen = 13 tags, Guaba and *Rubus* namely Media Luna = 3 tags) of the 19 deployed GPS tags (The NANO, Druid Technology Co. Ltd., China). At a first glance, the results of these analyses showed that anis in Kastdalen use territories of 11.23 ha on average (± 1.25 SE), while those from Media Luna use territories of 8.16 ha on average (± 1.83 SE). The social group composition of anis was not correlated with their territory size in Kastdalen ($r = 0.43$, $p = 0.146$). This could not be analysed for the groups of Media Luna, given the low number of tagged birds.

Data on anis territory use in their natural distribution range is limited. Lentz (2005) found that anis territories at Cabo Rojo National Wildlife Refuge, Puerto Rico covered on average 9.41 ha (± 0.90 SE); however, these data were collected in a different type of ecosystem, mainly composed by exotic grasses with scattered trees and surrounded by farmlands and rural, slightly urbanised areas, at a lower elevation. Moreover, in southwest Puerto Rico, potentially in the same location just mentioned, three groups assessed were found to occupy 6.2, 8.7, and 9.6 ha (Quinn and Startek-Foote 2020). A third study carried out in Central Soledad, Cienfuegos, Cuba reported that the territory of large groups of about 15 birds may occupy 4.05 ha (Davis 1940). All these findings suggest that the territory size of anis varies across their distribution range, however, none of the research cited above were conducted in places with similar vegetation coverage to ours, neither from the source population of the anis in Galápagos, which is thought to be from the Ecuadorian mainland.

- c) Management of anis in Galápagos requires a priori data on their ecology that can serve to the Galápagos National Park Directorate to conduct strategically planned control actions. In this context, one of the aims of our research is to determine whether the territories of the anis are stable or change in composition over time.

Our fieldwork started on Floreana in the 2023 breeding season. Here, we banded anis and monitored their roosts in the agricultural and dry urbanised zone. This was done before the eradication plan aforementioned was carried out in November 2023. Banded anis were searched again in 2024 and 2025 to determine whether they remained or potentially moved their territories. Furthermore, in 2024 we banded anis in the agricultural zone of Santa Cruz and searched for them in 2025.

We banded 39 anis with unique combinations of colour metal rings on Floreana (Table 1). Between 2024 and 2025 we resighted 28 (72%). Most of those birds (93%, $n = 26$) were resighted in the territories they were banded, and only two moved to neighbouring territories. Most resighted juveniles (91%, $n = 10$) were in their natal territories. Seven fledglings were banded from three territorial groups: Ani08 ($n = 1$), Ani09 ($n = 4$) and Ani28 ($n = 2$). In 2024, we resighted three from Ani09 and one from Ani28. In 2025, we resighted again two of the fledglings we saw in 2024 and an additional one that was not observed in 2024, meaning that at least three of the fledglings from Ani09 stayed in their natal territory through our three field seasons.

Table 1. Banded anis resighted on Floreana throughout the breeding seasons of 2023, 2024 and 2025.

SITE	ANIS OBSERVATIONS	ANIS OBSERVED PER SEASON			RESIGHTED TOTAL
		adults	(juveniles)	{nestlings}	
		2023	Only in 2023 + 2024	Only in 2023 + 2025	2023 + 2024 + 2025
Agricultural	Resighted in the same territory	-	6	3	11
	Resighted in a different territory	-	0	0	1
	Anis banded	14(6){7}	0	0	0
Dry/Urban	Resighted in the same territory	-	5	1	0
	Resighted in a different territory	-	0	0	1
	Anis banded	4(8)	0	0	0
Total anis banded and resighted		18(14){7}	11	4	13

On Santa Cruz, we only resighted six (18%) of the 34 banded anis: three during the 2024 nonbreeding season, and three during the 2025 breeding season. Five of them were resighted in their former territory, and only one bird moved to a neighbouring territory (Table 2). No fledglings were banded on Santa Cruz. Banded anis that were not resighted, 11 on Floreana and 28 on Santa Cruz, could have died or moved to other territories.

Table 2. Banded anis resighted on Santa Cruz throughout the breeding and non-breeding seasons of 2024 (24), and breeding season of 2025 (25).

SITE	ANIS OBSERVATIONS	ANIS OBSERVED PER SEASON			RESIGHTED TOTAL
		adults	(juveniles)	[indetermined]	
		br 24	Only in br 24 + nb 24	Only in br 24 + br 25	br 24 + nb 24 + br 25
Kastdalen	Resighted in the same territory	-	2	3	0
	Resighted in a different territory	-	1	0	0
	Anis banded	23(2)[2]	0	0	0
Media Luna	Resighted in the same territory	-	0	0	0
	Resighted in a different territory	-	0	0	0
	Anis banded	4(3)	0	0	0
Total anis banded and resighted		27(5)[2]	3	3	0

br: breeding season, **nb:** non-breeding season.

These findings suggest that anis on Floreana tend to remain on their former territories, whereas on Santa Cruz tend to potentially disperse to other territories. The agricultural zone – the habitat type preferred by the anis – covers approximately 280 ha of Floreana, whereas on Santa Cruz this zone covers over 11,420 ha. Therefore, the difference in the number of resighted anis between

these two islands can be attributed to a higher territory availability on Santa Cruz, which gives the anis the opportunity to disperse from their natal territories. Moreover, it is possible the ani population on Floreana is close to or has reached its carrying capacity, resulting in less dispersal of individuals to new territories.

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

Bird catching

The anis are very alert and skittish birds, a feature that makes them difficult to catch and we needed much more time than anticipated to get our numbers. We tried two different approaches to capture anis for fitting GPS transmitters and colour bands on them: 1) mist netting, and 2) use of funnel traps. Funnel traps require a lure bird that is placed inside the trap in order to catch the attention of anis from a different territory. The lure bird had to be captured using mist nets. However, when one or more anis fell into the mist nets and managed to escape, they would not return to the same place on the same day. To cope with this issue, we tied strings to the highest line of the mist net used. Once an ani flew into the net, two people, one at each side of the net, would pull the strings down and close the mist net with the ani inside. In addition, we made modifications to the funnel trap by including new funnels in the top of the trap. This increased our capture success and thus the number of anis tagged and banded.

GPS data gathering

The amount of data produced by the GPS transmitters was not as high as we expected. Unfortunately, we could not implement a long-term sampling, as we could only retrieve data from one device until November 2024. We searched for anis with transmitters throughout 2024 and again in 2025; however, our searches were not successful. This can be attributed to methodological issues related to the way the GPS tags were mounted, dispersal of tagged individuals to other sites of the island, or their death. It is important to mention that we only found two banded anis that have lost their transmitters, the other 17 were not resighted (every tagged ani was banded with a unique colour combination of metal rings). Despite these constraints, the data retrieved is useful to describe their territory use during the first breeding season. This is relevant information to design an informed management plan for this bird in Galápagos. For publication, we decided to combine their territory use, and population density into a single, comprehensive chapter of my PhD thesis, to make it more impactful.

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

Seven of our study sites were located on local farms. This involved direct contact with landowners, which gave us the opportunity to inform them about the research, explain the importance of studying the invasive anis, and share information about this species in Galápagos.

Engaging and training local people is highly encouraged for research conducted in the Galápagos. Throughout our fieldwork, we trained one field technician from Santa Cruz in bird monitoring, habitat data collection, and faecal sample collection. Additionally, we had the opportunity to have five volunteers from other parts of

Ecuador as a part of our research team, two of them collaborated with us in two different seasons. They also received training in a variety of field methods.

At the end of the 2025 fieldwork, we gave a talk at the Charles Darwin Research Station, to share the preliminary results of our research. This was an open talk, which was attended by members of local and scientific communities and authorities. The anis do not have a direct impact on humans in Galápagos (e.g. they are not crop pests or livestock predators). However, delivering knowledge about the anis and the importance of studying them is crucial for future implementation of control methods. Moreover, if future conservation actions imply land management, it is important to raise awareness among stakeholders engaged in these activities.

5. Are there any plans to continue this work?

A final field season is planned for Sep-Oct 2025, aimed at complementing the roost monitoring data on Santa Cruz, in the non-breeding season of anis. This field season will also include faecal sample collection to compare their diet composition between seasons. Ultimately, the main research objective is to design a management plan for the anis in Galápagos that can also serve as a framework for other invasive bird species on oceanic islands. This process will include multi-sector meetings and workshops, in order to create a well-informed and strategic plan that can be implemented by the Galápagos National Park Directorate. These activities are not included in my PhD research; however, they belong to a wider framework and will be carried out alongside or after my research is completed.

Lastly, the data collected in this research have not yet been analysed in depth. These analyses are scheduled for completion in the first half of 2026. The results will provide detailed insights on the ecology of the invasive anis in Galápagos.

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

The results of our research will be shared as scientific publications, technical reports, and conference presentations.

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

On a broader scale, it might be useful to gather data on anis ecology from different islands, especially from those with agricultural zones. This would provide local authorities with more detailed data on the priorities to consider when conducting a management plan. Moreover, it is important to organise multi-sector meetings, and workshops. These activities can improve the impact of future management and that includes the community, which in turn is crucial for sustaining a medium- to long-term control programme. A major objective of this research is to serve as a framework for other invasive bird species; therefore, a key step will be to implement this research framework to other relevant cases where convenient.

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?

Presentations where I used The Rufford Foundation Logo:

1. **Poveda C.**, Fessl B., Cooke S. C., Maclean I. M. D. and Kaiser-Bunbury C. N. 2024. The introduced smooth-billed ani (*Crotophaga ani*) in Galápagos. Oral presentation. Friday Postgraduate Talks, University of Exeter, Penryn, Cornwall, UK.

2. **Poveda C.**, et al. 2024. Dinámica territorial del Garrapatero Piquiliso (*Crotophaga ani*) en la zona agrícola de la isla Santa Cruz. Oral presentation. VIII Reunión Ecuatoriana de Ornitología. Macas, Morona Santiago, Ecuador.
3. **Poveda C., Deckers A.**, Fessl B., Cooke S. C., Hugé J., and Kaiser-Bunbury C. N. 2025. Ecología de forrajeo y perspectivas de investigación del garrapatero piquiliso (*Crotophaga ani*). Oral presentation. Encuentros: Ciencia y Comunidad. Charles Darwin Foundation, Pto. Ayora, Galápagos, Ecuador

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

Team member	Role
Dr Christopher Kaiser-Bunbury	1st PhD supervisor – University of Exeter
Dr Birgit Fessl	External supervisor – Charles Darwin Foundation
Dr Sophia Cooke	External supervisor – Environmental Funders Network
Ann-Sophie Deckers	MSc student and international field assistant 2025
Melany Prado	Undergraduate student and national field technician 2024 - 2025
Merlin Mauchamp Fessl	International field technician 2024
Fernando Villegas	National field technician 2023 - 2024
Emilia Andrade	National field technician 2024
Paula Pröll	International volunteer 2024
Mireia Corvera	International volunteer 2024
Camila Contreras	National volunteer 2025
Edwin Lara	Local volunteer 2025
Freddy Tapia	National volunteer 2024

10. Any other comments?

References

- Davis, D. E. 1940. "Social Nesting Habits of the Smooth-Billed Ani." *The Auk* 57 (2): 179–218. <https://doi.org/10.2307/4078745>
- Quinn, J. S., and J. M. Startek-Foote. 2020. "Smooth-billed Ani (*Crotophaga ani*)." Version 1.0. In *Birds of the World* (A. F. Poole and F. B. Gill, Editors). Cornell Lab of Ornithology, Ithaca, New York, US. <https://doi.org/10.2173/bow.smbani.01>
- Lentz, Cindy. 2005. "An Investigation of Territory Quality in the Smooth-Billed Ani (*Crotophaga ani*)." McMaster University. <http://hdl.handle.net/11375/23615>

ANNEX – Financial Report
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