The Rufford Foundation
Final Report

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.

Thank you for your help.

Josh Cole, Grants Director

Grant Recipient Details	
Your name	Spencer Christian Schubert
Project title	Applications of Avian Seed Dispersal for Forest Restoration in the Dominican Republic and a Closer Look at Biodiversity across Fragmented Landscapes
RSG reference	21941-2
Reporting period	April – December 2017
Amount of grant	£5000
Your email address	sschu001@odu.edu
Date of this report	7 March 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
1. Continued Monitoring of RSG I Studies				Experimental plots constructed in 2016 were surveyed for bird activity periodically until July, slightly over 12 months since their original establishment. We completed the yearly seedling censuses, and these will be repeated annually until 2020. From these plots we are beginning to see a clearer picture of how birds are involved in natural patterns of forest succession in farmland landscapes.
2. Site Selection & Restoration Plot Installation				Unfortunately, *Plan Yaque* was unable to acquire access to as many farms as originally anticipated. Consequently, we had to reduce the number of properties on which we could work and modify the methodology of the study accordingly.
3. Biological Surveys				Of the available properties, we selected seven large farms to study forest communities. Between June and December, each site was sampled using standardised surveys to evaluate the diversity and abundance of avian and plant taxa. Additionally, we conducted observations on foraging and seed dispersal of birds using multiple protocols.
4. Collaboration with Local Partners				Throughout the year, we worked closely with *Plan Yaque* to advance the forest restoration projects. We also began what is expected to be a long-term collaboration with ecolodge and environmental advocate, *Rancho Baiguate* among other organisations.
5. Outreach				Some of our outreach involvements have included hosting training workshops for tour guide staff, aiding a developing university ornithology curriculum, and promoting nature-based recreation to Dominican families and tourists.

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

The major obstacle that I encountered during 2017 was with respect to organising and initiating field work for the artificial perch experiments in cooperation with *Plan Yaque*. Prior to submitting the proposal for the second Rufford Small Grant, I had met with the director of this organisation multiple times to discuss the possibility of a collaborative effort to integrate my research into an existing forest restoration programme in the farmland communities surrounding the town of Jarabacoa. The previous year, I had witnessed, in person, two examples of farms where this programme had been undertaken. The director assured me that their organisation had identified 40 private farms that were prospective sites for replicating this design and that they intended to carry out this work at most of those sites. However, when the time came to visit these sites and talk to landowners about advancing with these projects, many did not support the proposition. Opposition to the programme was usually due to concerns about the space that restoration plots would require and how this may reduce grazing areas for livestock. Another issue that we encountered were disagreements about how some existing plots on properties dedicated to forest restoration should be managed. While the stated objective of the programme was to promote the recovery of forested habit, some land owners were more concerned with planting exotic trees with economic value (i.e. avocados, mango, pines, etc) that would not have been consistent with the programme's initiative to restore native vegetation. The original plan was to install perches at as many as 18 sites with a subset of eight sites (and their surrounding landscapes) selected for more focal study. However, due to the reduced availability of sites for the programme, I have condensed the scale of the study to only eight focal sites. We are hopeful that in future years the programme will gain favour with more land owners and that we will have the opportunity acquire more sites for the study.

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

1. Advances in Forest Restoration Projects in The Region

Despite the initial setbacks that have required us to reduce the scale of the forest restoration programme, our efforts have still been rewarded by considerable progress. By the end of the summer months, we had selected all eight sites and completed construction on three of these. During the fall, as we continued to progress with our surveys at study sites, we also completed construction of two additional sites. We were unable to complete the construction of the final three sites due to reasons that varied at each farm. For example, one property owner agreed to allow us to install the experiment but asked that we delay construction so that he could continue grazing the land for the remainder of the year. Completing construction of the remaining plots and maintaining existing plots will be our first task when I arrive on site in April 2018. Once the final construction has been completed, we will have acquired more than 1 ha of space scattered across the watershed for forest restoration purposes. While we have already begun monitoring these plots for forest regeneration using small quadrats to monitor seedling establishment, we do not expect to observe measurable recovery until 1-2 years following installation. This expectation is informed by the results

from our study of abandoned pasture plots that began in 2016, which have only recently begun to show significant growth. In the short-term, the effectiveness of artificial perches in this restoration project will be primarily measured through observations of their use by avian seed dispersers. Over the course of the late summer and fall, we sampled seed dispersal around artificial perches using elevated seed traps. Based on our initial collections, the rate of seed deposition is somewhat less than would be expected below naturally-occurring isolated trees that we measured during the first year of field work. Our collections included seeds from a variety of species, including many that have proven to be successful colonists in our original abandoned pasture plots such as *Cecropia schreberiana*, *Cupania americana*, and *Trema micrantha*. During December, I shipped camera equipment to our field site and used this to record the identity of visitors to the plots as I visited each site for the final surveys of the year. I recorded several avian seed dispersers using artificial perches, including northern mockingbird, grey kingbird and stolid flycatcher. I expect bird activity to increase in these plots with time as they acclimate to the change in their environment.

In addition to the studies involving forest restoration that began this year, I have also had the opportunity to help other organizations in the region develop projects related to forest restoration. In the spring, my project members and I were invited to the town of Mao to meet with the administrators of an organic banana farmer's cooperative, *Banelino*. This organization learned of our research through *Plan Yaque* and hoped to consult our knowledge of bird-friendly land management techniques that they can incorporate into their farms. We helped *Banelino* survey several banana plantations and identified areas that would be favourable for habitat restoration to increase bird diversity and the pest control services of insectivorous birds. More recently, I participated in winter bird surveys in a small village in Los Cerezos in the province of Dajabón near the Haitian border. I was invited on this trip as part of a scholarship that I was awarded in 2017 by the Virginia Society of Ornithology (VSO). My role in this project was to accompany members of the VSO and another American non-profit organisation, Earth Sangha. Both these groups are partnered with a local coffee farming cooperative, *Asociación Productores de Bosque, Los Cerezos*. This alliance is working to develop a nursery for native tree species that are currently being used for dozens of small-scale forest restoration projects in the area. The director of Earth Sangha and I are continuing to share ideas about our respective projects and how we may learn from one another

2. Training Biologists and Naturalists

At the beginning of the 2017 season, I was able to renew the contract of one of the technicians that had previously worked with the project in 2016. Joaris Gonzalez became a key resource for our project, since his working knowledge of the field studies allowed us to quickly transition new personnel into the project work routine. Together, we trained and managed several volunteers who contributed their efforts to the project. These included four Americans and two Dominican women – Anatheydi and Ambar. The volunteers learned valuable field research techniques in ornithology and botany. Some of these techniques include point count and line transect bird surveys, foraging behaviour observations, forestry inventory sampling, evaluation of tree phenology characteristics, and procedures for collecting and preserving botanical samples. These volunteers also gained experience in other

aspects of field biology by volunteering with my fiancée, Holly Garrod, in her studies of broad-billed tody and narrow-billed tody nesting biology. Many of these individuals have already moved on to other biologist positions or graduate programmes.

Additionally, I have organised and led multiple workshops for *Rancho Baiguate* staff and other interested naturalists in the area. The content of these workshops has mostly focused on bird identification skills in the field and how to communicate this information to school children and tourists. Most of the birding tourism in the Dominican Republic is based in the Barahona Peninsula in the southwest, where there are several endemic species seen nowhere else on the island. Many Dominican tourists and school groups travel to Jarabacoa to experience nature and learn about the native ecosystems. However, there are currently no outdoor birding activities offered by any organization in Jarabacoa. Through these workshops, I aim to give locals the tools they need to capitalize on this open market, which would serve both to provide economic opportunity as well as a powerful platform from which to educate the public about conservation issues facing birds and forests.

3. Expanding Collaborations with Conservation Partners

The loyal commitment and support of our local partners have been instrumental to the project's success in 2017. In addition to the affiliates that began the year with us, we started working with *Rancho Baiguate*. *Rancho Baiguate* is a privately owned ecotourism resort founded on the ranch historically owned and farmed by the Rodriguez family. I met the ranch owner through mutual friends from *Plan Yaque* in Jarabacoa. By this time, the ranch administrators were already aware of the research that my colleagues and I have been conducting regarding birds and forest restoration projects, and they expressed interest offering their land as a potential study site. Unfortunately, there was no parcel of land available on the property that qualified for the forest restoration programme. However, this did not stop us from pursuing other endeavours. In recent years, the ranch has begun taking on volunteers to undertake projects beyond the essential functions of their business, many of which involve projects in environmental conservation and outreach projects. At the end of the summer, I reached an agreement with the owner that would allow our project personnel free room and board at the ranch in exchange for part-time commitments to developing side projects on the ranch. This new partnership has provided major benefits to both sides by allowing me to repurpose funds that would otherwise have been needed for housing and food costs toward expenses more directly related to fieldwork activities. Some of the projects that our team members have completed on the ranch include bird and plant surveys, training workshops for staff in bird tourism, trail signs and informational brochures, and invasive species removal. Because of the success of this collaboration, the ranch owner has offered us a similar agreement in 2018. Recently, Sr. Rodriguez extended an invitation to my team and I to assist with the administration of the family's new environmental foundation, *Verde Soy*. During 2018, we have been asked to assist in the management of a private property near Armando Bermudez National Park in the village of Manabao. Here, the Rodriguez family hopes to establish a wildlife sanctuary where we will undertake projects such as habitat restoration, artificial nest box installation, and breeding bird surveys.

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

One of the primary aims of the forest restoration programme initiated during 2017 is to provide benefits to local land owners through the improvement of local water resources. However, the benefits of this programme may take several years to have these positive effects. In the meantime, we are focused on maintaining positive relationships with local land owners. Many of the farmers and their neighbours were initially bewildered by the peculiar bamboo towers (i.e. artificial perches) placed in the restoration areas. I am often confronted by locals asking about their purpose and why, of all places, I would go through all this trouble and effort to study the forests in their backyard. These everyday encounters provide an important opportunity to draw attention to the value of forest resources that are tangible to average people. Some of the locals have taken a special interest in the projects and tell us about their sightings of birds using the artificial perches. In most farming communities, many people see forests in a negative light as a lost opportunity to use that space to produce more livestock or crops. Therefore, our projects are viewed with a healthy degree of scepticism by some. *Plan Yaque* and I have been working to educate local land owners about other benefits of their participation in forest restoration efforts, including the government programme *Pago Por Servicios Ambientales*. This programme offers payment subsidies for farmers according to the space on their farms that they either leave undeveloped or repurpose for forest restoration. This is potentially an important first step to incentivising other local farmers to preserve forest habitat and change the attitude toward forest conservation. Paying community members for their services in plot fence construction also helped us make connections with neighbouring families and community leaders. On several occasions, *Plan Yaque* has helped by accompanying us into the field and providing gifts to farmers in the form of seedlings of coffee, cacao, and avocado for planting.

5. Are there any plans to continue this work?

Field research associated with the studies that have been set up in the last 2 years will continue until the summer of 2020. Based my ongoing communications with local partners, I believe there is strong potential for these projects to continue well beyond my graduate research. The techniques that we are using for our restoration projects have already been noticed by other organisations, who are following the progress of our studies with special interest. I see our relationships with *Rancho Baiguate* and their new environmental foundation *Verde Soy* as an important opportunity to establish long-term conservation projects in Jarabacoa and surrounding communities.

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

During this past year, I presented the results from previous work at the international BirdsCaribbean meeting in Cuba. Here, I had a rare opportunity to meet other researchers and conservationists from all over the region and discuss current and future work with them. Other less formal presentations included invited talks to *Rancho Baiguate* and at the *Plan Yaque* headquarters. Unfortunately, the faculty at local universities *UAFAM* and *ISA* were unable to schedule me for a talk at their respective

campuses. However, I expect that we will be able to arrange this during this coming year. Later this month, I will be presenting the results of some of my studies at the Biology Graduate Student Organization Spring Symposium as well as the Graduate Research Achievement Day, both at Old Dominion University. I have also made plans to present the results of my research at the Ecological Society of America's meeting in New Orleans, Louisiana in August 2018, pending the acceptance of my abstract. This is one of the world's most prestigious gatherings of professional ecologists and an opportunity to see the latest directions in research and progress in my area of study.

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

I originally anticipated that the RSG II funds would be applied to project expenses between April and December of 2017, and this was indeed the case. By the end of the calendar year, our expenses had reached the budget amount initially proposed.

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
Rental Car (SUV)	1395	161	1234	I managed to greatly reduce expenditure on a rental vehicle by sharing the expenses with a collaborator who had been awarded funding for this purpose. Additionally, I was able account for this spending using the funds awarded from other agencies (i.e. Sigma Xi, BirdsCaribbean, Roger Williams Park Zoo). During the fall months, our project technician and the resident volunteer primarily used a motorbike for transportation as a more affordable alternative to a rental vehicle.
Petrol	250	139	111	Expenses were reduced through my sharing of a rental vehicle. Once the rental vehicle was returned at the end of the summer, our field crew primarily used the motorbike, which helped with fuel economy.
Bus and Taxi Fares	155	208	-52	My team required public transportation to travel to the capital to deposit samples for identification at the botanical garden. I

				also required a taxi to go to and from the airport for the BirdsCaribbean conference in July.
Rebar (3/4 ")	509	0	509	This item was originally intended to serve as a mount for artificial perches. We avoided this cost by harvesting bamboo poles from the properties of cooperating land owners.
Field Technician Salary	1758	2034	-276	Total payment for the technician was somewhat higher than expected due to him working more days and a slightly higher rate of pay due to the increased responsibility of managing volunteers.
Volunteer Food Expenses	220	223	-3	
Seed Trap Materials	517	0	517	We were able to acquire all the necessary materials for seed traps by recycling materials purchased in 2016 and through funds from BirdsCaribbean.
PVC for Seedling Quadrats	196	26	93	Some seedling quadrat posts were crafted from PVC materials; however, we also used bamboo poles for this purpose.
Airfare Expenses (one-way)	0	198	-198	I did not originally budget for this cost, since I had applied for travel monies from my own university department. However, this proposal was not funded. I paid for the return flight out of my own personal funds.
Tourist Visa & Surcharge Fees	0	51	-51	I used funds to purchase a tourist visa upon entering the country. I was also charged a fee for staying more than 30 days in the country.
Notebooks	0	24	-24	
Polaris Binoculars	0	105	-105	One of the Dominican volunteers who was working with our project did not have her own binoculars. I purchased these for her to use. They will continue to be used by other project members in future years.
Acer Laptop for data entry	0	143	-143	The project technician did not have his own personal laptop. I had previously devoted an old device to project members to use for data entry in 2016; however, this device lost its function and needed to be replaced. This laptop will continue to serve the project in future years.

Super Gato GY 200cc 2015 Motorbike (used)	0	755	-755	Shortly before returning the original rental vehicle, I assessed the potential project expenses for the remainder of the year and determined that we would surpass the proposed budget as much as two months early if we chose to renew the rental vehicle. Instead, I chose to invest a fraction of that money into the purchase of a motorbike. The technician, who has over ten years' experience operating similar motorbikes, assumed responsibility for transporting a passenger (either a volunteer or myself). And these two-person crews were able to effectively access remote sites and conduct field work.
Motorbike Safety Equipment	0	9	-9	One helmet came with the motorcycle and we purchased another for the passenger.
Motorbike Maintenance	0	77	-77	These expenses included multiple oil changes, a battery replacement, and repair of damaged plastic parts that resulted from wearing on bad roads.
Housing Expenses	0	579	-579	During the first seven months 2017, before relocating the project base to *Rancho Baiguate*, I rented a house together with other collaborators. When the paying tenants departed earlier than anticipated, I had to continue paying for lodging for the project volunteers in the final two months.
Philips Digital Voice Recorder	0	31	-31	This item was purchased to replace a unit that had become dysfunctional.
Suunto Compass	0	32	-32	This item was a replacement for one of our navigating compasses that was damaged in the field.
Fence Construction Materials	0	26	-26	These materials were required to repair damaged and aging fences from the plots constructed for the RSG I project.
Fence Labour Costs	0	129	-129	I compensated a handyman specializing in fences to repair and reinforce the abandoned pasture plot fences, so our team could allocate more time on the new sites
Service Charges	0	13	-13	Miscellaneous expenses, including package shipment/receiving fees and printing documents at a local shop.
Hotel	0	38	-38	When I left the country in August, I had to spend considerable time at the Ministry of the Environment to process a permit

				application for shipping seed samples from my research back to my university. I had to book a hotel the night before my flight's departure to account for the time that was needed for this process.
Total	5000	5000	0	

—exchange rates of $58.255 (DOP) = £1.00 (GBP) and $1.244 (USD) = £1.00 (GBP) were used for these calculations. These were exchange rates at the time funds were received at the end of April.

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

Our work plan for the future is clear at this point. We will continue to monitor the abandoned pasture plots that were constructed during the first year of the study. This will serve as a benchmark for our other forest restoration efforts and inform any potential changes in its management. Based on our observations and evaluation of the data from our restoration plots, we will consider potential changes or improvements to the artificial perch experiments. If the perches are not attracting significant activity of avian seed dispersers, we may choose to introduce other structures and potential regeneration nuclei into the plots. Currently, we are also concerned that overgrown pasture grasses may inhibit the growth of bird-dispersed plants. One possible methodological change that could overcome both these challenges would be to use live fence tree cuttings to create small patches of natural perching structures that also serve to shade out pasture grasses. *Plan Yaque* has begun planting seedlings of native tree species in some of our plots. While these will not grow to sufficient size to attract birds for several years, they will provide a more certain source of regeneration in the long term. For these reasons, we will also proceed to plant native trees in the remaining plots as well.

Now that I have completed the initial survey work and marking of transects, we now have the logistical means by which to use our study sites for more focused investigations. Specifically, I intend to sample these landscapes to describe and quantify mutualistic interactions among plants and seed-dispersing birds. By studying each of these communities from the perspective of interaction networks, we aim to understand how both species and their associations and co-dependence vary across the region. In this regard, future field work will rely heavily on sampling the phenology patterns of fruit availability and the foraging behaviours of frugivorous birds. Through this approach, we will uncover the effects of human disturbance and landscape mosaic composition on seed dispersal processes. Furthermore, this research will help to uncover potential keystone species – both birds and plants – that can be targeted for management in forest restoration projects to increase their effectiveness.

Finally, I aim to use my partnership with *Rancho Baiguate* and *Verde Soy* to expand upon the forest restoration efforts that we have started in 2017 to add more traditional approaches to bird conservation to my project's agenda. I believe that combining these different aspects can help my partners and I bring more attention to these matters in the communities where we work and establish a basis for long-term work in the region.

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

Yes. I used the Rufford logo at the end of all my research presentations this year. Additionally, I recognised the Rufford Foundation in my reports to other organisations that have co-funded my research, including the Roger Williams Park Zoo and BirdsCaribbean. For the latter, I also wrote a newsletter article that was widely shared to bird enthusiasts online that also recognized Rufford's contributions.

11. Any other comments?

As always, I am extremely grateful for the support of the Rufford Foundation for my project. Since my research project does not benefit from pre-existing infrastructure or large funds from my research advisor. I rely on small grants to keep the project going. In addition to my two RSG awards, I have won grants from several other agencies. Unlike the Rufford Foundation, many of these do not allow graduate students the opportunity to renew funding for studies that last multiple years. For this reason, this grant programme has been indispensable to my success, and I hope that my project will continue to benefit from the foundation's support in future years.