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	Maya Wilson
Project title	Population biology, life history and ecology of the Bahama Swallow (Tachycineta cyaneoviridis): informing conservation of an endangered bird in The Bahamas
RSG reference	18652-2
Reporting period	February 2016-17
Amount of grant	£4841
Your email address	mayaw@vt.edu
Date of this report	29 December 2016

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) Estimate Bahama swallow population density and abundance				Distance sampling surveys were conducted on randomised transects along roadways. With the addition of 2017 surveys, these data will be analysed to provide population estimates. Unfortunately, a lack of recaptures of Bahama swallow individuals will prevent estimates from capture-recapture analysis (see Question 2). Another survey method is being developed that will provide population estimates, along with supplemental information about the habitat that is available (see objective 4).
(2) Estimate Bahama swallow dispersal through genetic analysis				A total of 102 blood samples have been collected from individual Bahama swallows. These samples, along with those to be collected in 2017, will undergo genetic analysis to estimate dispersal through population structure.
(3) Determine life history characteristics of the Bahama swallow				Active Bahama swallow nests were located in cavities in a variety of structures. A subset of nests in pine tree snags were monitored using a specialised camera. These data, along with nest data from 2017, will be analysed to determine breeding season phenology, clutch size, and reproductive success.
(4) Assess availability of breeding habitat				Habitat surveys were conducted to assess the density of potential nesting structures and cavities within them. These data, along with data

				from 2017, will be analysed within geographic information system (GIS) systems to estimate the extent of Bahama swallow breeding habitat.
(5) Assess competition for nesting resources				Active nests of other cavity-nesting bird species were located in a variety of structures. With knowledge of the available breeding habitat (objective 4), these data will allow me to design a cavity-nest web, illustrating the interactions of cavity-nesting species.
(6) Assess impact of nest depredation on Bahama Swallow populations				The loss of eggs and nestlings due to depredation is observed during nest monitoring (objective 3). These data will be used to provide insight into the impact of several potential nest predators on the reproductive success of Bahama swallows.

*Note: Objectives have been partially achieved because, as indicated in the comments, another full field season is planned for Summer 2017. Statistical analysis will be conducted on the data set that includes all seasons.

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

Swallows tend to forage in open areas for aerial insects, manoeuvring quickly and changing direction often. These behaviours make capturing Bahama swallows with mist nets a difficult task. Although I have designed a structure that can be set up in most areas, often the birds do not fly in ways that make it possible to capture them. Despite immense effort, this seemed to be the case a majority of the time during the 2016 season. A lack of captures and, consequently, a lack of recaptures, prevents capture-recapture analysis to estimate population abundance. However, we were able to take blood samples from the 12 birds we did capture, which will contribute to estimates of population structure to assess dispersal. Capture effort during the 2017 field season will focus on collecting additional blood samples, particularly on Andros Island and Grand Bahama Island.

Locating nests of other cavity-nesting species is essential to understanding the interactions of these species with each other and with Bahama swallows. It can be difficult to locate nests of two cavity-nesting species in particular. The La Sagra's flycatcher (*Myiarchus sagrae*) is quiet and, although fairly inquisitive of human

presence, rarely leads us to a nest location. The American kestrel (*Falco sparverius*) appears to have a large range, leaving the area surrounding a suspected nesting cavity for long periods. When it is in the area, it often perches nearby without entering the cavity, making it challenging to confirm nest locations. Additional effort will be put toward locating nests of these species in 2017.

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

Prior to this project, the only Bahama swallow breeding biology data was collected in 1995 (Allen 1996). An understanding of Bahama swallow life history is vital to developing effective conservation strategies. We have been able to locate nests in a variety of structures, providing important insight into nest site selection and the distribution of nests. During the last two seasons, we examined the contents of pine snag nests using a specialised camera. These data will be used to provide breeding season phenology, clutch size, and reproductive success. These life history characteristics can be compared with other species within the *Tachycineta* genus. In particular, the Bahama swallow can be compared with its closest relative, *T. euchrysea*, which is a threatened species that is endemic to the Dominican Republic.

Previous Bahama swallow population estimates are based on the extent of pine forest cover within the species' range. This is logical, since the Bahama swallow is known to breed in pine tree snags. However, the structure of the pine forest, and therefore its suitability for Bahama swallow breeding, is likely not equally distributed across the islands. Also, Bahama swallows will build nests in structures other than pine tree snags, expanding the definition of suitable breeding habitat. My habitat surveys are designed to estimate the density of multiple nesting structures and the cavities within them, which will provide a more detailed understanding of the extent of available breeding habitat.

As obligate secondary cavity-nesters, Bahama swallows rely on other species to create cavities in which they can build their nests. The West Indian woodpecker (*Melanerpes superciliaris*) and the hairy woodpecker (*Picoides villosus*) are the only cavity-excavating species in The Bahamas. There are also several other secondary cavity-nesters present on the islands, including invasive species such as the house sparrow (*Passer domesticus*) and the European starling (*Sturnus vulgaris*). We have been able to locate nests of cavity-excavators and other secondary cavity-nesters, which will allows the design of a cavity nest-web that will illustrate the competition that the Bahama swallow faces for nesting cavities within different habitats.

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

I have been working closely with the Bahamas National Trust (BNT) since this project was developed in 2014. BNT is a non-governmental organisation that is responsible for managing all national parks and protected areas in the Bahamas, and is active in conservation initiatives that include working with scientific researchers. My team and I have participated in several activities organized by BNT. In 2016, BNT invited me to give a presentation about this research to the general public at the Island Roots Heritage Festival. We also assisted BNT in two summer camps, informing local school children about this research. The results of this research will be shared BNT and the Government of The Bahamas. It is my goal to work with these entities to develop strategies to conserve the Bahama swallow and its habitat.

Over the last two field seasons, I have employed Bahamian residents as research technicians, providing opportunities for locals to participate directly in this research project.

5. Are there any plans to continue this work?

As a doctoral dissertation, this ongoing project will continue during the 2017 Bahama swallow breeding season, expanding the current data set to accomplish the objectives described in this report. I also hope that by fostering collaborations with several organisations in The Bahamas and the U.S., related research and monitoring will continue beyond the limits of my work at Virginia Tech.

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

In addition to my dissertation, the results of this work will be shared with the scientific community by publishing peer-reviewed articles and presenting at professional conferences. I provide BNT with annual reports on the progress of this research, and, as previously mentioned, I will share the final results of this study with them. I will also provide educational materials (e.g. posters, pamphlets) related to the Bahama swallow and its habitat that will be accessible to the general public.

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 from the Rufford Foundation was used to pay for field season costs from April – July 2016, which was the anticipated length of this portion of the project.

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.

The 2016 field season was funded by the Rufford Foundation and the Virginia Tech (VT) Bailey Fund. Due to the system by which the funds were distributed by these two sources (i.e. direct payment vs. invoices/reimbursement), field season costs were paid for differently than originally anticipated.

Item	Budgeted Amount	Actual Amount	Difference	Comments
Field techs' flights to Abaco	693	0	693	Costs covered by the VT Bailey Fund
Field techs' stipends	1,320	0	1,320	Costs covered by the VT Bailey Fund
House rental on Abaco Island	0	2,530	-2,530	Paid directly to owner, provided housing for entire field team for the duration of the season. Originally budgeted for VT Bailey Fund.
Meals	990	1,433	-443	Purchased groceries for entire field team at local markets for the duration of the season. Food costs in The Bahamas are high due because most goods are imported.
Airfare to Andros	462	337	125	Roundtrip tickets from domestic airlines, partially covered by the VT Bailey Fund
Transportation on Andros	0	109	-109	Unanticipated costs for taxi fare from airport to Forfar Field Station.
Accommodations at Forfar Field Station, Andros Island	1,376	0	13,76	Costs covered by the VT Bailey Fund
USFWS/BNT Permits	0	109	-109	Processing fees for research permits. Originally budgeted for VT Bailey Fund.
Miscellaneous project costs	0	289	-289	This category includes unanticipated in-field

				expenditures such as materials from the local hardware store to maintain equipment and build experimental nest boxes, gas cans and other emergency supplies, mobile phone minutes for team communication, etc.
Total	4,841	4,807	34	

Note: £1 = $USD 1.38 at time of wire transfer from the Rufford Foundation.

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

In the months leading up to the next Bahama swallow breeding season (April-July 2017), I will perform preliminary analysis to determine how to best focus research efforts. After completing the 2017 field season I will fully analyse all data collected.

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?

The Rufford Foundation logo was featured in presentations given at the Bahamas Natural History Conference and the University of Maryland Baltimore County. It was also used on a poster presented at the the North American Ornithological Conference. The logo and link to the Rufford Foundation website is also included on the website for this research project (https://bahamaswallow.wordpress.com/funding-and-collaborations/).

11. Any other comments?

I am truly appreciative of the Rufford Foundation's contributions to this project. My research would not have advanced as far as it has without the funds provided by the Rufford Foundation.