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	Katharina Johanne Peters, Sonia Kleindorfer
Project title	Manual parasite control and community engagement to save Darwin's finches
RSG reference	14821-2
Reporting period	20.01. – 30.09.2014
Amount of grant	£6000
Your email address	Katharina.peters@flinders.edu.au
Date of this report	10.09.2014

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
Fly trapping: Manual removal of *P. downsi*			X	We caught a total of 553 parasitic flies with the flytraps. Of these flies, 199 were female. Female flies were caught in higher traps compared with male flies.
Investigating Darwin's finch nesting success in plots with and without flytraps and in relation to distance from the flytrap.		X		Due to low nesting activity in plots with flytraps, the sample size is too small (N= 7 nests) to draw meaningful conclusions.
Identify nesting success in Darwin's medium tree finch			X	The critically endangered medium tree finch had 0% nesting success in 2014 (out of seven nests with eggs)
Quantify parasite intensity and nesting success in all three sympatric species in declining forest			X	The critically endangered medium tree finch had the highest parasite intensity (~60) compared with small tree finch (~43), small ground finch (~33) and hybrid finches (~21).

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

Our field data collection was shortened because of the late onset of rains and early cessation of rains. The breeding season of the Darwin's tree finches is triggered by the onset of the rainy season, which often occurs in late January and lasts well into April/May. By mid-March most nesting activity of the tree finches had ceased, which meant that we could not gather as much data on nesting activity as planned.

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

Main findings of 2014 fieldwork:

1. We caught a total of 553 (199 female, 354 male) *Philornis downsi* flies with baited flytraps. The higher fly traps caught more flies, which is a significant findings for implementing manual control measures.
2. Out of 30 monitored nests, zero *Camarhynchus* tree finch nest produced fledglings in 2014 (Table 1). Hybrid nests had the lowest parasite intensity and medium tree finches had the highest parasite intensity (Table 1); all nests failed due to parasitism from *Philornis downsi*.
3. Only one small ground finch (*Geospiza fuliginosa*) nest produced fledglings (1/11; 9.1% success).

Table 1. Summary data for nesting outcome in the nests of tree finches (*Camarhynchus* spp.) and small ground finches (*Geospiza fuliginosa*) on Floreana Island in 2013 and 2014. Data include number of nests monitored, parasite intensity (mean ± SE) for *Philornis downsi* larvae in the finch nests, clutch size, and percentage of nests with total chick mortality. Clutch size data are shown for all nests with eggs, parasite intensity is shown for all nests with chicks. Note that medium tree finch nests had the most parasites compared with small tree finches, hybrid finches or small ground finches. All hybrid and medium tree finch nests failed to produce fledglings in both years.

	Small Tree Finch *C. parvulus*		**Hybrid *Camarhynchus***		**Medium Tree Finch *C. pauper***		**Small Ground Finch *G. fuliginosa***	
	2013	2014	2013	2014	2013	2014	2013	2014
No. Nests	15	15	15	8	4	7	13	11
P. downsi mean±SE	33.9±6.2	42.7±11.9	29.8±6.7	21.0±6.0	102.0±28	60.3±5.7	37.1±8.7	32.8±8.0
Clutch size mean±SE	2.6±0.2	2.1±0.3	2.5±0.2	2.6±0.2	2.5±0.3	2.6±0.3	2.6±0.2	2.9±0.1
% Chick mortality	88.0	100	100	100	100	100	80.8	91.3
% Fledging success*	5.9	0	0	0	0	0	23.1	9.1

*Fledging success is shown as the % of nests with eggs that produced fledglings.

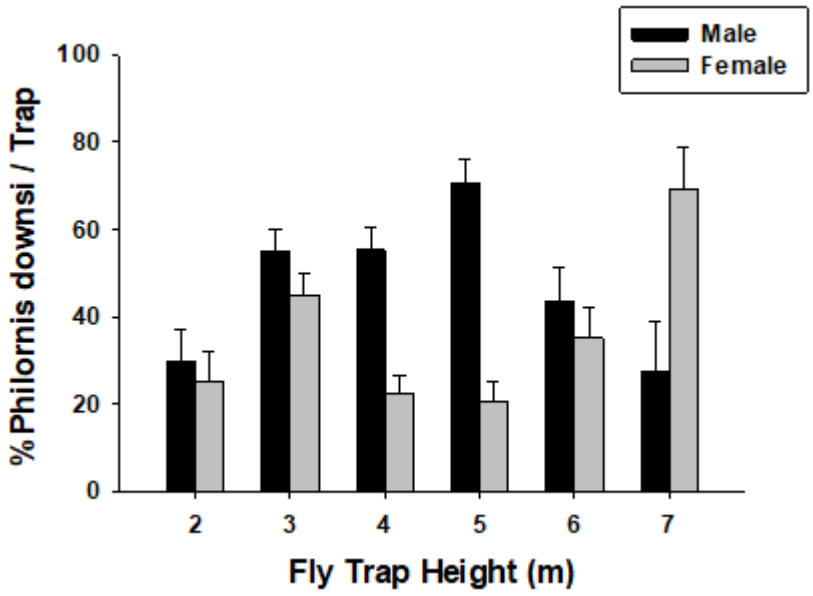

Figure 1. The percentage of male and female parasitic flies (*Philornis downsi*) caught in flytraps placed at different heights in the Scalesia forest on Floreana Island in 2014. Note that more female flies were caught in higher traps. This is significant because females oviposit eggs, and this could explain why finches nesting higher in the forest, like the medium tree finch, have more parasites.

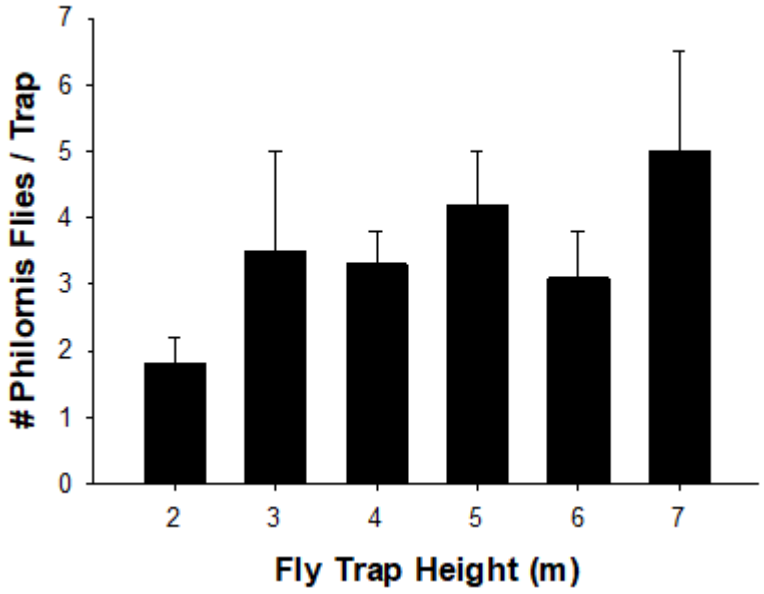

Figure 2. The number (mean ± SE) of *Philornis downsi* flies per flytrap placed at different heights in the Scalesia forest on Floreana Island in 2014.

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

We implemented our community engagement approach with teachers and the local community by presenting and sharing the interactive audio and visual brochures developed for the project. We have also made the files available to the Charles Darwin Foundation for dissemination via a planned on-line site for conservation awareness about introduced species on the Galapagos Islands. This work built on our trial study in 2013. We trialled an explicit model of community engagement with teachers, on-ground tour operators, international volunteers, and Galapagos National Park staff to increase awareness about the plight of the Galapagos land birds affected by the introduced parasite. We developed brochures, audio files, and PowerPoint presentations that have been disseminated to primary and secondary school across the Galapagos Archipelago and the mainland, including to the USA. We then invited a total of ~60 people into the field with us on different days and provided each person with a 6-hour intensive field day mist-netting birds and finding nests, putting up traps and removing larvae. The idea was to combine intense personal experience with “easy to use” field identification manuals and audio recordings that anyone could use to identify Darwin’s finches, and to disseminate the personal experience and information via these brochures and audio files with other students and volunteers. Thus, community professionals become the patrons of the local wildlife and in this manner are role models for the next generation of children. It is not effective for visiting scientists to possess all of the information and provide “expert advice” on what needs to be done if the local and international community remains unconvinced or unaware of the problem. By sharing the capacity to identify wildlife and threats to wildlife, the teachers, tour operators, international volunteers, and parks workers become stewards of the messages themselves adding personal anecdote to their tales of observing larvae eating nestling birds alive. This approach increases community capacity in several ways. We provide the most accurate information on Darwin finch identification and song available, because our group is a world leader on the subject. The volunteers and community members then engage and apply the information and generate their own insights, observations, and experiences; local and international students benefit from an increasing number of mentors with first-hand experience observing birds and controlling introduced disease, which creates

awareness, interest, and provides a skill base to be an effective conservation manager or citizen more likely to vote for conservation action.

5. Are there any plans to continue this work?

This project is part of an on-going study supervised by Kleindorfer since 2000 with support from the BirdLab since 2004. Our group has conducted annual fieldtrips to collect data on various aspects of the ecology of Darwin's Tree Finches since 2000 with focus on the critically endangered medium tree finch since 2004; the years we were unable to collect data were the years that we were unable to secure funding (2007, 2009, and 2011). The severe impacts of the introduced fly *Philornis downsi* for all Galapagos land birds and Darwin's finches in particular is a key research area. We are part of an international research team that works with the Galapagos National Parks and Charles Darwin Research Station to develop a scientifically informed approach to manage the impacts of this invasive parasite. Our future plans are to analyse the geo-spatial dynamics of host and fly behaviour and track fly behaviour at different forest heights. We plan to monitor if there is a change in fly sex ratio in relation to flytrap height, and an effect of host nesting height on parasite intensity. Another key research focus will be to monitor low nesting outcome in the critically endangered medium tree finch, which has had 0% nesting success since 2012. Therefore we will use a plant-based insecticide (pyrethrum) at their nests to manually remove *Philornis* from their nests in the next years to guarantee their survival until use of flytraps or other measures become effective to control the parasite.

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

In 2014, we published three manuscripts on the work funded by the Rufford Foundation in the journals *American Naturalist, Current Zoology,* and *Ethology* (PDFs attached). In September 2014, we submitted a fourth manuscript to the journal *Current Zoology*. We presented our work at the ISBE (International Society of Behavioural Ecology) conference 2014 in New York, USA. Publication of the research findings is a high priority and we are currently preparing several manuscripts for peer-review within the next year. In all years of study, we have actively shared the project outcomes with all relevant stakeholders, and well beyond that with local schools, conservation managers and tour operators. We will continue this approach and actively communicate the results of our findings with the local community as well as international scientists and conservation organizations to implement effective control options. This will be done in close collaboration with the Charles Darwin Foundation and Galapagos National Parks, via on-ground training, invited talks, dissemination of written and audio materials. The strategies we use have broad general significance in other localities where introduced parasites and disease are impacting fauna. Our research has featured in Ecuadorian TV programmes, online websites, online education programmes (e.g. NEXUS), and other non-traditional outlets. In addition, we will disseminate the findings of our study in traditional venues such as journal publications, conferences, and workshops. Because of its isolation, the Galapagos Archipelago is vulnerable to the introduction of foreign organisms through tourism and mass cargo delivery of many goods to sustain the island communities. Under these circumstances, community outreach is even more important to engage the local and international public about conservation and working together towards sustainability to the benefit of all.

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 Rufford Small Grant was used to cover fieldwork expenses during January-March 2014. Due to the remote location and the intensity of the work, fieldwork is naturally the most costly part of this project. We therefore used the RSG for this period of time. Additional project costs such as data analysis, manuscript and report writing were not funded by the Rufford Foundation.

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
Charles Darwin Research Station Research Fees	1020	1860	-840	Research fees for 2014 have increased since 2013
Full set of banding equipment	2639	2639	0	-
Bioacoustics equipment	9840	9840	0	-
Annual expendables (notebooks, batteries etc.)	120	120	0	-
Three inspection cameras with extension cords for checking the nests	360	360	0	-
40 McPhail traps, including transport	600	600	0	-
Accommodation on Galápagos for a team of 4 people (3 months, £360 per month)	1080	1500	-420	Accommodation costs on Floreana have increased since 2013
Food on Galápagos for a team of 4 people (3 months (90 days), £15/day per person)	5400	5400	0	-
Airfares for PhD 4680 student K. Peters and supervisor S. Kleindorfer	4680	2340	+2340	Due to no additional available funding, only K. Peters travelled to Galapagos in 2014
Boat travel to and from Floreana	720	720	0	-
Car travel to study sites (30£ / day for 90 days)	2700	1350	+1350	On several days the weather conditions did not allow fieldwork, therefore less local travel costs
Air travel Quito - Galápagos for an Ecuadorian Volunteer	300	300	0	-
Total	29459	27029	2430	

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

The important next steps build on our discoveries in 2014 on Floreana Island. We found more *Philornis downsi* flies in higher traps and more female flies in higher traps. This information is important for the implementation of various control measures. Knowing the location and geo-spatial behaviour of a target species is a vital component to managing its eradication. Notably, Causton and Lincango found the same pattern of height preference in *Philornis* flies on Santa Cruz Island. We need to extend our insight about fly height preference across the host breeding season. Fly trapping removes flies from the population. Thus, fly trap data complemented by finch nesting behaviour will provide insights into the efficacy of local fly traps for improved local nesting success. The fact that the parasite has different sex ratios and sex-specific forest heights will be useful to our colleague Prof Stephen Teale who is developing pheromone attractants to improve trapping of *Philornis* flies. Our work clearly suggests that pheromone lures for males should be lower in the forest and those for females higher in the forest, which can be tested.

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?

Two presenters used the Rufford Foundation logo for conference presentations at the ISBE (International Society of Behavioural Ecology) conference 2014 in New York, USA. We will use the logo on the BirdLab website which will be online in the near future.

11. Any other comments?

The ideas and data that we generated in 2013 and 2014 will inform the next phase of our research project that aligns with the International Philornis Action Plan. We are most grateful to the Rufford Small Grant Foundation for its support, without which this work could not have been done.