The Rufford Small Grants Foundation
Final Report

Congratulations on the completion of your project that was supported by The Rufford Small Grants Foundation.

We ask all grant recipients to complete a Final Report Form that helps us to gauge the success of our grant giving. 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. 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	Niti Sukumal
Project title	Investigating habitat use by green peafowl (*Pavo muticus*) in pristine habitat in Thailand and defining its status in Cambodia, Myanmar and Indonesia
RSG reference	17837-2
Reporting period	September 2015 – September 2016
Amount of grant	£5,000
Your email address	Niti_230@hotmail.som
Date of this report	September 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
Provide ranging behaviour information		X		The study on ranging behaviour was expected to increase the sample size of collared animals, however as catching animal appeared more complicated than expected and, following an increased effort only one animal was caught and fitted with a necklace-mounted radio-collar that given us to monitor in 1 year round (2014 and 2015). More trapping will be conducted in the coming breeding season (Jan to Jun 2017). From the collared male in Huai Kha Khaeng Wildlife Sanctuary, Thailand, data on the breeding (January-March) and non-breeding season (April-October) showed that the range in breeding season was 25.75 ha which clustered in a small area around the display site on a stream shore, while during non-breeding season the animal had larger range with 177.23 ha and mostly used the area with high coverage of ground vegetation. We also attempted to catch peafowl in Myanmar. One female was caught and fitted radio collar in March 2016, however, relocation of the animal was limited possibly due to its range over an unknown area. More trapping is on the way in area
To estimate the population density where different anthropogenic impact are observed			X	Population density was estimated in central Myanmar in an area where the species inhabit a non-protected areas moving between small forest patch and agriculture areas around a Buddhist monastery.

				Moreover, starting in January 2016 we have trained the existing local conservation group to estimate peafowl population density for future follow up and to collect data on the species use of agricultural areas and their reaction to agricultural activities which might influence the species. Data for the first annual cycle will be available in December 2016 for analyses. A new survey was settled in Mondulkiri Protected Forest, in the eastern plain of Cambodia, where we have trained the student from the Royal University of Phom Penh and local staff from WWF and data collection was conducted between January and April 2016 and are currently been analysed. Unfortunately the planned survey in Indonesia could not be done in 2016 due to time limitation during the 2016 breeding season. However, we are currently plan to carry out the survey in the 2017 breeding season.
Predict and identify the size of suitable remaining habitat to be surveyed and actively managed			X	Remaining suitable habitat and identification of key conservation area for the species in southeast Asia was achieved using both the data collected during our surveys in Thailand, Cambodia, and Myanmar, other research projects and Global Biodiversity Information Facility (GBIF). Those record locations were modeled with habitat variables from GIS data base. Predicting model was conducted only in Southeast Asia as information of the status and disturbance affecting the population in South China and Java of Indonesia are still unknown. For the key conservation areas identified we suggest action to be taken such as survey, protection and outreach.
Increase knowledge of the ecology of			X	The result of our study has provided baseline information on the ecology of

green peafowl				green peafowl and we have provided education material for outreach programme (for example power point and poster) which gave to stakeholder, student, and local conservation group to increase knowledge and awareness on green peafowl conservation.

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

The most difficult part of the study was catching animals to fit radio transmitter for the study on ranging ecology and micro-habitat use. However, we have design an alternative method to collect part of those data by using line transect survey and record changing pattern of green peafowl occurrence for the whole year round.

Another limiting issue on our research is the limited time for survey which has to be conducted during the breeding season. This is why we could not undertake the proposed survey in Java in 2016. Consequently we have planned to run this survey in 2017.

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

3.1. Define key conservation/management area for the species over its range
Investigating different level of anthropogenic impact gave us a better understand on the species response to human activities. We combined this result with our data on density estimates from several sites to model areas with high species suitability. By overlaying this with the remaining forested habitat in the region we highlighted keys area where conservation management should be prioritised (Figure 1). This result can be used as a guideline for suitable action plan to recover the population of this high threatened species in Southeast Asia.

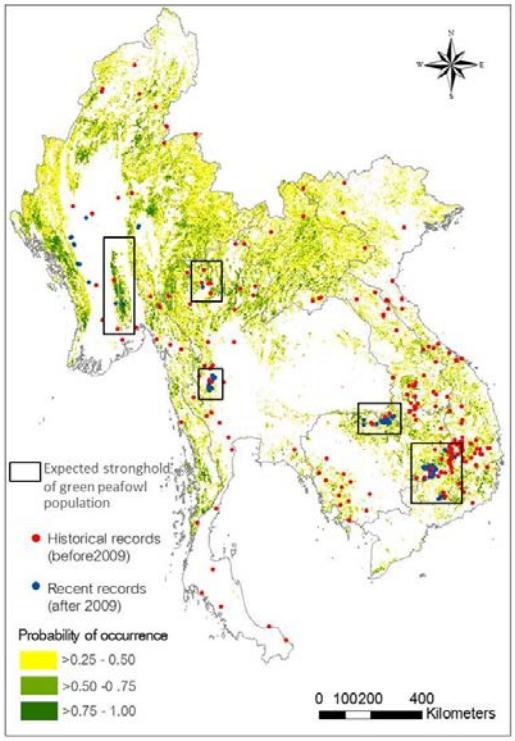

Figure 1. Predicted remaining suitable habitat for green peafowl in Southeast Asia mainland based on recent records (blue spots) modelled with habitat variables from GIS database using Generalised linear model (GLM). Green polygon indicate high suitable habitat (or high probability of occurrence) of green peafowl (p>0.5). Black open polygon

indicate expected stronghold areas for green peafowl population that were identified by overlap between recent record locations, high probability of occurrence areas, and open forest areas (Sukumal et al in preparation, expected to be submitted to Biological Conservation by November 2016).

3.2). Range of individual animals over a year cycle

This project is the first study which have provided ranging behaviour from a collared green peafowl over the whole year (breeding and non-breeding season). Research so far were focusing on the breeding season showing that the species mostly prefer riverine habitat. Our results show that this is the case only during the breeding season (Figure 2 and 3) as this micro-habitat might provide a suitable open habitat for males display behaviour. However, during the non-breeding season, the bird travel over a larger range far away from stream, mostly using patches with open understory vegetation but high ground vegetation coverage (Figure 2 and 4). These micro-habitat characteristics are mostly found scatter within a lowland dry dipterocarp or mixed deciduous forest mosaic.

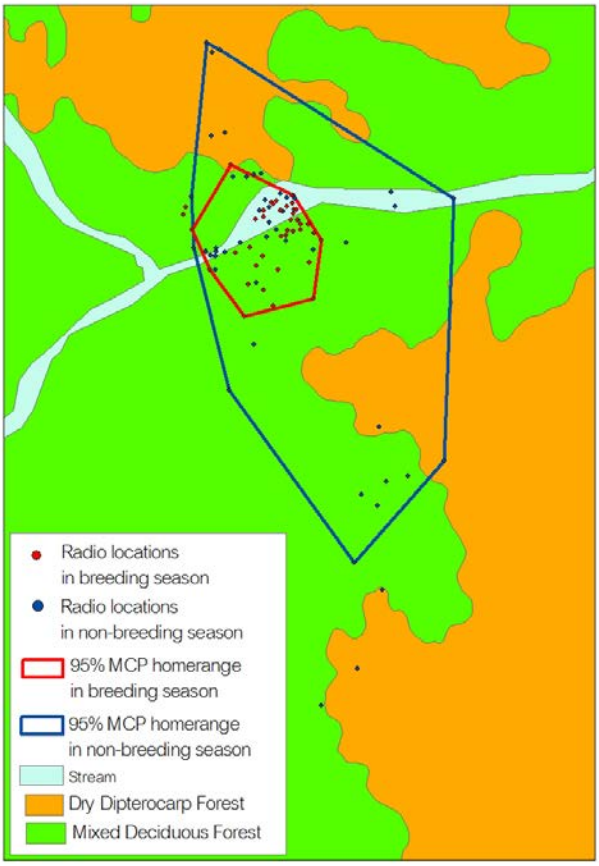

Figure 2. Radio locations and range size of radio-collared male peafowl compare with random locations around radio locations. The red spots and open polygon indicate the locations and home range size during the breeding season (25.77 ha), the blue spots and open polygon indicate the locations and home range size during the non-breeding season (177.23 ha) (Sukumal et al., *in press*, Bird Conservation International).

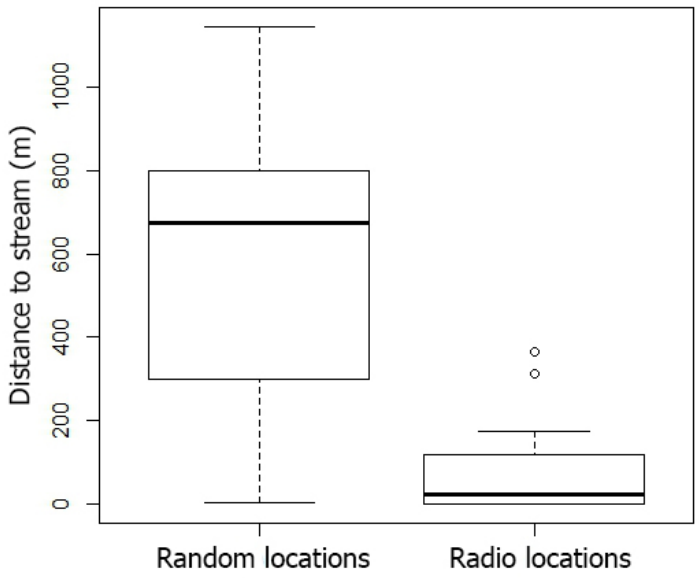

Figure 3. Distance to stream compare between random locations and radio locations in breeding season (Sukumal et al., *in press*, Bird Conservation International).

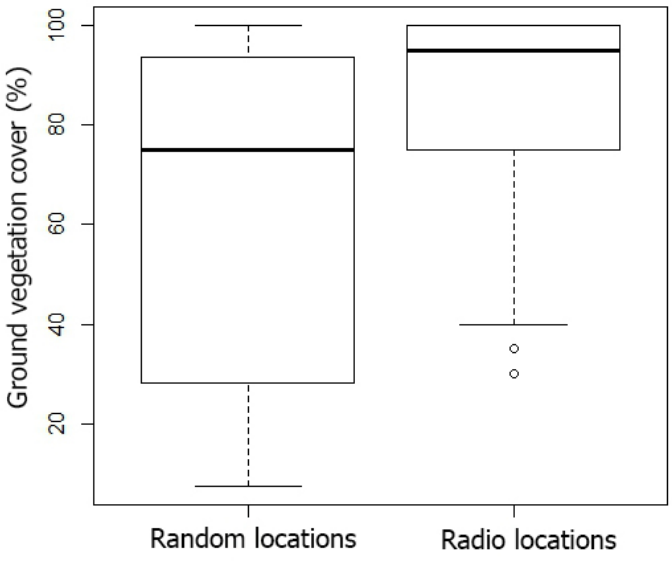

Figure 4. Ground vegetation cover between random locations and radio locations of tagged bird in non-breeding season (Sukumal et al., *in press*, Bird Conservation International).

3.3). Local conservation awareness

While conducting survey of green peafowl to estimate population densities we closely collaborated with local conservation group, local student, and local NGO staff to set up the monitoring programme (Picture 1, 2 and 3), and we have provided education material for outreach programme (PowerPoint and posters (See

also paragraph 4). These activities will increase knowledge and awareness to stakeholder on the importance of green peafowl conservation and other natural resource, as our study has pointed out the relationship of green peafowl population and other wildlife species which shared the same habitat (Sukumal et al., *in press*, Bird Conservation International).

Picture 1. The student of Royal University of Phnom Penh and local staff of WWF Cambodia were trained to collect data on green peafowl calling by using compass, GPS and estimate calling distance.

Picture 2. Local conservation group of Pwe Hla Village in the southern part of Shan State in Myanmar was trained to collect data on green peafowl density and

investigate agriculture activities in the areas which might influence to habitat use pattern of green peafowl.

Picture 3. Green peafowl at Pwe Hla Village, here the bird use between forest around the temple and in agriculture areas.

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

In the southern part of Shan State, Northeaster Myanmar, the local conservation group at Pwe Hla Village is currently playing an active part in the green peafowl survey. We have trained the group to collect data using quantitative methods, this activity is part of a planned long term monitoring programme to estimate the population density changes over time and investigate the influence of agriculture activities to changing habitat use pattern of green peafowl. In the same area we also provided posters which give details on green peafowl ecology and conservation to school, hospital, market, temple, and hotspot tourist area at Pindaya Township. We gave presentation at Yangon University and Myeik University on wildlife survey and conservation, and green peafowl conservation.

In Mondulkiri Protected Forest, eastern Cambodia, we have trained the student of the Royal University of Phnom Penh and local staff from WWF to collect data on green peafowl density, the survey was conducted in January-March 2016 and now is in analysing data which expected to get the result soon. This result will give us more information on situations of green peafowl in the largest dry deciduous forest patch of Southeast Asia.

Picture 4. The poster which gives information on green peafowl ecology and conservation was distributed to school, hospital, market, temple, and hotspot tourist area at Pwe Hla Village, Pindaya Township.

Picture 5. The poster was distributed to the temple around Pwe Hla Village in Myanmar where here the monk paly as a conservationist leader of the village.

Picture 6. The poster was provided in both English and Myanmar language and set up at the hotspot area where the villager and tourist frequently visit in the area.

5. Are there any plans to continue this work?

To complete and update information of this endangered species over their range in Southeast Asia, we have planned to expand the survey to Java Indonesia to estimate the population density and investigate more information on their situation. Although they have historical reported in Yunnan southern of China, but this population seem to be no long term existence as high level of disturbance still increasing in the area. The separate and distinct population in Java may be another stronghold population that historical records have showed wide distributed over the island, but so far their situation still obscure and requiring update information to guide the conservation action plan to maintain or recover their population in the area.

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

6.1). A first poster on the ecology and conservation of green peafowl was distributed to community at Pindaya township in both English and Myanmar languages. An updated version will be made shortly after the data on use of agricultural land will be analysed.

6.2). Power Point presentation was given to lecturer at Yangon and Myeik University (Myanmar). I have chance to visit Chester Zoo in United Kingdom on September and gave a seminar in title of landscape scale conservation of green peafowl in Southeast Asia.

6.3). Scientific articles were prepared form this research, one article is accepted to be published in Bird Conservation International Journal and another article on

landscape study is in preparing. The support by RSGF will be kindly recognized and knowledge throughout of publication or any publicity in relation to this work.

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

The budget from RSG was spent according to the activity plan (September 2015-2016). The remaining budget will be kept and use for the next survey which plan to expand to Java Indonesia, this survey will be conducted in 2017.

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
Receiver and antenna (for radio tracking)	140	840	-700	Surplus expense was covered by other additional funding
Field work in Cambodia (10 days in December 2015 and 10 days in March 2016	1,000	1,300	-300	Surplus expense was covered by other additional funding
Travel for Cambodia (2 trips in December 2015 and March 2016)	420	420	0	For 1 person in December 2015 and 2 persons in March 2016 (with one assistance)
Field work in Myanmar	1,300	1,300	0	Included the cost for 200 of education posters
Travel for Myanmar	420	420	0	For 3 persons
Field work in Java	1,300	1,300	0	The budget was kept for the survey in next year (2017).
Travel for Java	420	420	0	The budget was kept for the survey in next year (2017).
TOTAL	5,000	6,000	1,000	(Surplus expense was covered by other additional funding, and 1,730 GBP of remaining fund from RSGF was kept for the field work in Java next year.

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

Our study in Huai Kha Khaeng Wildlife Sanctuary western of Thailand implied that existing of large herbivore species (for example Banteng Bos javanicus) give benefit to green peafowl population as this herbivore community maintain the suitable open area for green peafowl, moreover recovering large herbivore species which benefit to recover green peafowl population and this also result in recovering of large predator species (e.g. tiger *Panthera tigris* and leopard *P. pardus*) as available of prey abundance. However, this issue still require more study in detail that can use as baseline information of recovering ecosystem. We have planned to study this topic in Thailand and Java Indonesia where show overlapping and sharing the same habitat between this two endangered species. Our study in Thailand also showed the interaction between green peafowl and their natural predator (tiger and leopard), this issue also need to consider and require more study for any population which live close to human settlement areas, and domestic animal may play as the predator and depress green peafowl population. We have planned to add this topic as a variable effect to population survey around Pwe Hla Village in Myanmar.

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

The RSGF logo has used in every publicity materials of this project, I have used RSGF logo on poster and power point presentation.

11. Any other comments?

The grant from RSGF is very importance to my project, the goal of my project will be difficult and obscure to achieve if no supported from RSGF. As this project still have a part of survey in Java Indonesia which still unsuccessful, the remaining fund from this project will be accumulated with other additional fund to conduct the survey in Java next year. I confirm that the budget from RSGF is only used for all activities on this research to achieve the goal of the project.