

## The Rufford Foundation

### Final Report

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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](mailto:jane@rufford.org).

Thank you for your help.

**Josh Cole, Grants Director**

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#### Grant Recipient Details

<b>Your name</b>	Tabitha Cheng Yee Hui
<b>Project title</b>	Improving wildlife corridor designs to mitigate the impacts of habitat fragmentation on small mammals in Peninsular Malaysia
<b>RSG reference</b>	21698-1
<b>Reporting period</b>	April 2017 to March 2018
<b>Amount of grant</b>	£4,994
<b>Your email address</b>	tabitha.hui@gmail.com
<b>Date of this report</b>	31 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
Determine whether corridors facilitate the movement of small mammals across highways				I found that small mammals seldom used underpasses to cross from one side of the highway to the other. There were only 10 records of movements of an animal beside the underpass as well as in it during the entire study period. Of these, only two records were full crossings through the underpass from one side of the highway to the other.
Determine whether corridors maintain species diversity and population abundance in fragmented habitats				Species diversity was higher in fragmented and connected (beside the underpasses) habitats, lower in forest interiors and lowest in the underpasses. However, abundance was highest in the underpasses, although this was almost exclusively of just one species, <i>Rattus tiomanicus</i> .
Determine the factors which influence the use of corridors by small mammals				Community structure was associated more with habitat structure than whether the habitats were connected or fragmented. Fragmented habitats had more logs and greater variation in vegetation density in different vertical strata, providing hiding and dwelling places for a variety of small mammals.
Determine the effectiveness of corridors in mitigating the impacts of fragmentation by bringing diversities, population abundances and movements closer to that in intact forests than fragmented ones				As underpasses were built to facilitate the passage of animals across the highway thereby maintaining connectivity between populations, we predicted that the community structure in these habitats should be more similar to intact interior forest areas. Diversity and abundance of small mammals next to underpasses were instead more similar to fragmented habitats. Interior habitats fared relatively

			<p>poorly compared to fragmented and connected habitats in terms of diversity and abundance. We attribute this to the network of logging roads that have been built to access areas deeper in the forest. These smaller access roads radiate from the highway and go behind our interior forest sites, essentially fragmenting the forest into smaller patches with the highway on one side and the access roads on the other. The lower diversity and abundance in interior forest patches may thus be due to the disturbance from these smaller roads rather than the highway. An alternative explanation may be that the species we caught are all common generalist species which are more likely to be trapped than rainforest specialists which may be present in the interior forest areas but are trap shy.</p>
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**2. Please explain any unforeseen difficulties that arose during the project and how these were tackled (if relevant).**

I conducted fieldwork in Kenyir from April to November 2017. Initially I trapped at 18 sites, six each in fragmented (roadside), connected (underpass) and intact forest habitats (>500 m from any roads). However, I found three of the underpasses (natural gullies) unsuitable for trapping after the first round of fieldwork as the sides were so steep, rocky and covered in ferns that there was little space to place the traps down. The traps that were successfully placed caught only *Rattus tiomanicus*. I thus focused on the three purpose built wildlife underpasses which are much wider, flatter and suitable for the placement of traps. I trapped in these underpasses and associated connected and intact forest habitats four times in 2017 instead of three to make up for the fewer sites. I am now trapping in Sungai Yu, Pahang, and the state next to Terengganu, where another three wildlife underpasses have recently been built. I can thus compare the effectiveness of wildlife underpasses in facilitating the movement of small mammals across highways in two locations instead of just one.

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

Small mammal community structure is similar beside roads and viaducts, but crossings are rare whether there is a viaduct connecting the two sides of the highway or not.

Small mammal community structure is highly dependent on the kind of habitat available, with logs and vegetation complexity in different strata being key factors. The viaducts, being devoid of trees, present a very different habitat from the forest on either side and have become almost completely monopolised by *Rattus tiomanicus*, a species adapted to open environments. The combined effects of this very different habitat and competitive exclusion by one abundant species may have resulted in the viaducts becoming a barrier to movement instead of a facilitation for other small mammal species.

Comparisons between roadside and forest interior habitats did not reveal significant differences in community structure between them. This means that the highway does not appear to have had a significant impact on the small mammal community there, or that the changes in community structure occurred before this study, or that factors other than the construction of the highway are affecting forest community structure.

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

At both the Kenyir and Sungai Yu sites we hire only local guides sourced from nearby villages. At Sungai Yu we partner with the local non-profit organisation Ecoteer to give English and science lessons using the rainforest animals that we have found and the impacts of local developments as examples.

**5. Are there any plans to continue this work?**

I am continuing this work in Sungai Yu after completing four sampling sessions in Kenyir.

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

Other than reports to the relevant authorities, journal articles and conference presentations, we intend to continue contributing to community outreach programmes organised by the local non-profit organisations Rimba (Kenyir) and Ecoteer (Sungai Yu) (e.g. reforestation, anti-poaching patrols, English and science classes).

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

We used the Rufford Foundation grant to fund our fieldwork expenses from April 2017 to March 2018. Fieldwork is expected to be completed by September 2018.

**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
Tomahawk cage traps	1692	963 GBP1 = MYR5.15	729	We managed to find a local supplier who makes similar traps to the Tomahawk cage traps
Elliott sheet metal traps	241	677 GBP1 = AUD1.62	436	We had to replace 22 Elliott traps which were stepped on or destroyed by larger animals, stolen or rolled down the steeper viaducts in the first sampling session
Subsistence payments for local team	1972	1972 GBP1 = MYR5.15	0	
Fuel	1049	1315 GBP1 = MYR5.15	266	The price of fuel has increased significantly in Malaysia due to cessation of fixed petrol pricing
Bait	40	67 GBP1 = MYR5.15	27	The price of bananas increased as there was lower than average harvest due to prolonged wet weather in a usually dry period

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

We feel it is important to work with local NGOs and the government to revegetate and provide structural complexity in the viaducts. At the moment tree planting is taking place mainly beside the viaducts and not in it. Consistency in maintenance of the viaducts and their surroundings is also important as at the moment it is only ad hoc. Long term monitoring using the same methods is also needed so that comparisons can be made over time and across viaducts. With more highways and railways planned with viaducts as mitigation measures, it is important to reiterate that viaducts do not reverse the damage caused by fragmentation; at most they can reduce the impacts.

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

We always use the Rufford Foundation logo in presentations and reports. It would be helpful if vehicle screen labels with the Rufford Foundation logo were provided so that the public knows we are doing research work in the area.

**11. Please provide a full list of all the members of your team and briefly what was their role in the project.**

**Stephen Williams** and **Susan Laurence** are the primary supervisors for this project, ensuring that the study design is scientifically sound and that work is on track to meeting the project aims.

**Ju Lian Chong** is the local collaborator for this project and makes sure that the project is tailored to meet local aims, keeps the relevant authorities in the loop about the progress of the project, obtains the necessary permits and that local sensitivities are adhered to.

**Reuben Clements** is the field collaborator for this project, organising manpower, equipment, accommodation, transport and logistics.

**12. Any other comments?**

We would like to apply for a 2nd Rufford Small Grant to continue our work in Sungai Yu if the progress of the first year of this project is deemed satisfactory. We only need funding for 4 out of 6 months of fieldwork as we managed to obtain some additional funding from another organisation during the course of the year. The funding requested will be for subsistence payments, accommodation, fuel and bait only as all necessary equipment have been obtained.



Left: Highway in Sungai Yu with viaduct at far right. Right: Kenyir highway.



Purpose built viaduct and forest beside



Left: Viaduct at Sungai Yu. Right: Logging behind the forests beside the highway.



Left: Making our way across tyres discarded in the forest. Right: Processing captured animals.



Left: *Echinosorex gymnura*. Right: *Maxomys whiteheadi* in cage trap.



Left: *Maxomys rajah* burrow with spool thread leading into it. Right: Spool and line.



Left: *Lariscus insignis*. Right: *Niviventer cremoriventer*.





Left: *Paradoxurus hermaphroditus* caught in viaduct. Right: *Tupaia glis*.



Left: *Sundasciurus tenuis*. Right: Roadkill *Callosciurus caniceps*.