

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	Manoj Chaudhary
Project title	Status and spatial distribution of the Hispid hare <i>Caprolagus Hispidus</i> (Pearson, 1839) in Parsa Wildlife Reserve, Nepal
RSG reference	20751-1
Reporting period	12 months
Amount of grant	£4996
Your email address	sdx2013nepal@gmail.com
Date of this report	September 2017

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
Status and distribution of the Hispid hare through sign surveys and transect surveys				Hispid hares are scarce throughout their range and their scarcity is evinced by the fact that, despite carrying out proven field survey procedures, no hispid hares were encountered during the current survey.
Obtain faunal data through the use of camera traps				A total of 10 camera traps were used in 97 localities throughout the three study areas in Parsa W.R. No hispid hare images were captured but Indian hares were captured in large numbers in all three areas. The presence of tall grassland created difficulty in placing some of the camera traps owing to the high sensitivity of the camera's motion sensors.
Conservation material development and their distribution				T-shirts and caps, leaflets and posters were developed and circulated in PWR, NTNC, ZSL and IOF library and local communities to generate awareness.
Assessing the threats to potential Hispid hare habitats and the status of the two Critical /Endangered terrestrial ecoregions within Parsa W.R.				Burning of grasslands, pollution, grass cutting, grazing of cattle and erosion were found to be the major ongoing threats.

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

The study area was found to be the major route of elephant and movement of this species created difficulty in planning the project. Tiger were also present in the Bhata River study area. Night stays were not carried out owing to the danger of attack by wild animals and therefore observation of movements of small mammals was only able to be undertaken between 7 pm and 10:30 pm.

The permit to use camera traps was delayed by the Department of National Parks and Wildlife Conservation due to legal issues involved in the sensitivity of using camera traps in the reserve area. Alongside this, an initial shortage of camera traps that I was told would be made available, delayed the start of the camera trapping process. The reason given was that the allotted camera traps were being used by NTNC in two field projects elsewhere in Nepal.

Annual grassland burning, flooding, and pollution had disturbed the study area. Due to this, the number of days set aside for camera trapping was reduced. To compensate, double the number of camera traps (10 rather than five) were used with the result that actually more locations were surveyed than originally planned.

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

The three most important outcomes of this project are:

- The absence of the hispid hare was affirmed in the study area while information was gathered on the distribution of the Indian hare (*Lepus nigricollis*) and a number of other mammals in PWR.
- Information was gathered on the status of the two CR/EN ecoregions, Himalayan subtropical broadleaf forest and Terai-Duar savanna and grassland.
- The conservation outreach program increased awareness of the hispid hare amongst reserve staff, local village communities, and forest users.
- Absence of the hispid hare and information on the distribution of the Indian hare (*Lepus nigricollis*) and other mammals in PWR.

Three study areas, each of which supported habitat favoured elsewhere in Nepal by the hispid hare, were surveyed within the reserve, namely Bhata grassland, Bhata River and Ramvori grassland. The study areas are shown in Figs. 2-5 below.

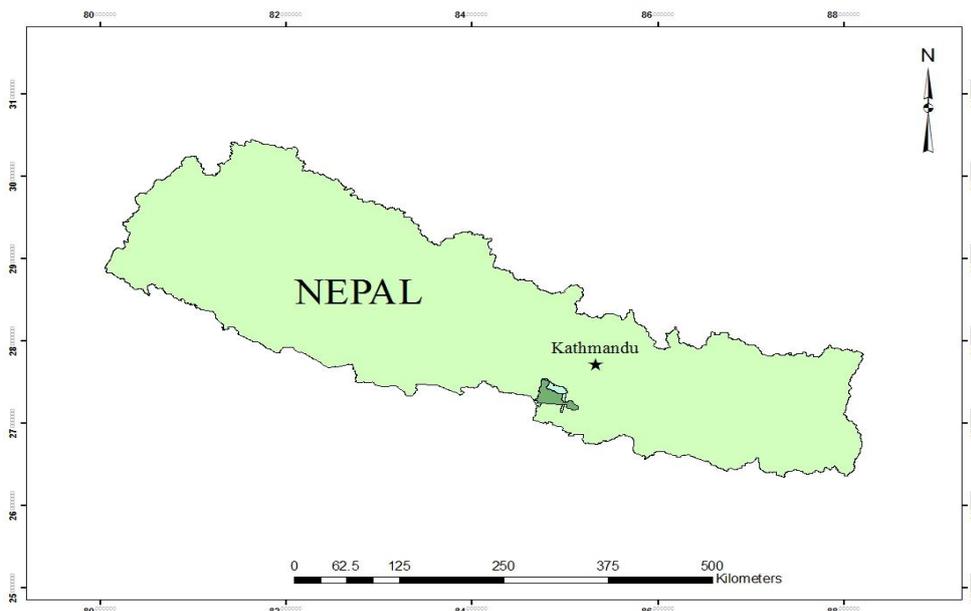


Fig.1: Map of Nepal showing Parsa Wildlife Reserve (dark green area).

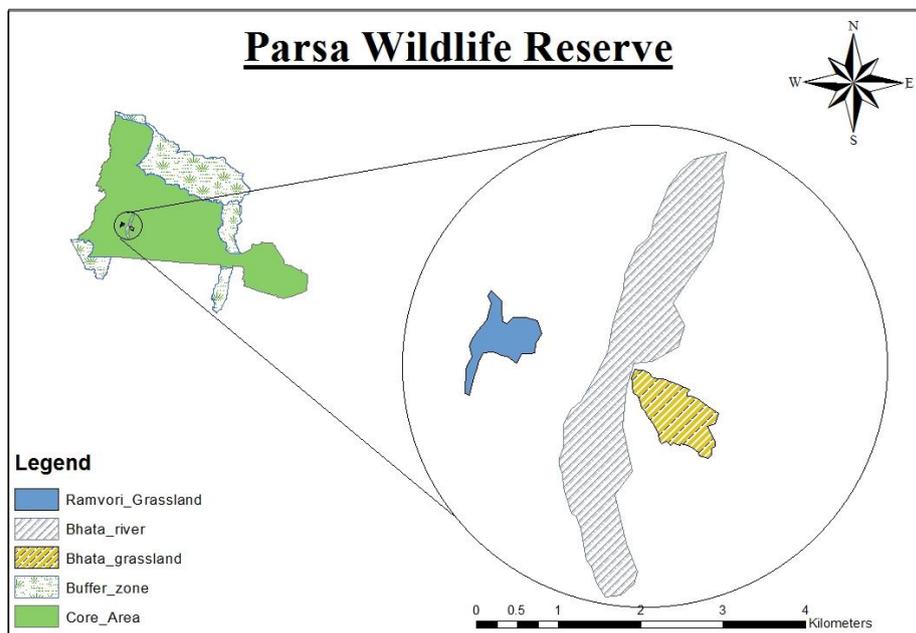


Fig. 2: Map of Parsa Wildlife Reserve showing the three study areas

Camera Traps and Sign surveys

A total of 10 camera traps was used during the survey. Forested areas near the study sites were also taken into consideration to cover the maximum possible sites of the hares. These areas were mainly considered based on signs (pellets) observed on the sites. Camera traps were frequently shifted to cover the study sites.

Signs surveys were also carried out. GPS points were taken with full detailing from where the pellets were collected.

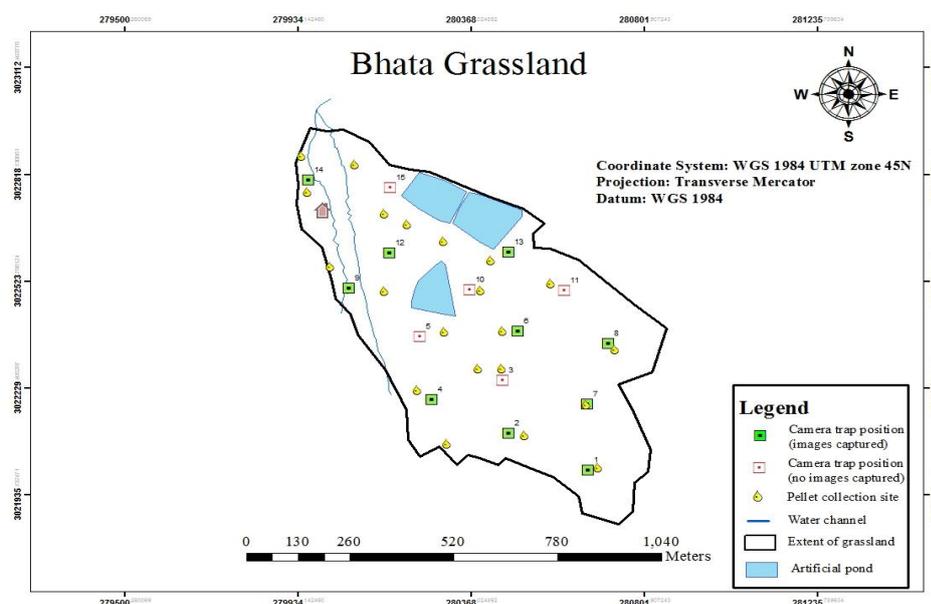


Fig. 3: Camera trap positions and pellet collection sites in Bhata Grassland

The species recorded in Bhata grassland in the camera traps are listed below with the GPS location of each species:

Camera Trap Number	Longitude(X)	Latitude(Y)	Species recorded
1	280661	3022003	<i>Lepus nigricollis</i>
2	280461	3022103	<i>Lepus nigricollis</i>
3	280447	3022251	None
4	280269	3022198	<i>Lepus nigricollis</i>
5	280239	3022371	None
6	280484	3022385	<i>Lepus nigricollis</i>
7	280658	3022185	<i>Lepus nigricollis</i>
8	280711	3022353	<i>Lepus nigricollis</i>
9	280061	3022503	<i>Lepus nigricollis</i> , <i>Axis axis</i>
10	280364	3022500	None
11	280602	3022498	None
12	280164	3022600	<i>Lepus nigricollis</i> , <i>Axis axis</i>
13	280461	3022603	<i>Lepus nigricollis</i>
14	279961	3022803	<i>Lepus nigricollis</i> , <i>Axis axis</i> , <i>Canis aureus</i>
15	280161	3022803	None

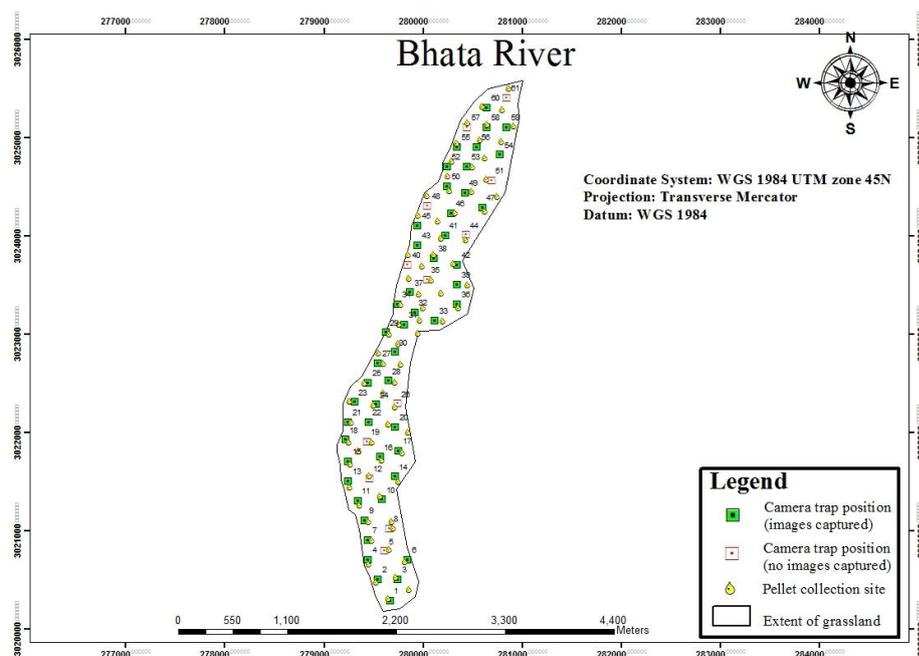


Fig. 4: Camera trap positions and pellet collection sites in Bhata River.

The species recorded in Bhata River in the camera traps are listed below with the GPS coordinates of each species:

Camera Trap Number	Longitude(X)	Latitude(Y)	Species recorded
1	279665	3020294	<i>Lepus nigricollis</i>
2	279544	3020510	<i>Lepus nigricollis</i>
3	279744	3020510	<i>Lepus nigricollis</i>
4	279444	3020710	<i>Lepus nigricollis</i>
5	279612	3020797	None
6	279844	3020710	<i>Lepus nigricollis</i>
7	279444	3020910	<i>Lepus nigricollis</i>
8	279660	3021029	None
9	279409	3021110	<i>Lepus nigricollis</i>
10	279585	3021323	<i>Lepus nigricollis</i> , <i>Canis aureus</i>
11	279344	3021310	<i>Lepus nigricollis</i>
12	279455	3021534	None
13	279244	3021510	<i>Lepus nigricollis</i>
14	279715	3021558	<i>Lepus nigricollis</i> , <i>Pavo cristatus</i>
15	279245	3021710	<i>Lepus nigricollis</i>
16	279563	3021755	<i>Lepus nigricollis</i>
17	279752	3021821	<i>Lepus nigricollis</i>
18	279217	3021931	<i>Lepus nigricollis</i>
19	279432	3021912	None
20	279720	3022061	<i>Lepus nigricollis</i>
21	279244	3022110	<i>Lepus nigricollis</i>
22	279449	3022110	<i>Lepus nigricollis</i> , <i>Axis axis</i>
23	279308	3022316	<i>Lepus nigricollis</i>
24	279525	3022289	<i>Lepus nigricollis</i>
25	279444	3022510	<i>Lepus nigricollis</i>
26	279739	3022299	None
27	279544	3022710	<i>Lepus nigricollis</i>
28	279649	3022531	<i>Lepus nigricollis</i>
29	279624	3023021	<i>Lepus nigricollis</i> , <i>Canis aureus</i> , <i>Panthera tigris</i>
30	279717	3022823	<i>Canis aureus</i>
31	279811	3023102	<i>Lepus nigricollis</i>
32	279914	3023229	<i>Lepus nigricollis</i>
33	280119	3023142	<i>Lepus nigricollis</i> , <i>Felis chaus</i>
34	279744	3023310	<i>Lepus nigricollis</i> , <i>Francolinus francolinus</i>
35	280039	3023561	None
36	280344	3023310	<i>Lepus nigricollis</i>
37	279868	3023429	<i>Lepus nigricollis</i>

38	280111	3023775	<i>Lepus nigricollis</i>
39	280344	3023510	<i>Lepus nigricollis</i> , <i>Vanellus indicus</i>
40	279844	3023710	None
41	280223	3024008	<i>Lepus nigricollis</i>
42	280344	3023710	<i>Lepus nigricollis</i>
43	279944	3023910	<i>Lepus nigricollis</i>
44	280429	3024016	None
45	279944	3024110	<i>Lepus nigricollis</i>
46	280284	3024236	<i>Lepus nigricollis</i> , <i>Canis aureus</i>
47	280597	3024295	<i>Lepus nigricollis</i>
48	280044	3024310	None
49	280423	3024442	<i>Lepus nigricollis</i>
50	280244	3024510	<i>Lepus nigricollis</i>
51	280690	3024570	None
52	280244	3024710	<i>Lepus nigricollis</i>
53	280444	3024710	<i>Lepus nigricollis</i>
54	280777	3024829	<i>Lepus nigricollis</i>
55	280344	3024910	<i>Lepus nigricollis</i>
56	280544	3024910	<i>Lepus nigricollis</i>
57	280444	3025110	None
58	280644	3025110	<i>Lepus nigricollis</i>
59	280844	3025110	<i>Lepus nigricollis</i>
60	280644	3025310	<i>Lepus nigricollis</i>
61	280844	3025410	None

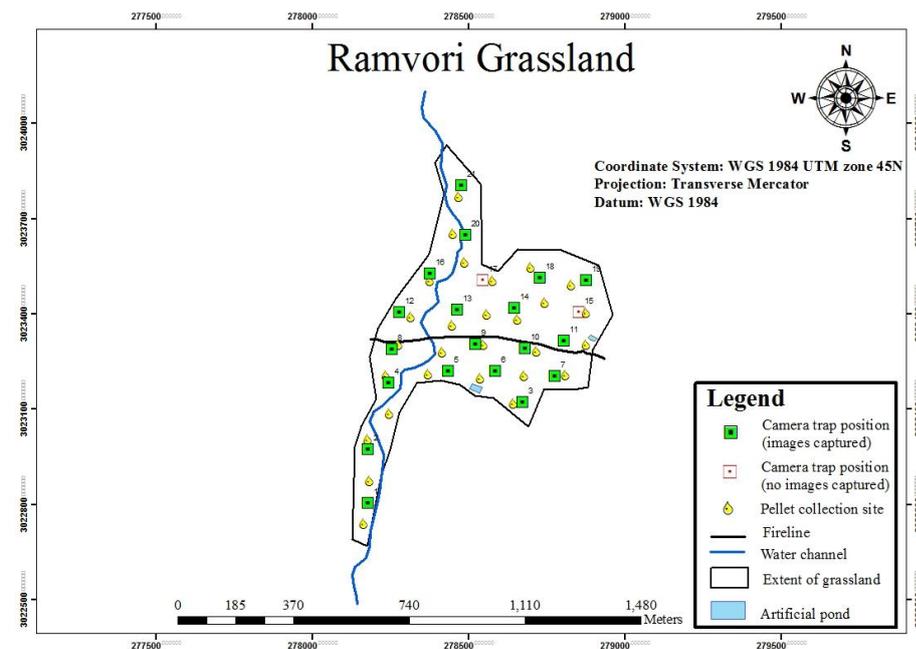


Fig. 5: Camera trap positions and pellet collection sites in Ramvori Grassland

The species recorded in Ramvori grassland in the camera traps are listed below with the GPS location of each species:

Camera Number	Trap	Longitude(X)	Latitude(Y)	Species recorded
1		278177	3022805	<i>Lepus nigricollis</i>
2		278178	3022973	<i>Lepus nigricollis</i>
3		278672	3023123	<i>Lepus nigricollis</i>
4		278244	3023182	<i>Lepus nigricollis</i>
5		278434	3023219	<i>Lepus nigricollis, Acridotheres tristis</i>
6		278585	3023220	<i>Lepus nigricollis</i>
7		278777	3023205	<i>Lepus nigricollis</i>
8		278253	3023289	<i>Lepus nigricollis</i>
9		278521	3023304	<i>Lepus nigricollis</i>
10		278680	3023292	<i>Lepus nigricollis, Axis axis</i>
11		278806	3023316	<i>Lepus nigricollis</i>
12		278277	3023405	<i>Lepus nigricollis</i>
13		278463	3023412	<i>Lepus nigricollis</i>
14		278647	3023418	<i>Lepus nigricollis, Pavo cristatus</i>
15		278853	3023405	None
16		278377	3023528	<i>Lepus nigricollis</i>
17		278545	3023505	None
18		278728	3023513	<i>Lepus nigricollis</i>
19		278877	3023505	<i>Lepus nigricollis</i>
20		278490	3023650	<i>Lepus nigricollis</i>
21		278477	3023805	<i>Lepus nigricollis</i>

Pellet Identification

Pellets were collected throughout the field survey and 23 of them were selected and sent for species identification at the Center for Molecular Dynamics, Nepal. The CMDN report indicated that two analysed sequences of the pellets showed a 97% identity match with the reference cytochrome-b sequence of the Burmese hare, *Lepus peguensis*. Further phylogenetic inference of the two sequences with reference sequences showed these are closely related to *L. peguensis* but with just enough divergence to be different species.

L. peguensis is not known to occur in Nepal but the following three hare species are distributed in the country: the hispid hare (*Caprolagus hispidus*); the Indian hare (*Lepus nigricollis*); and the woolly hare (*Lepus oiostolus*), which is a montane species and occurs only in far north of central Nepal. CMDN report stated that the analysed sequences were not closely related either to *C. hispidus* or to *L. oiostolus* (Fig. 6) and, unfortunately, that there was not any reference sequence of *L. nigricollis*, deposited in the GenBank database. If *C. hispidus*, *L. oiostolus*, and *L. peguensis* are excluded,

it is probable that the analysed pellets were from *L. nigricollis*, especially as that species was recorded in 80% of all camera traps.

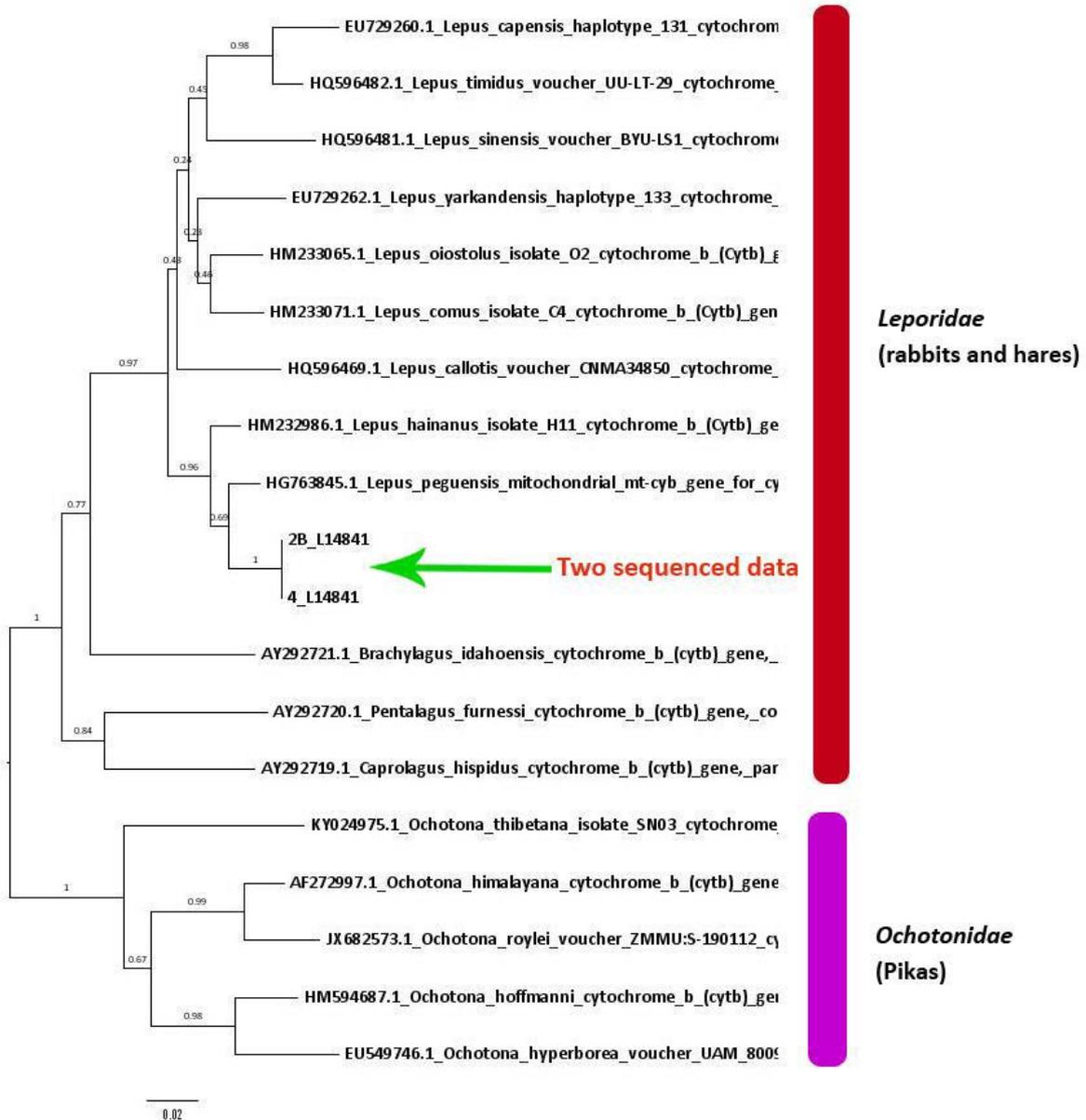
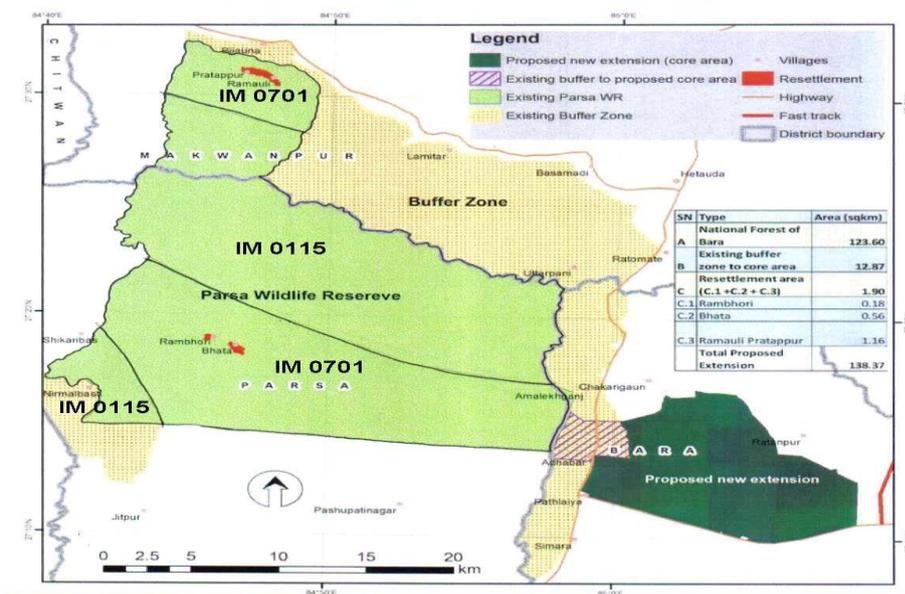


Fig. 6: Phylogenetic tree of Lagomorpha, constructed using K2P distance model and neighbour-joining (NJ) algorithm of 10,000 bootstraps. The numbers on nodes are bootstrap values. Data from Centre for Molecular Dynamics, Nepal.

Status of the CR/EN ecoregions, Himalayan subtropical broadleaf forest and Terai-Duar savanna and grassland.



<https://imgs.mongabay.com/wp-content/uploads/sites/20/2015/09/03163636/Map-png-of-extension-are...> 16/05/2017

Fig. 7: The two terrestrial ecoregions occurring in Parsa WR (IM0115: Himalayan Subtropical Broadleaf Forests; IM0701: Terai-Duar Savanna and Grasslands).

To understand the integrity of Himalayan subtropical broadleaf forest and Terai-Duar savanna and grassland, personal inspection together with discussions with the staff of the Parsa Wildlife Reserve, officers of the National Trust for Nature Conservation and the Zoological Society of London were carried out. In this regard, Bhata grassland was found to be a highly vulnerable zone due to the high movement of humans during the Bhata festival (July to August) and other occasions. Every year, hundreds of thousands of worshippers from India and Nepal visit the religious site of Bhata resulting in high disturbance in the grassland area of Bhata and creating pollution in the Bhata River as well. Temple committees are planning to manage the waste but are unable to do so due to the high frequency of worshippers during the festivals (images were submitted as part of my preliminary report in January, 2017 and appear on my RSG webpage).

Other factors that are responsible for the disturbance of small mammal habitat are the burning of the grassland and the collection of tall grasses for thatching roofs. In the riverine belt, habitats are heavily degraded by erosion during the monsoon season (June to August).

Similarly, I have visited ecoregion IM0115 to see any unforeseen disturbance cited by the staff of the PWR. It was found that the south-western section of IM0115 near

Nirmalbasti was disturbed due to movement of local people for the collection of fuelwood and fodder for their cattle. However, the central belt of IM0115 between the northern and southern areas of IM701 was not affected by anthropogenic activities.

According to staff of PWR, NTNC and ZSL, the Bhata area is the hotspot for all wild species but this area is highly disturbed.

Conservation outreach programs

T-shirts, caps, posters and leaflets were produced to raise awareness of the hispid hare among local stakeholders during the project period. These awareness materials were distributed to the staff of PWR, NTNC, ZSI, and local communities and forest users.

A 1-day programme on the conservation status of this species was held to give information on *C. hispidus*. Presentation was mainly focused on the second year and third year students of the Institute of Forestry, Hetauda. Similarly, I, alongside, my field team, demonstrated the method of camera trapping of wild animals, especially small mammals like hares, in forested habitat controlled by the Institute of Forestry, Hetauda. Leaflets were also distributed among the teachers and students of IOF. To make it available for others, these leaflets were placed in the library of IOF.



Fig. 8: T-shirts distributed to NTNC officers of PWR.



Fig. 9: Demonstration of camera trapping methods in the forests of IOF.

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

The project was initiated in close collaboration with the local communities. Conservation materials were developed and distributed to spread awareness about the importance of this species. Group discussions were held with focal persons, buffer zone user groups, community based anti-poaching units (CBAPU) and local elite groups to facilitate communication with local people. Alongside this, questionnaire surveys were distributed in local villages and collected upon completion.

Before this project, people were unknown about the hispid hare and considered all the rabbits and hares as the same. This project has established awareness about this species and its endangered conservation status.

5. Are there any plans to continue this work?

This project has given me an opportunity to extend my knowledge more of this species. I have learned much and gained many experiences during the field work which has encouraged me to undertake similar work with great enthusiasm.

I, therefore, would like to pursue similar projects in other undocumented sites of Nepal and therefore have planned to conduct research in Blackbuck Conservation Area of Bardiya District which is also a possible site of hispid hares and is adjacent to Bardiya National Park, where hispid hares have been previously recorded. Alongside this, I have plans to continue my work on the conservation programmes to inform

local communities about the small mammals and to draw attention to their conservation needs.

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

The results obtained will be disseminated to the concerned agencies like the Department of National Parks and Wildlife Conservation, National Trust for Nature Conservation, IUCN, ZSL, Institute of Forestry and other local green agencies. Alongside this, I have planned to publish my finding in the National Journal "Banko Janakari".

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 majority of the activities were carried out as anticipated in the proposal. However, some working activities are delayed due to some reasons which are explained below:

1. Camera Traps:

The process of getting approval took longer due to the high sensitivity in permitting camera trap methods in protected areas. This also restricted to some extent the conduct of other field work in Parsa Wildlife Reserve such as transect surveys and pellet collection

Similarly, a shortage of camera traps also created a delay NTNC were using all their camera traps in Tiger monitoring in Bardiya National Park and also in a Faunal Biodiversity Assessment in Churia region of western Nepal.

Therefore, the camera trap was carried out in April 2017.

2. Pellet identification test:

It is expected to submit the results of species identification test on the first phase of the RSG but due to the delay in permission mentioned, the test results were unable to be included in the preliminary phase. After the field visit, the identification test took nearly 3 weeks for the results.

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. 1 £ sterling = 4.44 Nuevo Sol

Item	Budgeted Amount	Actual Amount	Difference	Comments
Travel cost	231	342	-111	Hiring of the vehicles was costly and more frequent hiring of the vehicles was necessary due to

				delay in camera trapping.
Food Costs	1120	1228	-108	Food costs varied from place to place
Lodging Costs	1890	1862	+28	Lodging costs varied from place to place.
Allowances	400	400	0	
Equipment	880	687	+193	Camera traps were supported by NTNC and therefore, hiring costs were reduced. However, GPS were hired and batteries and memory cards were purchased. Awareness materials were developed and were costly.
GIS Data	35	35	0	
Laboratory Tests	200	200	0	The cost of DNA tests was high costing £ 40 per sample
Insurance (Team)	150	120	+30	Insurance and First Aid materials were cheaper than anticipated
Communications	50	82	-32	Internet and telephones calls were frequently used to provide information about the progress report to PWR, NTNC and ZSL.
Hire of meeting halls	40	40	0	
Total	4996	4996	4996	Exchange rate: £1= NRs.136 while receiving

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

There are still many areas that are not been surveyed for hispid hare populations. Therefore, as the species' habitat is increasingly under threat, there is an urgent need to understand their actual distribution and status in Nepal. I would like to undertake my survey at Black buck Conservation Area which is adjacent to Bardiya National Park where hispid hares were previously sighted. Similarly, I would also like to focus on the belt of the Rapti River in Chitwan National Park where Oliver (1985) previously recorded hispid hare pellets (Fig. 10)

Moreover, to increase information about this species, I would like to focus on awareness programmes in the areas where they are most likely to occur since there is little knowledge about this species amongst local people.

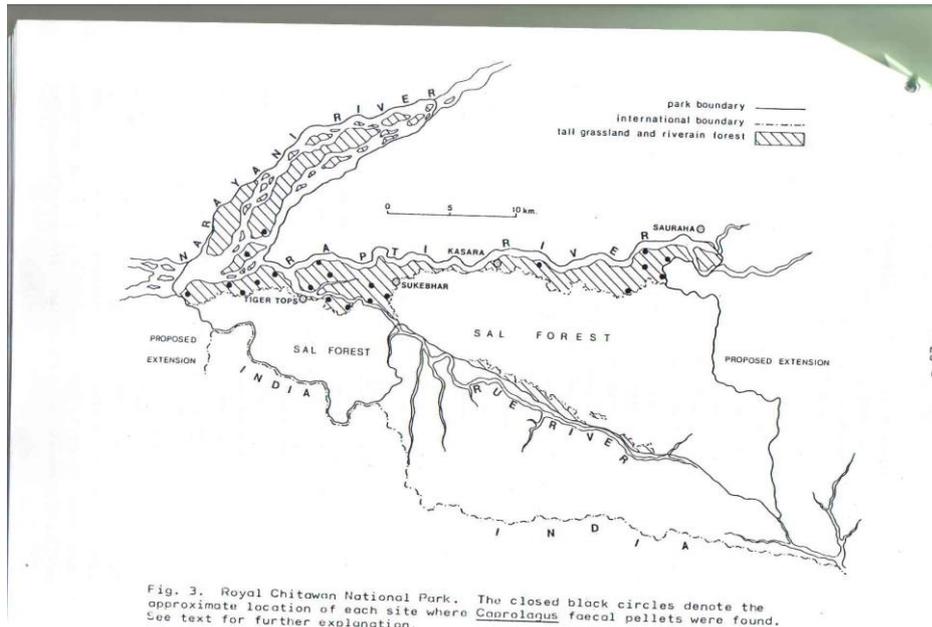


Fig. 10: Distribution of Hispid hare pellets in the area of the Rapti River in Chitwan National Park (Oliver, 1985).

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 logo of the Rufford Foundation was printed on every produced conservation material (Fig. 11). A 1-day presentation seminar was conducted about the project progress in the Institute of Forestry, Hetauda. Rufford was acknowledged in every respect on the awareness materials used during the presentation (posters, leaflets, caps and t-shirts).



Fig. 11: One of the T-shirts produced for the awareness program

11. Any other comments?

Larger mammals are always given first priority in Nepal in the context of conservation and management. However, research into small mammals in our country is still relatively scarce. Therefore, more research needs to be conducted and small mammals and their habitats would benefit greatly from a significant increase in targeted awareness programs.

First and foremost, I am very thankful to Rufford Small Grants for Nature Conservation for providing financial support to carry out this project.

I am highly indebted to the Department of National Parks and Wildlife Conservation for the allowing me to conduct camera trapping. I would like to owe my debt to Parsa Wildlife Reserve and their staff for their full support.

I am equally indebted to National Trust for Nature Conservation (NTNC) for the technical support. Without their help, camera traps and other technical support would be impossible. I would like to acknowledge to Mr Chiranjibi Prasad Pokharel (Ph.D, NTNC), Mr Babu Ram Lamichanne (Conservation Officer, NTNC), Santosh Bhattarai (Conservation Officer, NTNC) and all the staff of NTNC for their immense support.

I would highly like to acknowledge my research advisors and my field team for their full support.

I would also like to remember all the respondents who have provided me some valuable information for the successful completion of the project.

Species recorded by camera traps



Fig. 1: *Lepus nigricollis* recorded in Bhata grassland



Fig. 2: *Panthera tigris* recorded in Bhata river



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Fig. 3: *Felis chaus* recorded in Bhata River



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Fig. 4: *Axis axis* recorded in Ramvori grassland



Fig. 5: *Canis aureus* recorded in Bhata River



Fig. 6: *Pavo cristatus* recorded in Ramvori grassland



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04-18-2017 08:55:48

Fig. 7: *Acridotheres tristis* recorded in Ramvori grassland



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Fig. 8: *Vanellus indicus* recorded in Ramvori grassland



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Fig. 9: *Francolinus francolinus* recorded in Bhata River