

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	Sanjan Thapa
Project title	Habitat and acoustic survey and an action plan for bats conservation in the Kathmandu Valley, Nepal
RSG reference	19715-B
Reporting period	12 months
Amount of grant	9970
Your email address	thapasanjan@gmail.com; sanjan_thapa@yahoo.com; sanjan@smcrf.org
Date of this report	July 27, 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
Carrying out a Phase 1 type habitat survey to determine and map the current land cover to use as a baseline against which future change can be measured				<p>This activity was schedule to be completed by October in 2016, but it started only in January 2017. Without any hesitation, this was the first time I and my team was conducting Phase 1 type, it took longer time (6 months in additional) to understand, plan, learn from experts abroad, start and complete the task.</p>
Developing an acoustic call library so that bats can be surveyed and monitored non-invasively.				<p>Within the expected time frame (October, 2016), just 10 species of bats were recorded. And echolocation calls (as reference) of only five species of bats were recorded till then. Also, since a baseline had to be developed from this project. It was necessary to document bats in winter season. The project team wanted to record more species and baseline survey was extended for more than a year to conduct bat surveys during April-May 2017 (spring and November 2017 (winter). The reason for taking a gap of more than 6 months in two sites and about a year in most of the sites is to avoid harassment and any harm from mist netting and regular or repeated surveys.</p>
Drafting a local bat conservation action plan based upon the possible impacts of the land cover change				<p>It is understood that drafting action plan is a time consuming process. Again, it was a new activity for the project team; it took additional time (about a year) to complete this task. Even, it took about 6 months to arrange and manage to organise the sharing workshop, which was targeted to hold just after a month</p>

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

Since, most of the activities in the project were new to the project team; it was really difficult for us to handle this project. With the support and suggestions from experts at abroad we were able to tackle several shortcomings, however, it took a longer time than anticipated.

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

1. Baseline survey

There had been no information on the current land cover and land use in the vicinity of the bat habitat (regular monitoring sites). This project produced information, identification of land cover and land use from the 15 sites. Also, the current context of land cover has been mapped. Possible impact of land use land cover to the bat habitat and bat species was identified. However, species monitoring opportunistic survey was extended to four additional sites. Overall, the survey was conducted in three phases from August 2016 to April 2018. Possible impacts of LULC change upon bats assemblage and bat species were identified too. Trait based habitat survey (Phase I) initiated in the country from the Kathmandu valley is first of its kind in the country.

From this baseline survey (species monitoring), environmental data (temperature, humidity, cloud cover, canopy cover, light intensity) were documented for 19 sites. Altogether 24 species of bats were recorded. During this current project (2 years duration) about 73% of the bats species so far documented since Scully (1887), was recorded. Three species new to Nepal; *Cynopterus brachyotis*, *Myotis frater* and *Nyctalus aviator* has been recorded. Similarly, three species of bats new to the Kathmandu valley; *Rhinolophus lepidus*, *Barbastella leucomelas* and *Eptesicus serotinus* (second locality record to Nepal after Tumlingtar) has been recorded. Also, three species; *Rousettus leschenaultii*, *Murina huttoni* and *Murina leucogaster* have been reported after 129 years since Scully (1887). In addition, localities of these species were unknown then, whereas localities of occurrence for these species have been confirmed. New locality records within Kathmandu valley has been documented for eight species; *Cynopterus sphinx*, *Rhinolophus ferrumequinum*, *R. affinis*, *R. luctus*, *Myotis nipalensis*, *Pipistrellus javanicus*, *Pipistrellus coromandra* and *Miniopterus fuliginosus*.

Table 1: Bat species recorded during baseline survey in Kathmandu valley from August 2016 to April 2018

S.N.	Surveyed sites	Species recorded		
		First Phase	Second Phase	Third Phase
1	UN Park, Jwagal, Lalitpur	<i>Cynopterus sphinx</i>	-	
2	Chobhar (Manjushree park with cave and Karya Binayak Temple)	<i>Hipposideros cineraceus</i>	<i>Hipposideros cineraceus</i>	
		<i>Rousettus leschenaultii</i> ***	<i>Rhinolophus pusillus</i>	
		<i>Rhinolophus affinis</i>	<i>Megaderma lyra</i>	
		<i>Megaderma lyra</i>		
3	Bajrabarahi	<i>Murina huttoni</i> ***	<i>Pipistrellus javanicus</i>	
		<i>Murina leucogaster</i> ***	<i>Miniopterus fuliginosus</i>	
		<i>Myotis sicarius</i>		
		<i>Myotis sp.</i>		
		<i>Myotis frater</i> *		
		<i>Myotis nipalensis</i>		
4	Macchegaun	-	-	
5	Gujeshwori	<i>Nyctalus aviator</i> *	-	
6	Swoyambhu	-	-	
7	Godawari	<i>Rhinolophus sinicus</i>	<i>Hypsugo sp.</i>	<i>Rhinolophus affinis</i>
		<i>Rhinolophus affinis</i>	<i>Barbastella leucomelas</i> **	<i>Myotis csorbai</i>
			<i>Cynopterus sphinx</i>	<i>Cynopterus brachyotis</i> *
			<i>Myotis csorbai</i>	<i>Eptesicus serotinus</i> **
				<i>Miniopterus fuliginosus</i>
8	Nagarjun	<i>Rhinolophus pusillus</i>	<i>Rhinolophus lepidus</i> **	
		<i>Rhinolophus affinis</i>	<i>Rhinolophus affinis</i>	
9	Nagarkot	-	<i>Rhinolophus affinis</i>	
			<i>Rhinolophus ferrumequinum</i>	
			<i>Rhinolophus luctus</i>	
10	Sundarijal	-	<i>Rhinolophus luctus</i>	

			<i>Hipposideros armiger</i>	
			<i>Miniopterus fuliginosus</i>	
11	Gokarna	-	-	
12	Suryabinayak	-	-	
13	Pharping	-	<i>Rhinolophus affinis</i>	
			<i>Miniopterus fuliginosus</i>	
14	Panimuhan	-	<i>Pipistrellus javanicus</i>	
15	Bhrikuti Mandap	<i>Miniopterus fuliginosus</i>	-	
16	Nepal Academy	-	-	
17	Mulsanghu	-	<i>Myotis nipalensis</i>	
			<i>Pipistrellus javanicus</i>	
18	Gurjudhara	-	<i>Pipistrellus coromandra</i>	
19	Ichangunarayan	-	<i>Miniopterus fuliginosus</i>	
			<i>Pipistrellus javanicus</i>	

Table 2: Details on bat species captured during the baseline survey

S.N.	Species	Sites of capture	# sites in which the species was captured	Month and of year capture	# instance captured	Echolocation call
1	<i>Barbastella leucomelas</i> **	Godawari	1	Nov-17	1	Available
2	<i>Cynopterus brachyotis</i> *	Godawari Botanical Garden	1	Apr-18	1	Non-echolocating
3	<i>Cynopterus sphinx</i>	UN Bagmati Park, Jwagal	2	Aug-16	2	Non-echolocating
		Godawari Botanical Garden		Nov-17		
4	<i>Eptesicus serotinus</i> **	Godawari Botanical Garden	1	Apr-18	1	Available
5	<i>Hipposideros armiger</i>	Sundaridal	1	Nov-17	1	Available
6	<i>Hipposideros cineraceus</i>	Chobhar	1	Aug, Oct 16; Nov-17	3	Available
7	<i>Hypsugo</i> sp.	Godawari Botanical Garden	1	Nov-17	1	Available
8	<i>Megaderma lyra</i>	Chobhar	1	Aug, Oct 16; Nov 17	3	Available
9	<i>Miniopterus fuliginosus</i>	Pharping	5	Nov-17	5	Available
		Sundaridal		Nov-17		
		Ichangunarayan		Nov-17		
		Bhrikutimandap		May-17		
		Bajrabarahi		Nov-17		
10	<i>Murina huttoni</i> ***	Bajrabarahi	1	Aug-16	1	Not Available
11	<i>Murina leucogaster</i> ***	Bajrabarahi	1	Aug-16	1	Not Available
12	<i>Myotis csorbai</i>	Godawari	1	Nov-17	2	Available
		Godawari Botanical Garden		Apr-18		
13	<i>Myotis frater</i> *	Bajrabarahi	1	Aug-16	1	Available

14	<i>Myotis nipalensis</i>	Bajrabarahi	2	Aug-16	2	Available
		Mulsanghu		Nov-17		
15	<i>Myotis sicarius</i>	Bajrabarahi	1	Aug-16	1	Available
16	<i>Pipistrellus coromandra</i>	Gurjudhara	1	Nov-17	1	Available
17	<i>Pipistrellus javanicus</i>	Ichangunarayan	4	Nov-17	4	Available
		Mulsanghu		Nov-17		
		Panimuhan		Nov-17		
		Bajrabarahi		Nov-17		
18	<i>Rhinolophus affinis</i>	Chobhar	5	Oct-16	5	Available
		Godawari		Sep-16		
		Nagarjun		Apr, Nov-17		
		Nagarkot		Nov-17		
		Pharping		Nov-17		
19	<i>Rhinolophus ferrumequinum</i>	Nagarkot	1	Nov-17	1	Not Available
20	<i>Rhinolophus lepidus</i> **	Nagarjun	1	Nov-17	1	Available
21	<i>Rhinolophus luctus</i>	Sundarijal	2	Nov-17	1	Available
		Nagarkot		Nov-17		
22	<i>Rhinolophus pusillus</i>	Nagarjun	2	Apr-17	2	Available
		Chobhar		Nov-17		
23	<i>Rhinolophus sinicus</i>	Godawari	1	Sep-16	1	Available
24	<i>Rousettus leschenaultii</i> ***	Chobhar	1	Aug-16	1	Not Available

* First record to Nepal ** First record to the Kathmandu valley *** New record since Scully (1887)



Photo plate of bats species recorded



Rousettus leschenaultii



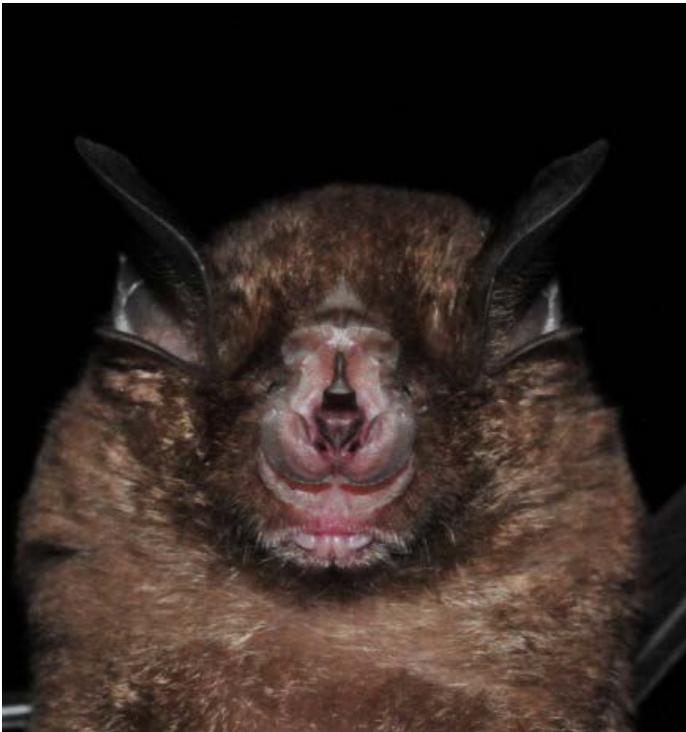
Cynopterus sphinx



Cynopterus brachyotis

Rhinolophus ferrimequinum

Rhinolophus affinis



Rhinolophus sinicus

Rhinolophus pusillus

Rhinolophus lepidus

Rhinolophus luctus



Hipposideros cineraceus

Hipposideros armiger



Megaderma lyra

Myotis sicarius



Myotis sp. (unidentified)



Myotis frater

Myotis nipalensis

Myotis csorbai

Barbastella leucomelas

Eptesicus serotinus



Pipistrellus javanicus



Pipistrellus coromandra



Nyctalus aviator

Hypsugo sp.



Murina leucogaster

Murina huttoni

Miniopterus fuliginosus

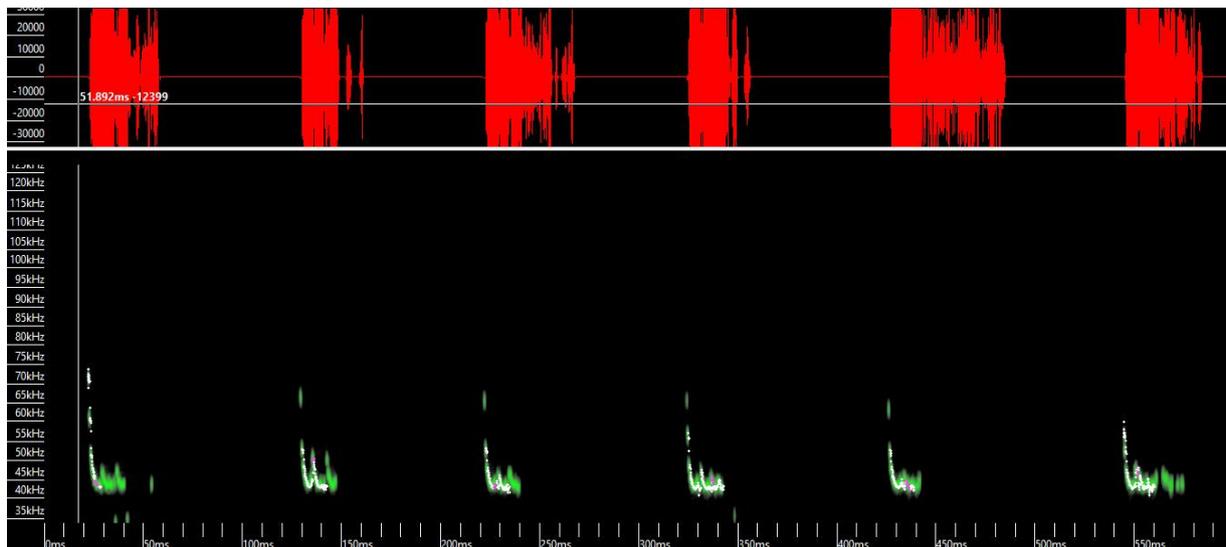
2. Establishment of Bat Call Library

For the first time in Nepal a bat call library was established. During the baseline survey at 19 monitoring sites, while releasing bats captured in the mist nets, their echolocation calls (as reference) were recorded deploying one to two Wildlife Acoustics SM4BAT ZC detectors. Although 24 species was recorded during the

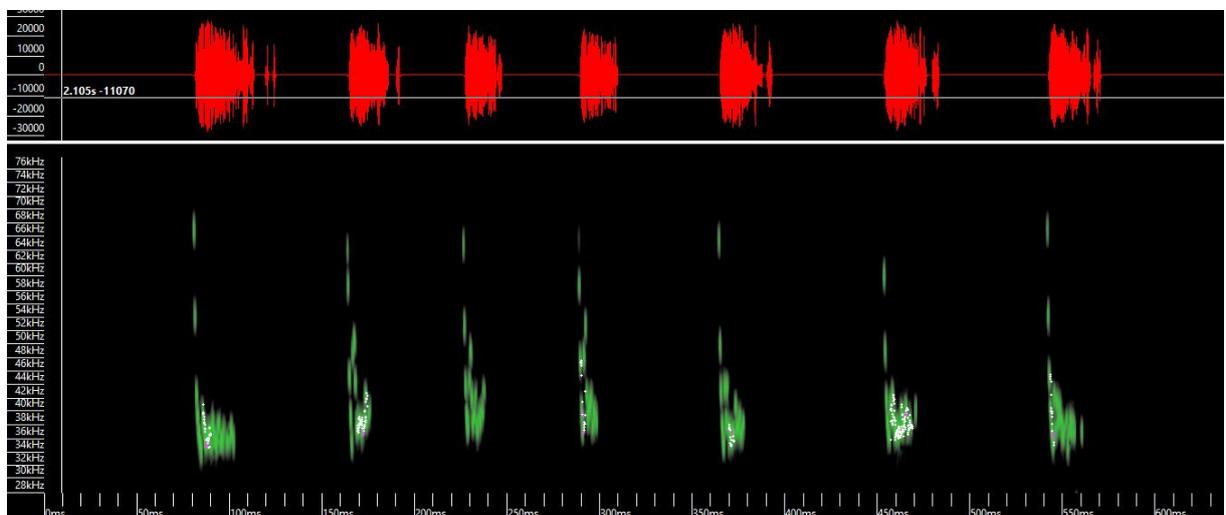
project, reference calls of only 18 species were recorded. Reference calls of few bat species such as *Murina leucogaster*, *Murina huttoni*, *Rhinolophus ferrumequinum*, *Rousettus leschenaultii* could not be recorded. Altogether, reference calls of 18 species of bats from Kathmandu valley from 19 sites (Table 2) have been deposited in the bat call library. Reference calls of 15 species of bats from the Kathmandu valley has been uploaded into Nepal Bat Call Library in the website of Small Mammals Conservation and Research Foundation (<http://smcrf.org/resource/nepalbatcall/>).

During this project, three days Bat Acoustics and Handling Training was organised in Kathmandu to build the capacity of altogether 12 participants including field member of the project team and other conservation enthusiasts.

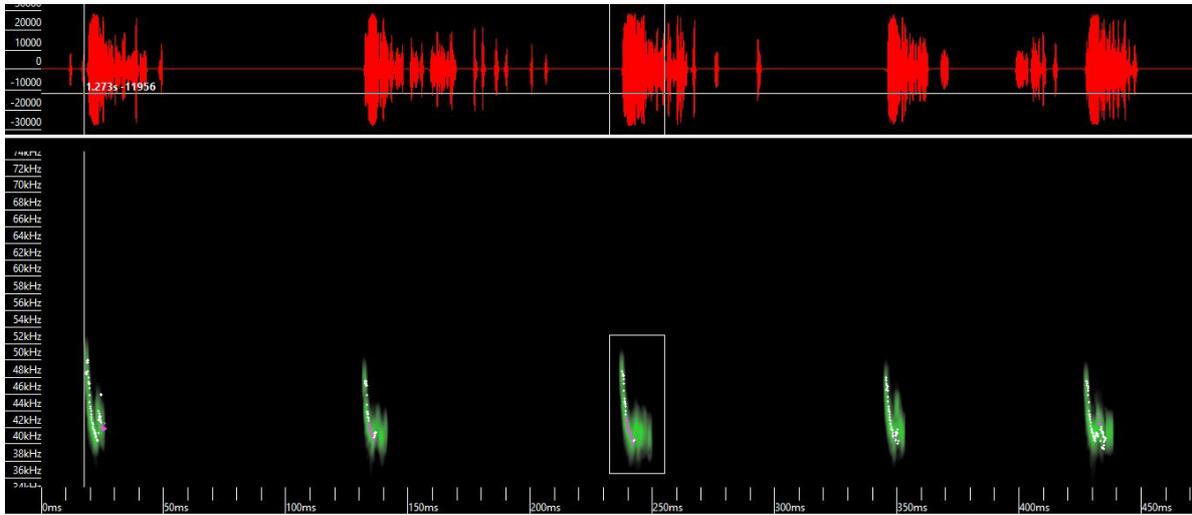
Photo plates of spectrogram of echolocation calls (reference) of bat species from Kathmandu valley



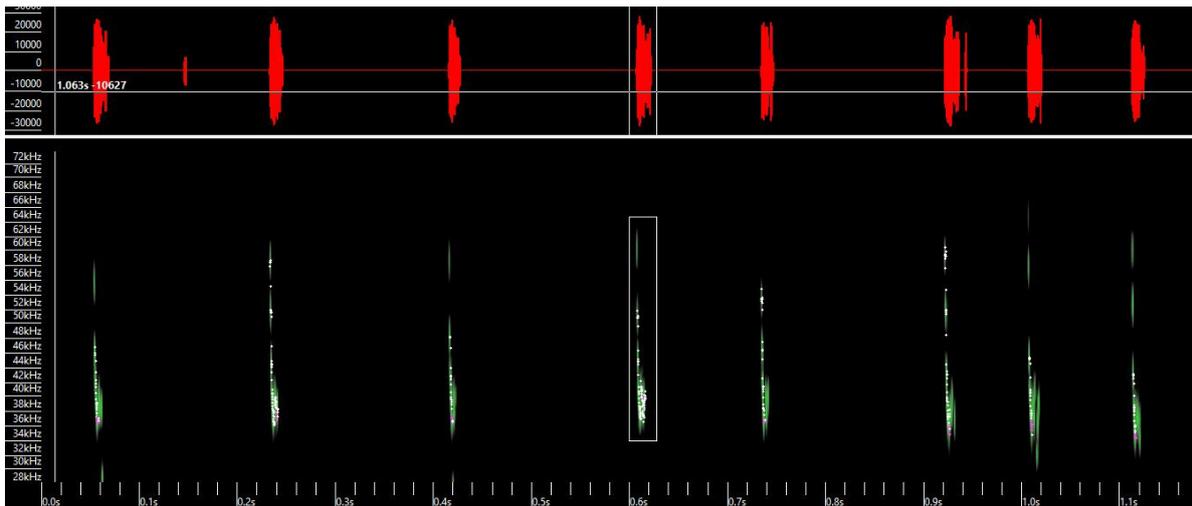
Unknown bat species (Probably *Pipistrellus* sp.) at Balkhu on August 3, 2016



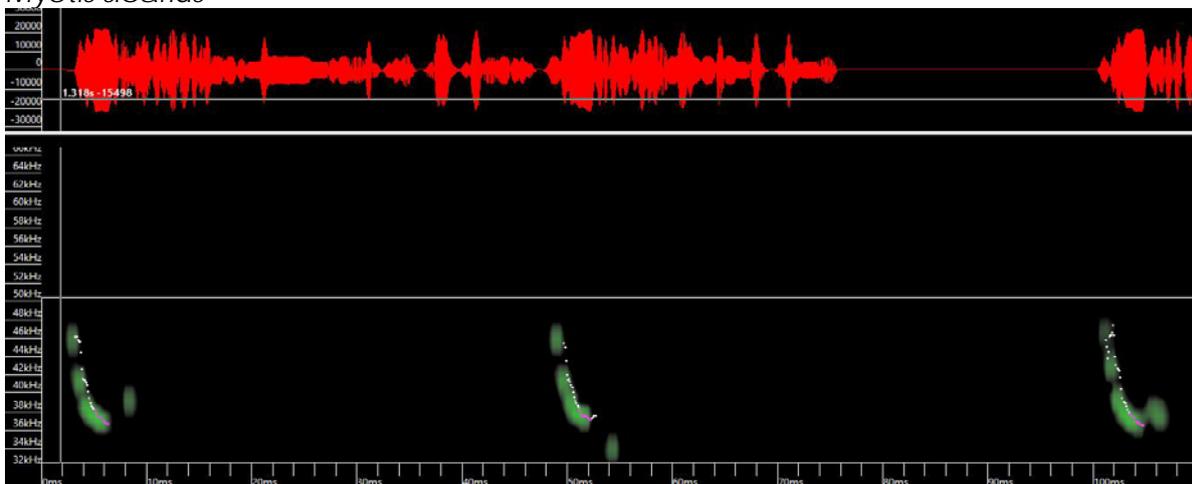
Myotis frater



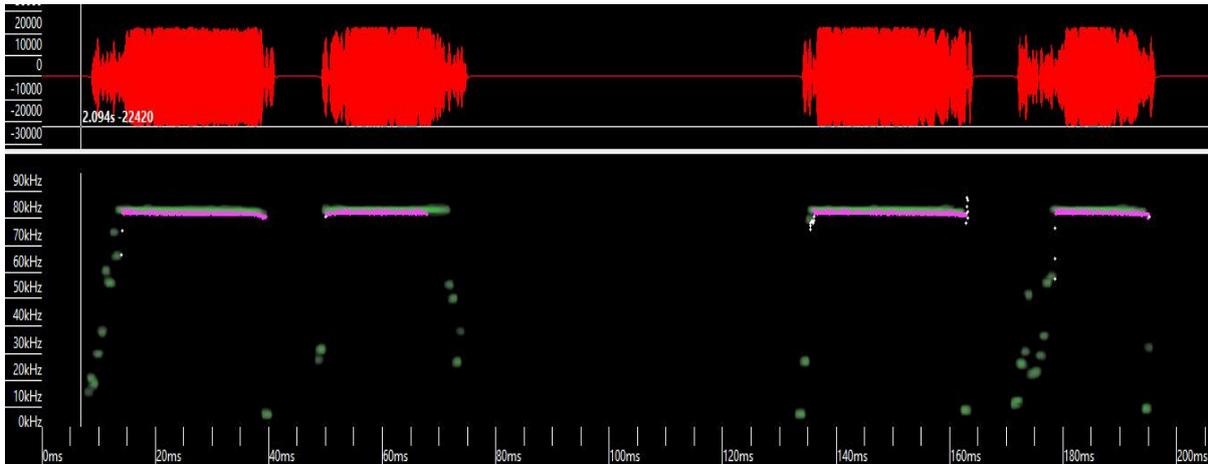
Myotis nipalensis



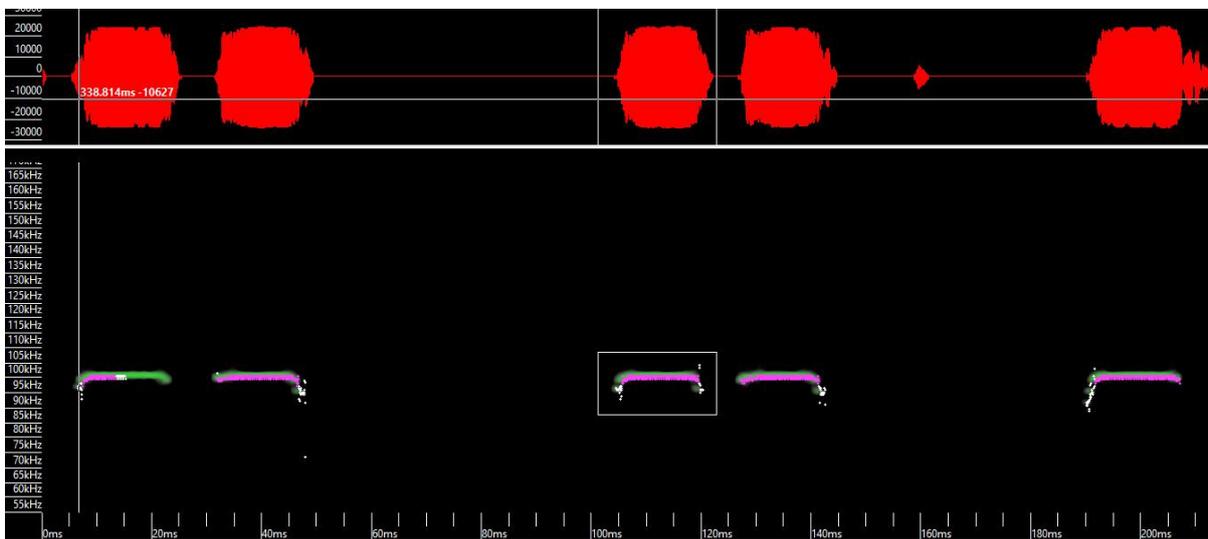
Myotis sicarius



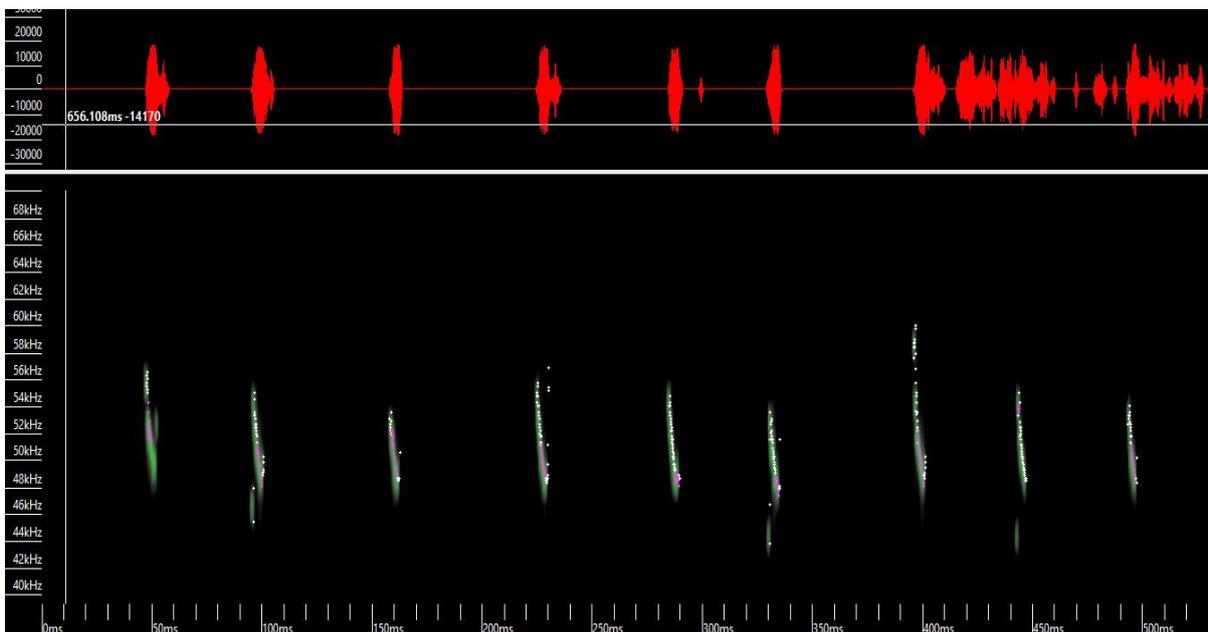
Nyctalus aviator



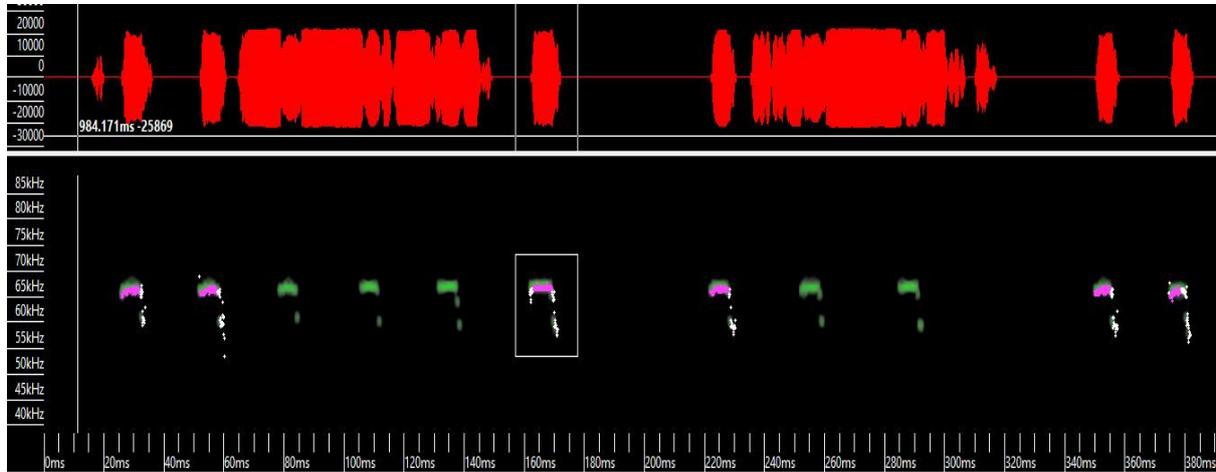
Rhinolophus affinis



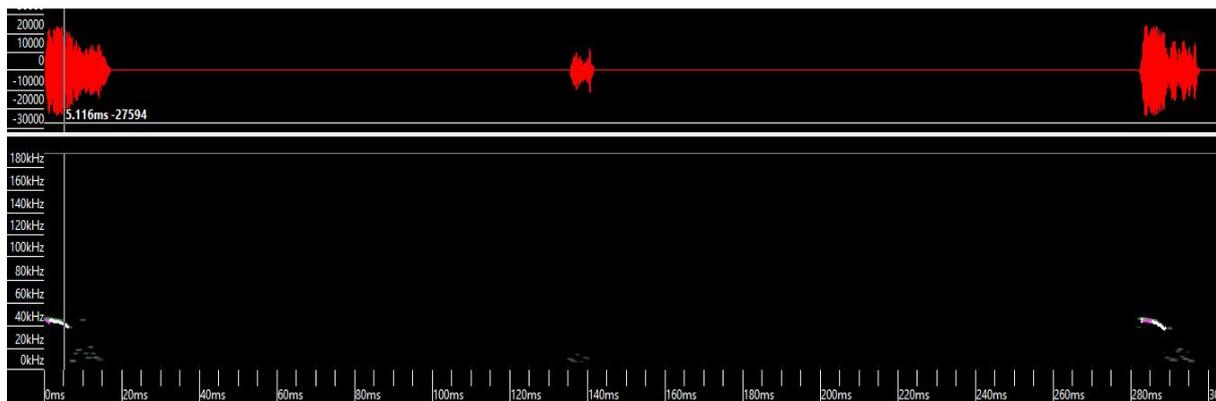
Rhinolophus pussilus



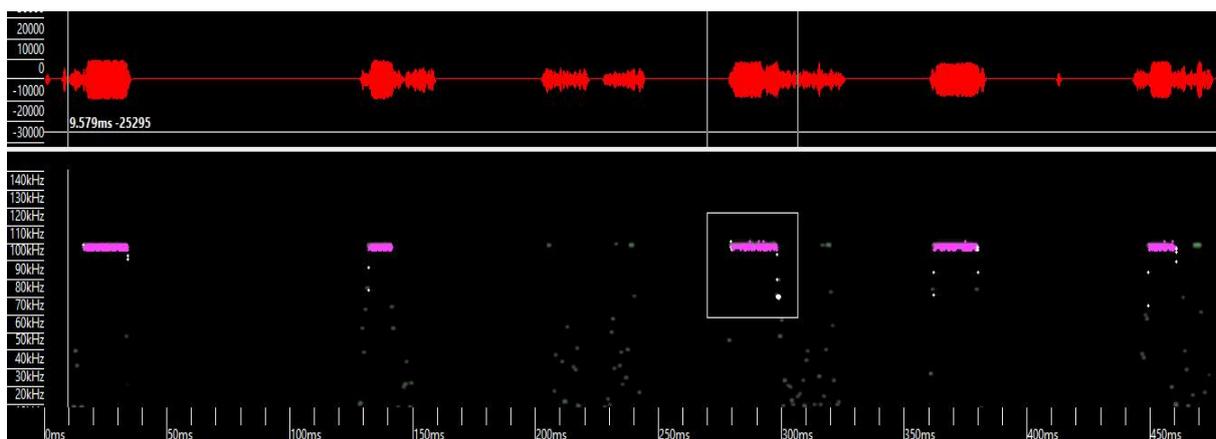
Miniopterus fuliginosus



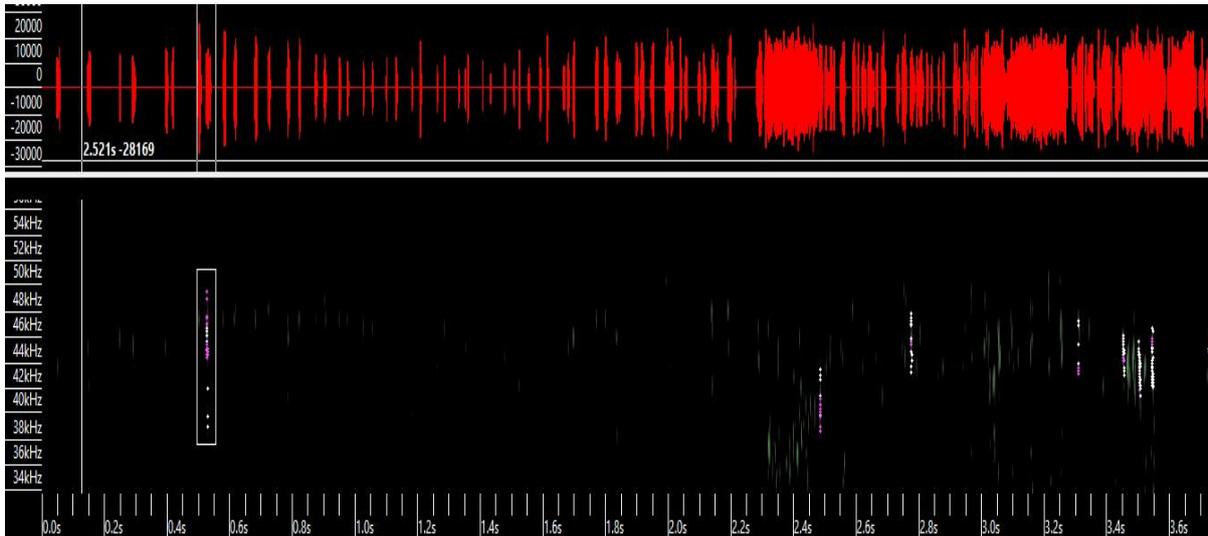
Hipposideros armiger



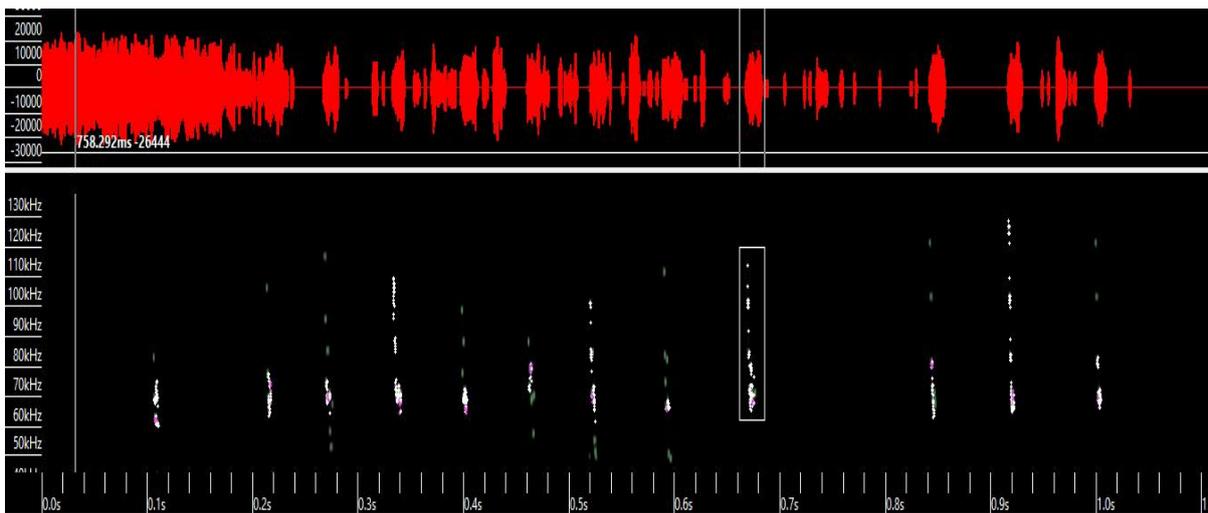
Barbastella leucomelas



Hipposideros cineraceus



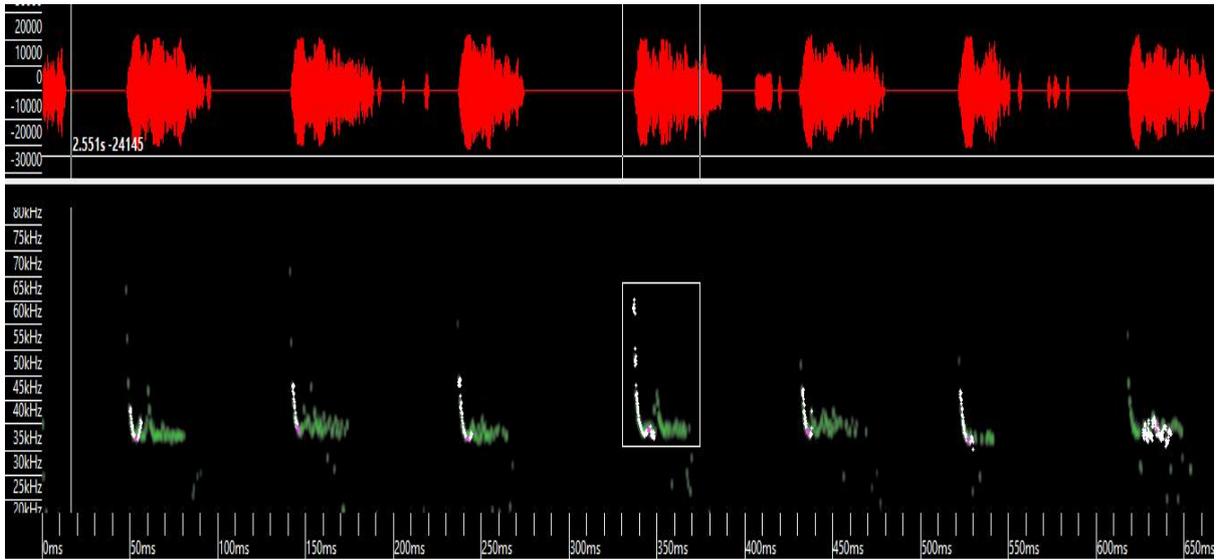
Megaderma lyra



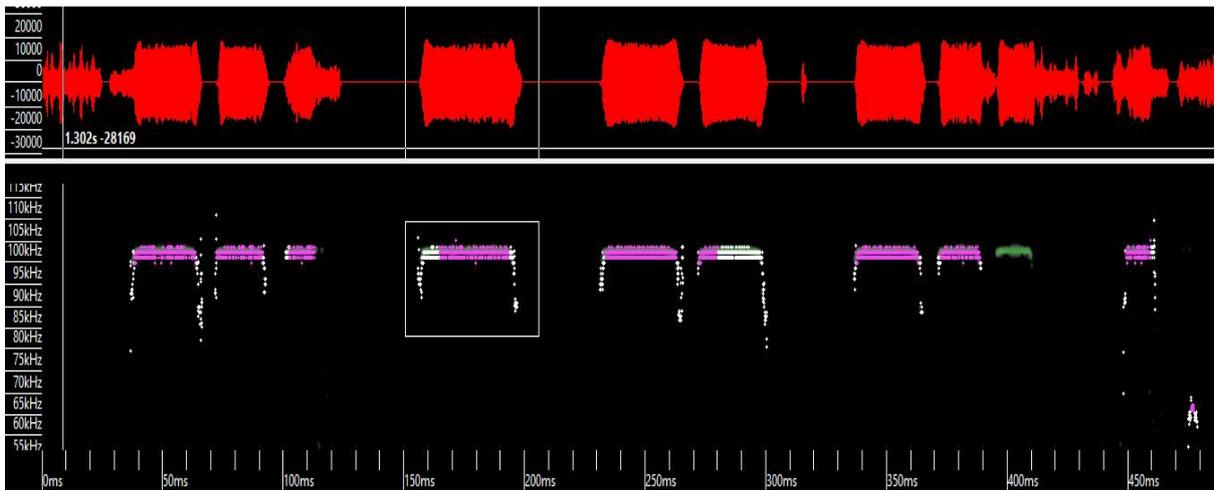
Myotis csorbai



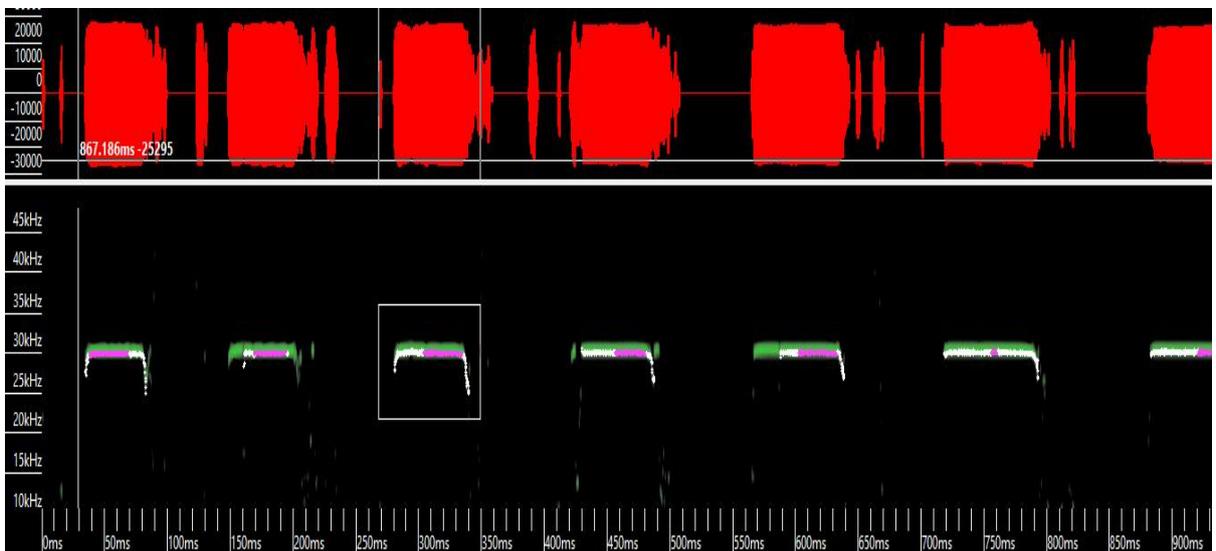
Hypsugo sp.



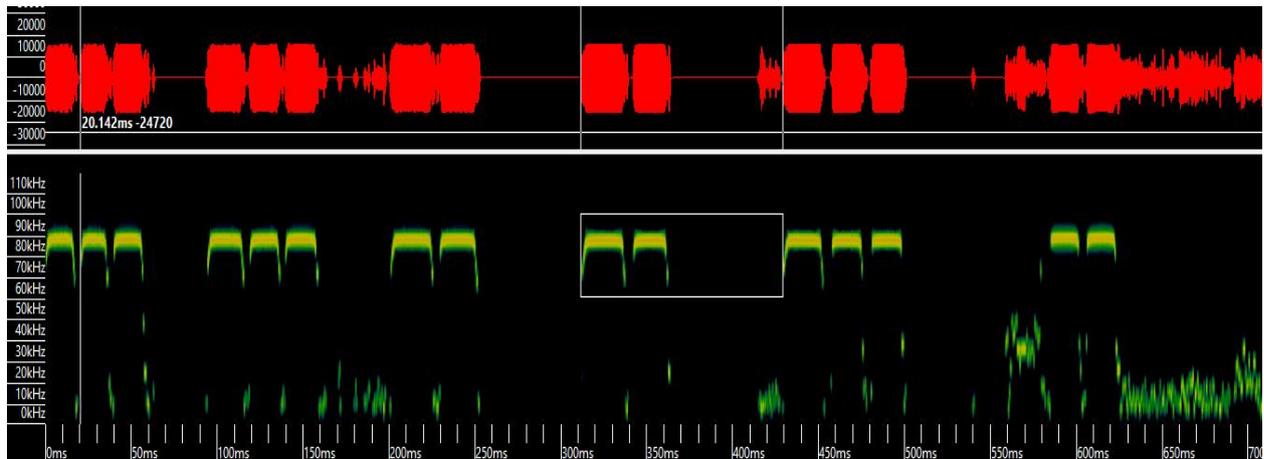
Pipistrellus javanicus



Rhinolophus Lepidus



Rhinolophus luctus



Rhinolophus sinicus

Table 3: Characteristics of echolocation calls of bat species from Kathmandu Valley in Nepal Bat Call Library

S.N.	Species	Mean Freq. (Fpmean kHz)	Min Freq. (Fpmin kHz)	Max Freq. (Fpmax kHz)	Peak Freq. (Fppeak kHz)
11	<i>Barbastella leucomelas</i>	23.952334	0	0	23.28435
14	<i>Eptesicus serotinus</i>	40.188422	0	41.25	39.577148
8	<i>Hipposideros armiger</i>	66.504656	63	69	66.86557
2	<i>Hipposideros cineraceus*</i>	108.114695	98.25	0	108.287172
13	<i>Hypsugo sp.</i>	34.571965	0	38.25	34.296469
9	<i>Megaderma lyra</i>	46.630309	0	0	46.604996
3	<i>Miniopterus fuliginosus</i>	50.510172	0	53.25	48.868449
12	<i>Myotis csorbai</i>	72.585656	0	75	68.165266
17	<i>Myotis frater</i>	37.100063	0	40.5	35.329129
4	<i>Myotis nipalensis</i>	71.003563	63	71.25	69.015273
16	<i>Myotis sicarius</i>	39.83257	0	42.75	37.61882
15	<i>Nyctalus aviator</i>	38.957594	36	43.5	37.644793
1	<i>Pipistrellus javanicus</i>	37.669172	0	42	36.850895
6	<i>Rhinolophus affinis</i>	85.509281	83.25	87.75	85.681781
5	<i>Rhinolophus lepidus</i>	102.187539	98.25	0	102.284438
10	<i>Rhinolophus luctus</i>	29.983381	28.5	32.25	30.095352
7	<i>Rhinolophus pusillus</i>	69.450758	56.25	72	69.763484
18	<i>Rhinolophus sinicus</i>	86.504328	82.5	90.75	87.002508

3. Kathmandu Valley Conservation Action Plan developed

Possible impacts of Land Use Land Cover (LULC) change was identified and reviewed. Based on the findings from the baseline survey, status of bat species was reviewed. Vision, goals (overall and specific), goal targets, objectives, objective targets and actions was developed (http://cmsdata.iucn.org/downloads/scshandbook_2_12_08_compressed.pdf).

Informal consultation meetings with local people, citizen forum, community forest users groups, land owners and school teachers were organised. Communication on the action plan draft with national and international experts and organisations working on environment and wildlife conservation was established. Based on the information gathered from these events, a draft of site-specific action plan for conservation of bats in Kathmandu valley (2018-2023) was prepared. A sharing workshop was organised on July 20th 2018 to share on the draft of the action plan, gather feedbacks and suggestion and revise the draft. A final draft has been submitted to Rufford Small Grants, UK.

The action plan has recommended some urgent (prioritised) and long-term implementing actions for four goal targets, site specific and species specific actions to mitigate human induced threats and some other threats imposed by LULC change. A tentative budget plan for implementation of the action plan for a 5-year period of 2018-2023 in collaboration with; government agencies (Ministry of Forests and Environment, Department of Forests, Department of National Parks and Wildlife Conservation, Department of Plant Resources, National Agricultural Research Council); local government bodies (Municipalities and Metropolitan cities); Funding charities and organisations abroad; conservation partners and development organization from abroad and the country; UN organizations; grassroots level CBOs (CFUGs) in Nepal. This action plan has also recommended RSG for the financial support to the implementation of specific (research and conservation) urgent actions for the year 2019-2020.

A final draft on site specific action plan for conservation of bats in the Kathmandu valley (2018-2023) will be submitted to Government of Nepal (GoN) recommending GoN to develop a national action plan for bats conservation.

This is a very first policy level document on bats conservation in the country. Although it is a site specific action plan, it can guide to the development of national level action plan in near future.

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

Local communities, especially Community Forests Users Groups (CFUGs) were involved during the bat survey and Phase I habitat survey in most of the sites (additionally opportunistic surveys). These communities were also involved during informal consultation for preparation of bat action plan draft at a few important habitat occurring and affected sites and very few from each such sites participated in the sharing workshop.

The local communities those participated during this project get familiar with bat survey techniques such as mist netting, habitat and roost survey, use of bat detectors etc. More importantly, they saw the bats very close than they had ever seen, and can differentiate difference in look between different species and became affectionate with bats. Most importantly, during their involvement, they came to know how important are bats to the ecosystems and humans

(themselves)? The local communities and even policy makers connected for the project approval, baseline surveys, action plan drafting, sharing workshop and other activities of the project were aware that bats play an important role in pollination, seed dispersal, pest control, disease control etc.

5. Are there any plans to continue this work?

Yes, there are plans to continue. Now, the publicised Site Specific Conservation Action Plan for Bats in the Kathmandu Valley has entered into the implementation phase. The action plan has also recommended (request funding) to RSG for the implementation of specific (research and conservation) urgent actions for the year 2019-2020.

Therefore, following actions need to be continued soon in support from RSG.

Action 1. Annual Kathmandu valley bat monitoring for their population in key habitats.

Action 2. Develop and publish guidelines for bats monitoring inside and outside the protected areas (not to disturb or hamper bats during hibernation and torpor).

Action 3. Conduct studies on diet of bat species.

Action 4. Prepare bat documentary on demonstrating important role of bats in providing ecosystem services in Kathmandu Valley and in Nepal.

Action 5. Understand and inform all stakeholders including local community on the role of bats for ecosystem services (pollination, seed dispersal and agricultural pest control etc.) for the behavioural change and increase the level of tolerance and motivate the willingness amongst the targeted group for the co-existence of the species and local level long term conservation of bats.

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

Some results from the project were shared to the participants (including policy makers, authorities, conservation partners and stakeholders) through the reports, presentation and discussion during the sharing workshop. The knowledge and understanding from the project (especially threats and its impacts including LULC), importance of bats and conservation needs has been shared to the public through radio interviews I had been invited.

Two peer reviewed journal articles will be published in a year or two based on the results on baseline survey (including phase I habitat survey, species monitoring and acoustics survey).

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 RSG grant was used for a period of 2 years (2016-2018). The grant was used additional year than the anticipated length 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. Exchange rate, 1 £ sterling=Nepalese Rs. 150

Item	Budgeted Amount (£)	Actual Amount (£)	Difference (£)	Comments
Transportation	1000	1490	-490	Number of persons involved increased from 4 to 6 and Several field visits (15 more) added for phase I habitat survey, baseline survey (species monitoring and acoustics survey) than anticipated
Accommodation (120 days for 4 persons)	3170	4080	-910	Number of persons involved increased from 4 to 6 and Several field visits (15 more) added for phase I habitat survey, baseline survey (species monitoring and acoustics survey) than anticipated
Remuneration for LC and LU mapping	600	500	+100	
Bat Sound Analysis Training (3 days and night)	1000	600	+400	PI (Sanjan Thapa) facilitated the training (It was expected to invite Facilitator from abroad)
Song Meter SM4BAT ZC Zero crossing including accessories (2pc); Kaleidoscope Stand-Alone Viewer (1 pc.)	2000	2000	0	
Local meetings and consultation for CAP	700	300	+400	These meetings were conducted informally and at five specific sites (less sites than anticipated)
CAP Workshop	1500	1000	+500	Since the project budget reduced and remained £ 1000
Lenovo G 505 laptop	0	0	0	Supported by Idea Wild
Garmin GPS (3pc)	0	0	0	Supported by Idea Wild (2) and SMCRF (1)
Topo-Maps	0	0	0	Supported by SMCRF
Stationeries	0	0	0	Supported by SMCRF
Total	9970	9970	0	

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

During the project, we were surprised to know besides local people, land owners, people involved with CBOs, NGOs, INGOs and government authorities and agencies and even the conservation enthusiasts, researchers, policy makers, journalists and reporters lack the awareness on the role played by bats for ecosystem services (pollination, seed dispersal, pest and disease control) etc.

Therefore, in the next step we would like to focus to elevate the awareness on bats through developing bat documentary on demonstrating important role of bats in providing ecosystem services in Kathmandu Valley and in Nepal and Peer to peer knowledge transfer through veterinarian and agricultural suppliers.

During this project we also monitored 12 bat houses (bat boxes) installed in different locations in the Kathmandu valley and found eight bat boxes needed replacing by new construction and two needed to be repaired. Therefore, we are planning to repair and Install new bat boxes (houses) at previous locations as well as at some new locations in the urban and heavy built areas.

Also the known key potential sites (where bat habitat occurs) that are impacted upon by LULC change and human-induced threats have been identified. We are looking forward to declare such key potential sites that are vulnerable, as bat conservation sites.

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?

Yes, we used Rufford Foundation logo in the banners for Bat Acoustics and Handling Training, Sharing workshop and the reports.

11. Any other comments?

Without any discrimination, The Rufford Foundation is the only global organisation which has been regularly funding the bat research and conservation projects in Nepal. Bat conservation International has been supporting bat conservation projects in the country but occasionally. So, we would like to express our esteem gratitude to the Rufford Foundation for encouraging and engaging us in the field of conservation of unprioritised and neglected taxa in the country.