Sciuridae (Order: Rodentia) in Nepal

Sanjan Thapa, Hem Bahadur Katuwal, Sabina Koirala, Badri Vinod Dahal, Bishnu Devkota, Robin Rana, Hemanta Dhakal, Rama Karki, Hari Basnet

Small Mammals Conservation and Research Foundation, Kathmandu, Nepal

Suggested Citation:

Thapa S., H. B. Katuwal, S. Koirala,B. V. Dahal, B. Devkota, R. Rana, H. Dhakal, R. Karki andH. Basnet (2016). Sciuridae (Order: Rodentia) in Nepal. Small Mammals Conservation and Research Foundation, Kathmandu, Nepal, 70pp.

Cover Photo:

Front: A captive Hodgson's Flying Squirrel in the vicinity of Dhap pokhari, Jamuna V. D.C. ward#2, Ilam District (Photo by: **Sanjan Thapa**)

Back: Male and female Grey-headed Flying Squirrel in Resunga Municipality Ward # 11, Gulmi (Photo by: **Hari Basnet**)

ISBN-978-9937-0-1959-0

Table of Contents

Preface

Small Mammals Conservation and Research Foundation published a report "An Overview Report on Squirrel (Sciuridae: Rodentia) of Nepal" in 2010. However, there needed some corrections and update. We collected additional information on squirrels and marmot since 2010 based on literatures and opportunistic photographs from different parts of Nepal. By compiling all the available information, we produce a field guide on squirrels and marmot of Nepal.

We are thankful to Mr. Man Bahadur Khadka, Director General, Department of National Park and Wildlife Conservation for writing forward of this book. Similarly we are grateful to Mr. Laxman Prasad Paudyal, Ecologist, Department of National Park and Wildlife Conservation for his support and Dr. Murali Krishna Assistant Professor at Amity Institute of Wildlife Sciences for his suggestions to revise this book. We would like to express sincere gratitude to Dr. Gabor Csorba, Malcolm Pearch and Harrison Institute for providing useful literatures. We are also thankful to Mr. Vimal Thapa, Mr. Rajendra Gurung, Mr. Rabindra Maharjan, Mr. Yadav Ghimire, Mr. Prakash Bhattarai, Mr. Krishna P. Acharya, Mr. Toshiyuki Kato, Mr. Tek Bahadur Gurung, Mr. Tek Gahrti Magar, Mr. Mann Shant Ghimire, Mr. Pratap Gurung, Mr. Purnaman Shrestha, Mr. Chiranjeevi Khanal, Mr. Ramesh Chaudhary, Mr. Seejan Gyawali, Mr. Sanej Prasad Suwal, Mr. Rajan Poudel, Mr. Amar Kunwar and Mr. Suraj Baral for providing valuable information and/or photographs to update the species accounts. We are indebted to Dr. Maheshwar Dhakal, Prof. Karan Bahadur Shah, Dr. Shant Raj Jnawali, Dr. Raj Amin, Dr. Hem Sagar Baral, Dr. Naresh Subedi, Ms. Sally Walker, Dr. Sanjay Molur, Dr. B.A. Daniel and R. Marimuthu for their kind and continuous encouragement and support to motivate and engage us in the field of small mammal research and conservation. We owe sincere gratitude to Dr. William Duckworth and Malcolm Pearch for their review and help in refining the book draft.

We hope that this book will be helpful for government, academic and touristic purposes. We would like to get feedback and suggestion for updating the list.

Government of Nepal
Ministry of Forest and Soil Conservation
Department of National Parks & Wildlife Conservation

1289

Foreword

Nepal's greatly varied geographical, geo morphological, and climate conditions harbors rich biodiversity. More than 208 species of mammals are found in Nepal including 11 species of squirrels and a marmot belonging to family Sciuridae (Order: Rodentia). These Sciurids are distributed from Terai to Trans-Himalayan region in protected areas as well as outside the protected areas in different habitat types throughout the country range.

Small Mammals Conservation and Research Foundation (SMCRF) has published this book to inform about the species of Sciuridae reported in Nepal based on the available literatures and photographic evidences found to till date. The book delivers the crucial details on conservation status, distribution, ecology and threats of each squirrels and marmot species of Nepal. The information contained here provides the baseline for further research and conservation of these important fauna in the country. Additionally, it is hoped that the information in this book will support concerned stakeholders for the conservation of these species.

I would like to thank SMCRF for adding a significant publication for these species. In particular, I would like to thank all the authors and contributors for their untiring efforts in the publication of the book.

29/Dec/2016

Man Bahadur Khadka

Director General

G. P.O. Box: 860, Kathmandu, Nepal. Tel. 4220912, 4220850, 4227926, Fax : 977-1-4227675

Abbreviations and Acronyms

ACA	Annapurna Conservation Area
BNP	Bardia National Park
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CNP	Chitwan National Park
DD	Data Deficient on *The IUCN Red List of Threatened Species*
DHR	Dhorpatan Hunting Reserve
E	Ear
EN	Endangered on *The IUCN Red List of Threatened Species*
FMNH	The Field Museum of Natural History, Chicago, U.S.A.
GCA	Gaurishankar Conservation Area
HB	Head-body
HF	Hind Foot
IUCN	International Union for Conservation of Nature
KCA	Kangchenjunga National Park
LC	Least Concern on *The IUCN Red List of Threatened Species*
LNP	Langtang National Park
MBNP	Makalu Barun National Park
MCA	Manaslu Conservation Area
MCZ	Museum of Comparative Zoology, Harvard University, Cambridge, Massachusetts, U.S.A.
MSUM	Michigan State University Museum, East Lancing, Michigan, U.S.A.
NHM	Natural History Museum, Tribhuvan University, Swoyambhu, Kathmandu, Nepal
NINS	National Institute of Natural Science, Kathmandu, Nepal
NT	Near Threatened on *The IUCN Red List of Threatened Species*
PSM	Puget Sound Museum, Tacoma, Washington, U.S.A. (now known as the James R. Slater Museum)
RNP	Rara National Park
ROM	Royal Ontario Museum, Toronto, Canada
SNNP	Shivapuri Nagarjun National Park
SNP	Sagarmatha National Park
SPNP	Shey-Phoksundo National Park
T	Tail
USNM	United States National Museum of Natural History, Smithsonian Institution, Washington D.C., U.S.A.
V.D.C.	Village Development Committee
VU	Vulnerable on *The IUCN Red List of Threatened Species*
YPM	Yale University Peabody Museum, New Haven, Connecticut, U.S.A.
°	Degree
'	Minute
a.s.l.	above sea level
C	Canine
I	incisor/s
Kg	Kilogram
m	Meter
M	Molar
Mm	Millimeter
M^1-M^3	Maxillary teeth row
ONL	Occipitonasal length
Pm	Premolar

About Maps: Protected Area-Green Color, Outside Protected Area-Red color

Introduction

Status of squirrels and marmot in Nepal

Among 279 species of squirrels and marmots found in the world (IUCN 2015) only twelve species are reported from Nepal (Thapa 2014). However, Thorington et al. (2012) presented overview of 285 species of squirrels in the world. Fourteen species of marmots are found world-wide (IUCN 2015). The global conservation status of Black Giant Squirrel (*Ratufa bicolor)* and Bhutan Giant Flying Squirrel (*Petaurista nobilis)* is Near Threatened while Hairy-footed Flying Squirrel (*Belomys pearsonii)* is Data Deficient. Nepal's nine species of squirrels are all assessed, globally, as Least Concern (IUCN 2015). The *Status of South Asian Non-volant Small Mammals: Conservation Assessment and Management Plan (C.A.M.P) Workshop report* assessed the regional status of 12 species: one Endangered, two Vulnerable, three Near Threatened and six Least Concern (Molur et al. 2005). The *Status of Nepal's Mammals: The National Red List Series* assessed the national conservation status of four species as Data Deficient, seven species as Least Concern and *Ratufa bicolor* as Endangered (Jnawali et al. 2011). *Ratufa bicolor* is also listed in Appendix II of CITES (Baral and Shah 2008).

Distribution of squirrels and marmot in Nepal

Squirrels are distributed from Terai (plain), mid hills, alpine region to Trans-Himalayan region of Nepal through elevation range of 70-4000m a.s.l. and marmots are found within an elevation range of 3000-5500m a.s.l. They have been reported from protected areas as well as outside the protected areas in Nepal. It has been observed from urban vegetation, Sal (*Shorea robusta*) forest in the terai, broadleaved forest of Siwaliks and Mahabharat foot hills, Oak-Rhododendron(*Quercus-Rhododendron*) forest of midhills, sub-tropical and deciduous forests to northern alpine region of the high Himalayas and Tibetan steppe biotope of the Mustang and Humla districts (Baral and Shah 2008, Jnawali et al. 2011).

History of squirrels and marmotsurvey in Nepal

The specimen collection and survey of squirrels in Nepal started from Hodgson (1836-1844). He collected the first specimens of six squirrels and a marmot from Nepal. Hodgson has been honored subsequently with a squirrel species named after him, Hodgson's Giant Flying Squirrel (*Petaurista magnificus*),

which he was the first to record from Nepal. Gray (1846) also

reported those catalogued specimens previously collected by Hodgson.

Scully (1879) reported only Orange-bellied Himalayan Squirrel (*Dremomys lokriah*)in his ornithological finding from Nepal. Wroughton (1911) reported first record of *Petauristapetaurista*. Hinton and Fry (1923) surveyed eight species of squirrels including first record of Five-striped Palm Squirrel (*Funambulus pennanti*). Fry (1925) supplemented three species re-records. Lindsay (1929) identified a new species from Nepal *Sciuropterus gorkhali* from Gorkha, which was later considered to be Grey-headed Flying Squirrel (*Petaurista elegans*) by Ellerman (1947) and Mitchell (1979). Ellerman and Morrison-Scott (1951) in their "*Checklist of Palaearctic and Indian Mammals*" included *Ratufa bicolor* from eastern Nepal. Ellerman (1961) elaborated study on squirrels from Nepal, especially focused to Gorkha. Wiegel (1969) re-reported three squirrels from Nepal including *P. magnificus* and *D.lokriah* from Bigu and Hoary-bellied Squirrel (*Callosciuruspygerythrus*) from Rapti Valley, Chitwan. Worth and Shah (1969) also supplemented re-records of *F.pennantii*. Chesemore (1970) also contributed the re-recordings of *C. pygerythrus* and *F. pennantii*. Abe (1971) reported three species of squirrels from central part of Nepal; *F. pennantii, C. pygerythrus* and *D. lokriah*. Mitchell (1979) published 'The Sciurid Rodents (Rodentia: Sciuridae) of Nepal' based upon literature and museum specimens, as well as information from field visits. This is the first literature focused on the Sciuridae of Nepal. He reported eleven squirrels and marmot from Nepal including the first record of Hairy-footed Flying Squirrel (*Belomys pearsonii*) from Nepal. Johnson et al. (1980) reported three species including *P. magnificus* from Mangalbaare, eastern Nepal. Ghose and Saha (1981) reviewed the distribution of *P. magnificus* and supported its presence in Nepal. Abe (1982) presented ecological distribution and faunal structure of small mammals including squirrels. He briefly described the distribution of eight species of squirrels in forests and also plotted their morphograms. Corbet and Hill (1992), Hoffman et al. (1993) further supported the presence of *P. magnificus* and other species from Nepal.

Biodiversity Profile Project (BPP) listed fifteen species of squirrels and marmots that are distributed along protected and non-protected areas of Nepal (Suwal and Verheugt 1995), included *Trogopteruspearsonii* for*Belomyspearsonii*, treated *Petaurista elegans* as two species, *P.canicep*sand*P. elegans*, and used *Marmotahimalaya*for *M. himalayana*.However, Corbet and Hill (1992)

do not support distribution of Common Palm Squirrel (*Funambulus palmarum)* in Nepal. BPP also included *Arctomys hodgsoni*, however, it is a synonym for *Marmotahimalayana* (Pearch 2011). Shrestha (1997) compiled the information on squirrels and marmot found in Nepal in his book "Mammals of Nepal". He presented short description of fourteen species of squirrels and marmot with inconsistent taxonomy and distribution. Ghose et al. (2004) contributed to the taxonomic study of *Funambulus pennantii* in Indian sub-continent. In the same year Srinivasulu et al. prepared a checklist of Sciuridae from South Asia. Molur et al. (2005) in the C.A.M.P. Workshop Report produced profile sheet of squirrels and marmots from South Asia. Majupuria and Kumar [Majupuria] (2006) referred to Suwal and Verheugt (1995). Baral and Shah (2008) and Jnawali et al. (2011) presented illustrations and brief information on 13 species of Sciuridae from Nepal including two marmots; *Marmota bobak* and *Marmota himalayana*. Dahal et al. (2011) updated the known distribution of *F. pennanti* from Chitwan National Park while Ghimirey et al. (2012) recorded *R. bicolor* from Makalu Barun National Park.Katuwal et al. (2013) updated the distribution of*D. lokriah*from Manaslu Conservation Area, Solukhumbu district including Sagarmatha National Park and Kanchenjunga Conservation Area and *M. himalayana* from Manaslu Conservation Area. Recently, Karki (2013) conducted her behavioral ecology of Irrawaddy Squirrel (*Callosciurus pygerythrus*) in urban habitats of Bhaktapur.

Sciuridae of Nepal

In total, 12 species of squirrels including one marmot are recorded in Nepal. All species are provided with the photographic evidence. Taxonomic updates are based on Wilson and Reeder (2005), IUCN (2015) and Pearch (2011). For the Nepali names Baral and Shah (2008) is followed and a few new Nepali names are added. Identifying characters is extracted primarily from Ellerman (1961) and Mitchell (1977; 1979). Distribution map is based upon locality records and opportunistic sightings.

Table 1: Checklist of the species of Sciuridae of Nepal

S.N	Scientific Name	Common Name
1	*Ratufa bicolor* (Sparrman, 1778)	Black Giant Squirrel
2	*Hylopetes alboniger* (Hodgson, 1836)	Particolored Flying Squirrel
3	*Belomys pearsonii* (Gray, 1842)	Hairy-footed Flying Squirrel
4	*Petaurista elegans* (Temminck, 1837)	Grey-headed Giant Flying Squirrel
5	*Petaurista magnificus* (Hodgson, 1836)	Hodgson's Giant Flying Squirrel
6	*Petaurista nobilis* (Gray, 1842)	Bhutan Giant Flying Squirrel
7	*Petaurista petaurista* (Pallas, 1766)	Red Giant Flying Squirrel

8	*Callosciurus pygerythrus* (I. Geoffroy Saint Hilaire, 1831)	Hoary-bellied Squirrel
9	*Dremomys lokriah* (Hodgson, 1836)	Orange-bellied Himalayan Squirrel
10	*Funambulus pennantii* (Wroughton, 1905)	Five-striped Palm Squirrel
11	*Tamiops macclellandii* (Horsefield, 1840)	Himalayan Striped Squirrel
12	*Marmota himalayana* (Hodgson, 1841)	Himalayan Marmot

Species Profiles

Squirrels and Marmot of Nepal

Ratufa bicolor (Sparrman, 1778)

Common name: Black Giant squirrel

Nepali name: राजलोखर्के(Baral and Shah 2008)

Sciurus bicolor Sparrman, 1778: 70. Anjer, western Java.

Sciurus giganteus M'Clelland, 1839: 150. Assam.

Sciurus macruroïdes Hodgson, 1849a: 775. "the lower, [1]

Conservation status

Global: Near Threatened (Walston et al. 2008b)

South Asia: Least Concern (Molur et al. 2005)

National: Endangered B1ab (i,ii,iii) (Jnawali et al. 2011)

The species is listed in CITES Appendix II List.

Size: HB: 260 (juvenile)-580mm, **T**: 250- 600mm, **HF**: 65-95mm.

*Ratufa bicolor*at Siraichuli, Chitwan District ©**Tek Bahadur Gurung**

Description

This is the largest squirrel species of Nepal, weighing 1.5-3.0 kg. Dorsal pelage varies from dark brown to black coloured. It has large black tail with black undersurface (abnormally white tufts of hairs in terminal end). Tail is nearly equal or longer (normally 120% of HB) than the head-body length. The outer parts of the limbs are same in colour as that of dorsal pelage. The ventral pelage is dull buffy white or yellow. The dark brownish black of the face extends around the eyes and the ears.

[1] The locality cited as "Hodgson, 1849: 775. Bengal" (Ellerman & Morrison-Scott, 1951, Corbet & Hill, 1992) needs correction (Pearch 2011).

Throat is often lighter than chest and belly. The ears are short, round, tufted (not so heavily) and black. Feet are broad, large and powerful. Forelimb has inner pad like enlarged pollex. Females have three pairs of inguinal mammae. Skull is heavily built and has a short and broad rostrum, and very large, triangular shaped post orbital processes. Maxillary tooth row (M^1-M^3) is in average less than one fifth of occipitonasal length (ONL). ONL: 73.2-78.4mm; M^1-M^3; 12.5-15.2mm. Dental formula is: i 1/1; c 0/0; pm 1/1; m3/3=20.

Distribution

S.N.	Place (Locality)	Reference
1	Eastern Nepal (exact locality missing)	Ellerman and Morrison-Scott 1951, Ellerman 1961, Corbet and Hill 1992, Hoffman et al. 1993, Srinivasulu et al. 2004, Molur et al. 2005
2	Ilam and Morang Districts	Mitchell 1977
3	MBNP, RNP and Ilam District	Suwal and Verheugt 1995
4	Num	Ghimire et al. 2011
5	MBNP, RNP; Ilam, Panchthar, and Terhathum Districts	Jnawali et al. 2011
6	9 miles South of Ilam (FMNH 94105); Arun River, below Sedua (FMNH 114363); 17 miles North North-West of Bhadrapur (MR.12535) (MSUM) (all as *R. b. gigantea* (McClelland, 1839))	Pearch 2011
7	MBNP	Badri Vinod Dahal pers. obser.
8	Siraichuli, Chitwan at an elevation of 450m a.s.l.	Katuwal et al. in preparation
9	Siddhi VDC, Chitwan	Hari Basnet pers. observ.
10	Patnali forest near Dharan at an elevation of 210m a.s.l.	Katuwal et al. in preparation

The distributional range has beenmentioned 500m-2000m a.s.l. (Mitchell 1979; Suwal and erheugt 1995). However, the species has been recorded from 210m a.s.l. (Katuwal et al. in preparation).

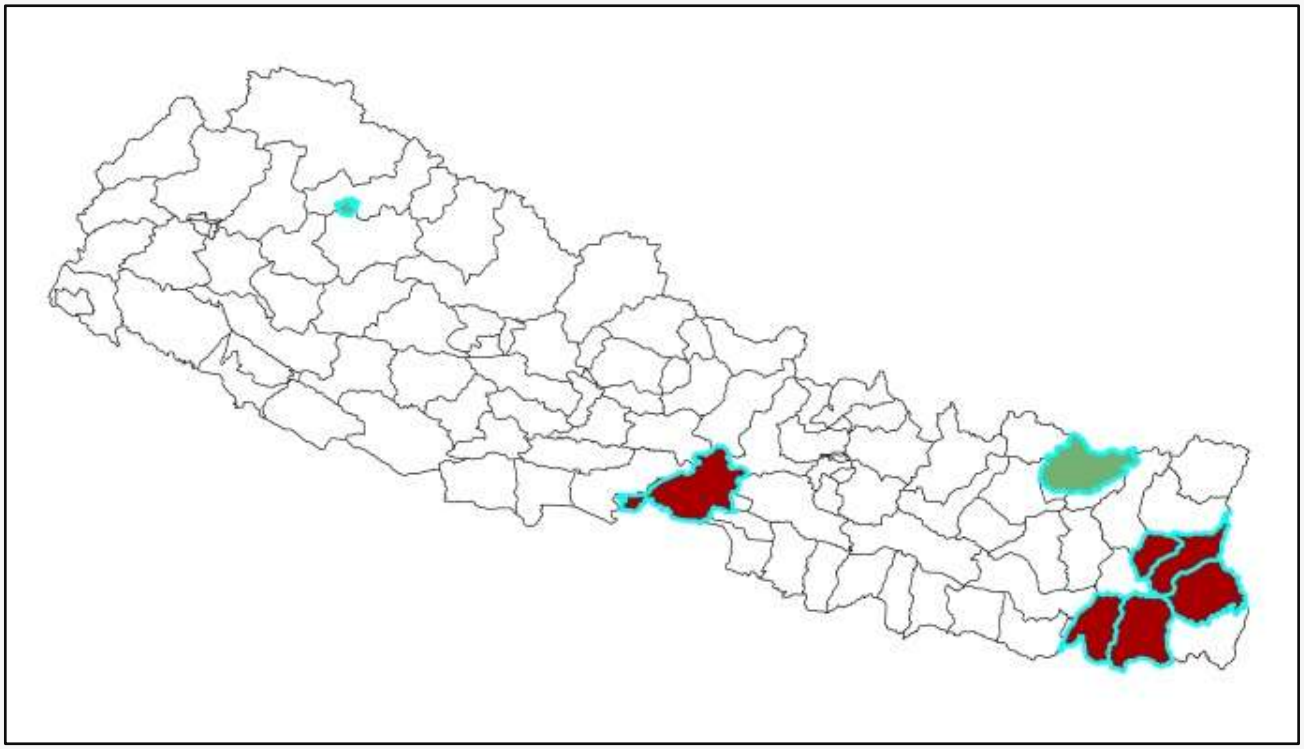


Figure 1Distribution of *Ratufa bicolor*

Habitat

In South Asia, it occurs in tropical and subtropical montane evergreen and dry deciduous forests where it occupies tree hollows in mid high canopy (Molur et al. 2005).In Assam, it is found chiefly in subtropical and tropical forests of the eastern Himalayan foothills. In Eastern Himalaya it is found in the sub-tropical and temperate deciduous forests and in the lower regions and deep valleys of the eastern Siwaliks and Mahabharat foothills (Mitchell 1979).

Black Giant Squirrel *Ratufa bicolor*atPatnali forest, near Dharan,Sunsari District © Vimal Thapa

Habits

In South Asia, it is a diurnal and arboreal species occasionally feeding on the forest floor (Molur et al. 2005; Mitchell 1979). It makes extremely agile leaps of five meters or more from tree to tree. Generally, it occurs singly, but sometimes it is also found in pairs. Its most common call is loud, harsh crackle. It feeds upon fruit, nuts, tree bark, insects and bird eggs. Gestation period ranges from 28 to 35 days. The young are born and reared in large globular drey made up of twigs and leaves. In December, these nests are quite conspicuous in deciduous forests around the Darjeeling area. One to two young are born in each litter (Mitchell 1979). The species has long generation time of eight to nine years (Walston et al. 2008b).

Threats

This species seems generally not very tolerant to habitat alteration (Walston et al. 2008b), therefore, human induced habitat degradation due to shifting (jhum) agriculture practices, small-scale logging, clear-cutting, forest fires, expansion of human settlement, harvesting for local consumption are major threats for this species in South Asia (Molur et al. 2005). Habitat loss due to clearing of forest areas for agriculture and livestock grazing, poaching for trade and subsistence and persecution are major threats to this species in Nepal (Jnawali et al. 011). It is the victim of retaliatory killing and people believe it to be a pestat MBNP, Sankhuwasabha district (Dahal and Thapa 2010).

Hide of *Ratufa bicolor* at a household in MBNP © **Badri Vinod Dahal**

Belomys pearsonii(Gray, 1842)

Common name: Hairy-footed Flying squirrel

Nepali name: झुसेंराजपंखी लोखर्के (Baral and Shah, 2008)

Sciuropterus pearsonii Gray, 1842: 263. Darjeeling, India.

Conservation status

Global: Data Deficient (Duckworth and Molur 2008)

South Asia: Least Concern (Molur et al. 2005)

National: Data Deficient (Jnawali et al. 2011)

Size: HB: 200-490mm, **T**: 110-460mm

Description

This species is smaller in size. Dorsal pelage is dark brown, rufous brown to reddish brown with hair tips profusely grizzled white in color. The fur is soft and long. Furs in the gliding membranes are evidently darker or almost black at the tip and ferruginous brown at the base. Feet are generally paler (dark greyish) and are covered with long hair which partially conceals the claws.The ventral pelage is paler (fulvescent white). However, gliding membrane is ferruginous brown ventrally. Its muzzle is whiskered. A tuft of long hairs at the base of each pinna is present. The tail is apparently shorter than head body size, flat and broad, bushy throughout.The tail is rufous brown often with black tipped hairs dorsally and greyish white ventrally. Females have three pairs of mammae. Molar patterns resemble that of *Hylopetes*, except that the ridges are more deeply grooved, wrinkled, and excavated. Dental formula= i: 1/1; c: 0/0; pm: 2/1; m: 3/3=22.

Hunted individual *Belomys pearsonii* (dorsal view)at Singdi Village, Lamjung District ready to be butchered (note: a Khukuri knife and a vessel at right down corner) © **Hemanta Dhakal**

Distribution

S.N	Place (Locality)	Reference
1	RNP	Suwal and Verheugt 1995
2	Kasuwa khola (27° 40′ N 87° 15′ E) at an elevation of 2120m a.s.l., Sankhuwasabha District	Mitchell 1979
3	RNP; Previously recorded from CNP	Jnawali et al. 2011
4	near Num (FMNH 114640; 114641) (as *B.p. pearsoni*)	Pearch 2011
5	Singdi village, Lamjung District	Hemanta Dhakal pers. observ.
6	In between Gum Pul (bridge) to Lokpa, on the way to Tsum Valley, MCA	Seejan Gyawali pers. observ.

The distributional range is 1500-2438 m.a.s.l. (Mitchell 1979).

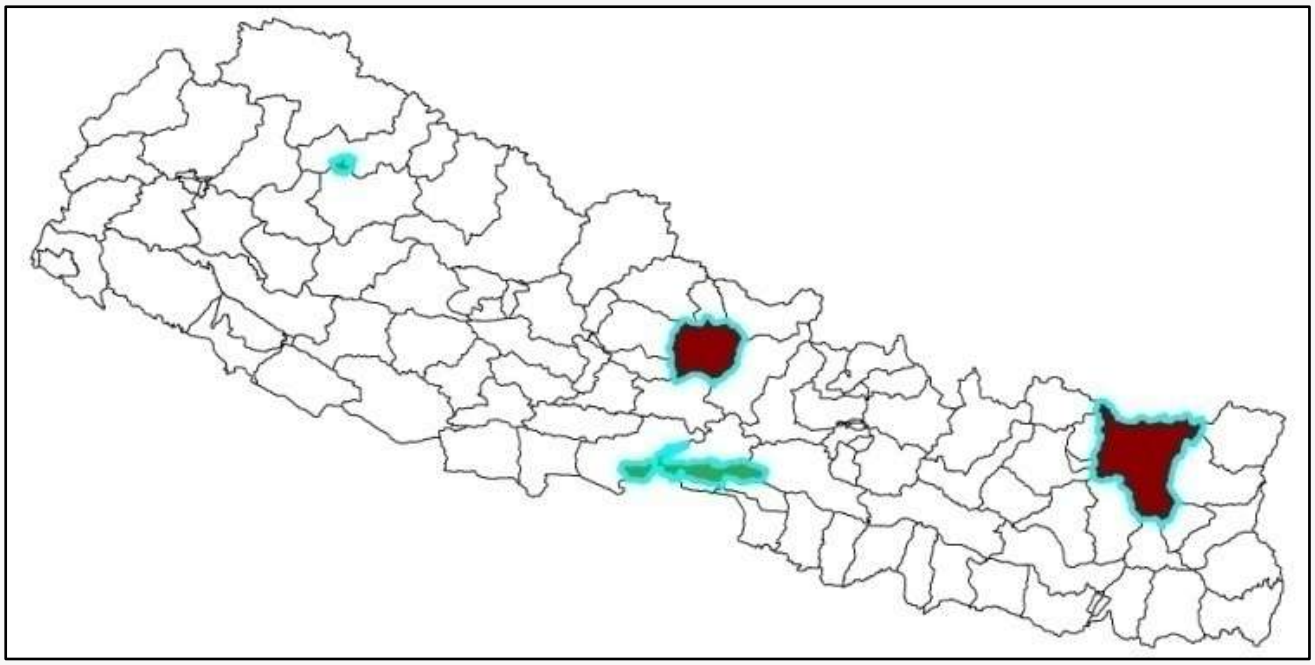


Figure 2 Distribution of *Belomys pearsonii*

Habitat

It inhabits primary dense mixed temperate broadleaved forests (*Lithocarpus-Quercus-Michelia*) and *Castanopsis-Quercus*) in the mid-hills of the eastern Himalaya (Mitchell 1979). It also occurs in temperate and subtropical dry deciduous forests. It can be found in secondary forests and plantations

in Thailand (Humphrey and Bain 1990). It has been found to occupy tree hollows of dense broadleaved forest patches and also in rock crevices (Molur et al. 2005).

Habit

It is a nocturnal and arboreal species. In each litter one or two young are born. The generation time is longer (probably five to six years).

Threat

In South Asia, habitat loss caused by unmanaged logging and land use land cover change (to agricultural lands), shifting (jhum) cultivation, forest fires, monoculture plantations and hunting for subsistence consumption are major threats to the species (Molur et al.2005; Duckworth and Molur 2008). Habitat loss, forest fires, monoculture plantations and hunting for local consumption are major threats to the species in Nepal (Jnawali et al. 2011). An individual was killed and flesh was consumed by local household at Singdi Village, Lamjung District in 2014 (Hemanta Dhakal pers. comm.).

Hunted Hairy-footed Flying Squirrel (ventral view)at Singdi Village, Lamjung District © **Hemanta Dhakal**

A dead Hairy-footed Flying Squirrel on the way to Tsum Valley, Manaslu Conservation Area © **Seejan Gyawali**

Hylopetes alboniger(Hodgson, 1836)

Common name: Particolored Flying squirrel

Nepali name:मालेराजपंखी लोखर्के(Baral and Shah, 2008)

Sciuropterus alboniger Hodgson, 1836: 231. "Central and Northern regions of Nipál".

Conservation status

Global: Least Concern (Duckworth et al. 2008b)

South Asia: Near Threatened (Molur et al. 2005)

National: Least Concern (Jnawali et al. 2011)

Size:HB: 192.1-300mm, **T**: 164.0-300mm, **HF**: 38.6 45.8mm, **E**: 28.8-32.2mm

Description

The species is notably smaller than *Petaurista*. It has soft and dense moderately long fur. It has dorso-ventrally flattened tail. Dorsal pelage ranges from greyish, greyish brown or reddish brown to rufous brown with white to pale patches at the shoulders. The dorsal fur is dark (ashy or black) at the base and drab at the tip. The ventral pelage exhibits a generally grey effect with hairs mostly bluish-grey but white at throat and chest. Base of the ventral fur is dark grey. According to Blanford (1891) juveniles are black coloured dorsally and white coloured ventrally. Tail is brown typically mixed with black and sometimes a long black terminal portion present. Feet completely brown, dark or dark with toes

Accidently killed juvenile Particoloured Flying Squirrel *Hylopetes alboniger* at Bhustung Village, Syangja District

© **Robin Rana**

Distribution

Place (Locality)	Reference
Sipari (Shivapuri??)	Hinton and Fry 1923
Sipuri (Shivapuri)	Ellerman 1961
Kaldapeh, Sindhupalchowk District (28° 03′ N 85° 35′ E) at an elevation of 2478m a.s.l.	Mitchell 1979
ACA, MBNP, CNP and RNP	Suwal and Verheugt 1995
Kaldapeh (FMNH 105547, FMNH 105548, FMNH 112561) (all as *H. a. alboniger*)	Pearch 2011
MBNP	Ghimire et al. 2011
Across Nepal and within ACA, DHR, SWR, CNP, SNNP, MBNP, RNP.	Jnawali et al. 2011
Bhustung village, Birgha Archale V.D.C., Palpa District	Robin Rana pers. comm.

The distributional range is over 1500-3300m a.s.l. (Mitchell 1979; Suwal and Verheugt 1995).

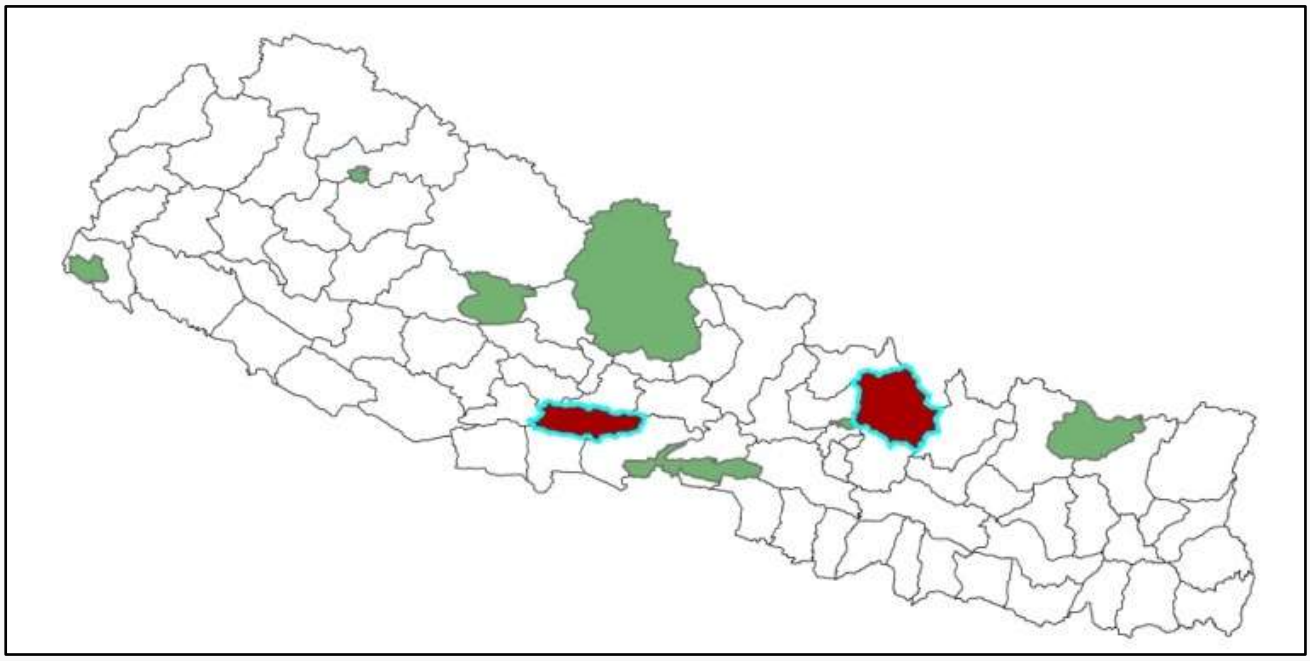


Figure 3 Distribution of *Hylopetes alboniger*

Habitat

It is found in tropical and subtropical montane forests, and in more temperate oak and rhododendron forests at middle to high elevations (Duckworth et al. 2008b). Populations can be found in primary

primaryforests as well as secondary, degraded forests and scrubby habitat. It has been reported from mid-hilly oak-rhododendron forest (Mitchell 1979) of ACA, MBNP, CNP and RNP (Suwal and Verheugt 1995).

Habits

This is an arboreal, shy and nocturnal species. It feeds upon fruit, nuts, buds, saplings and leaves trees. Two to three young are born in each litter from mid-March to June (Mitchell 1979; Molur et al. 2005). It produces high-pitched trill or repeated scree! It breeds in late January to early February. Sometimes it is found nesting in a hollow oak about 10m above the ground. The nest is globular made up of oak leaves and ferns lined with fine grasses (Mitchell 1979).

Threats

In South Asia, habitat loss due to shifting (Jhum) agriculture, small wood plantations, mining activities, infrastructure development, establishment of human settlements, construction of dams and forest fires are major threats to this species (Molur et al. 2005) which even is hunted for consumption in certain parts of northeastern India (S. Molur pers. comm.). Habitat loss is the main threat to the species in Nepal (Jnawali et al. 2011). Three juveniles were accidently killed while logging a tree at Bhustung, Palpa District, Nepal (Robin Rana pers. comm).

Accidently Killed juveniles whilelogging a tree at Bhustung village, Syangja District© **Robin Rana**

Petaurista elegans(Temminck, 1837)[1]

Common name: Grey-headed Flying Squirrel

Nepali name:थोप्लेराजपंखी लोखर्के
कैलोटाउकेराजपंखीलोखर्के (Baral and Shah, 2008)

Pteromys elegans Temminck, 1837: XII. Nusa Kimbangan Island, off southern Java.

Sciuropterus caniceps Gray, 1842: 262. Nepal.

Sciuropterus senex Hodgson, 1844: 68. "Nepal: Hills generally,but chiefly the central and northern regions".

Sciuropterus gorkhali Lindsay, 1929: 566. Apoon, Gorkha District, Nepal.

Conservation status

Global: Least Concern (Walston et al. 2008a)

South Asia: Near Threatened (Molur et al. 2005)

National: Data Deficient (Jnawali et al.

Size

HB: 245.8-370mm, **T**: 284-375mm, **HF**: 61.1-70.7mm, **E**: 39.8-46.0mm.

Grey-headed Giant Flying Squirrel seen at Resunga Municipality Ward #11 © **Hari Basnet**

[1]The species authority should be (Temminck, 1837) not (Müller, 1840) (explanation in Pearch 2011).

Taxonomic note: Ellerman and Morrison-Scott (1951) and Ellerman (1961) considered *caniceps* and *gorkhali* to subspecies of *P. elegans*. There is little discernible difference in skull and external measurements between *P. e. caniceps* and *P. e. gorkhali* (Mitchell 1977). Corbet and Hill (1992) regarded *Sciuropterus senex* and *Sciuropterus gorkhali* as synonyms of *Petaurista caniceps*. They separated *P. caniceps* (unspotted dorsal pelage) from *P. elegans* (spotted dorsal pelage). Further taxonomic including molecular investigation is necessary for clarification.

Description:

This species is smaller than *P. petaurista* (and is about two-thirds the linear measurements of *P. magnificus*). It is medium sized flying squirrel with total length 660-700mm. Head is ashy-grey speckled and is considerably greyer than the rump (dark brown). It has large, nearly naked ears. On the shoulders at the base of the ears, it is yellowish. Its dorsal pelage is nearly uniform darker brown and hairs are dark (ashy grey) at the base, while light (rufous brown) at the tips producinggrizzling appearance. Gliding membrane is dark reddish brown and slightly darker than the back or similar to the back. Feet are brown, cheeks are grey. Its nondescript brownish fine bushy tail is longer than head body and is black tipped. The fourth toe is longer. Claws are crescent in shape. The sole of the foot with six plantar pads in total is generally naked but at the fifth toe it is hairy. Ventral pelage is usually rufous, but sometimes it is light chestnut. Females have three pairs (one each pectoral, abdominal and inguinal) of mammae. Dental formula is the same as in *Belomys*, but the teeth structure is different (Mitchell 1979).

In *P. elegans gorkhali*, rump is slightly more yellowish, less greyish; ventral pelage tends to be ochraceous, less whitish; genital regions are pale grey (Ellerman 1961).

Distribution

This species is sympatric with Red Giant Flying Squirrel in mid-hills.

S.N	Place (Locality)	Reference
1	Apoon (Aapoo) and Barpak, Gorkha District (as *Petaurista caniceps*)	Fry 1925
2	Apoon (Aapoo), Sotti danda (Saurpani V.D.C.) (28˚ 01' N 84˚ 37' E) and Barpak (28˚ 00' N 84˚ 50' E), Gorkha District (as *Petaurista caniceps gorkhali*)	Ellerman 1961
3	Phulung Ghyang at an elevation range of 11200ft. (=3414m a.s.l.)-11,400ft. (=3475m a.s.l.) , Newakot (Nuwakot) District, collected by C.O. Maser on 27 May 1967 as	Lewis 1971b
4	*P.e. caniceps*	

5	Thodung (27° 37′ N 86° 22′ E) at an elevation of 2979m a.s.l., Ramechhap District,10 miles E. of Jiri ; Kasuwa Khola (27° 40′ N 85° 16′ E) at an elevation of 3245m a.s.l., Sankhuwasabha District; Phulung Ghyang (28° 07′ N 85° 22′ E) at an elevation of 2360m a.s.l., Nuwakot District (all as *P. e. caniceps*).	Mitchell 1979
6	LNP, ACA, MBNP, Gorkha District	Suwal and Verheugt 1995
7	ACA, MBNP, MCA, Gorkha District	Jnawali et al. 2011
8	Resunga Municipality, Gulmi District	Hari Basnet pers. Obser 2016
8	Thodung, 10 miles E of Jiri (FMNH 105541, FMNH 105542, FMNH 112557, FMNH 112558) (all as *P. e. caniceps*); 15 km East North-East of Chainpur, Sankhuwasabha District (FMNH 114373) (as *P. elegans*); near Num (FMNH 114372, FMNH 114644, FMNH 114369 - FMNH 114371) (all as *P. e. caniceps*); Phulung Ghyang (FMNH 104203—FMNH 104206; Phulung Ghyang (PSM 14767, PSM 14768) (all as *P. e. caniceps*)	Pearch 2011

The distributional range is up to 2100m-4000m a.s.l. (Mitchell 1979; Suwal and Verheugt 1995).

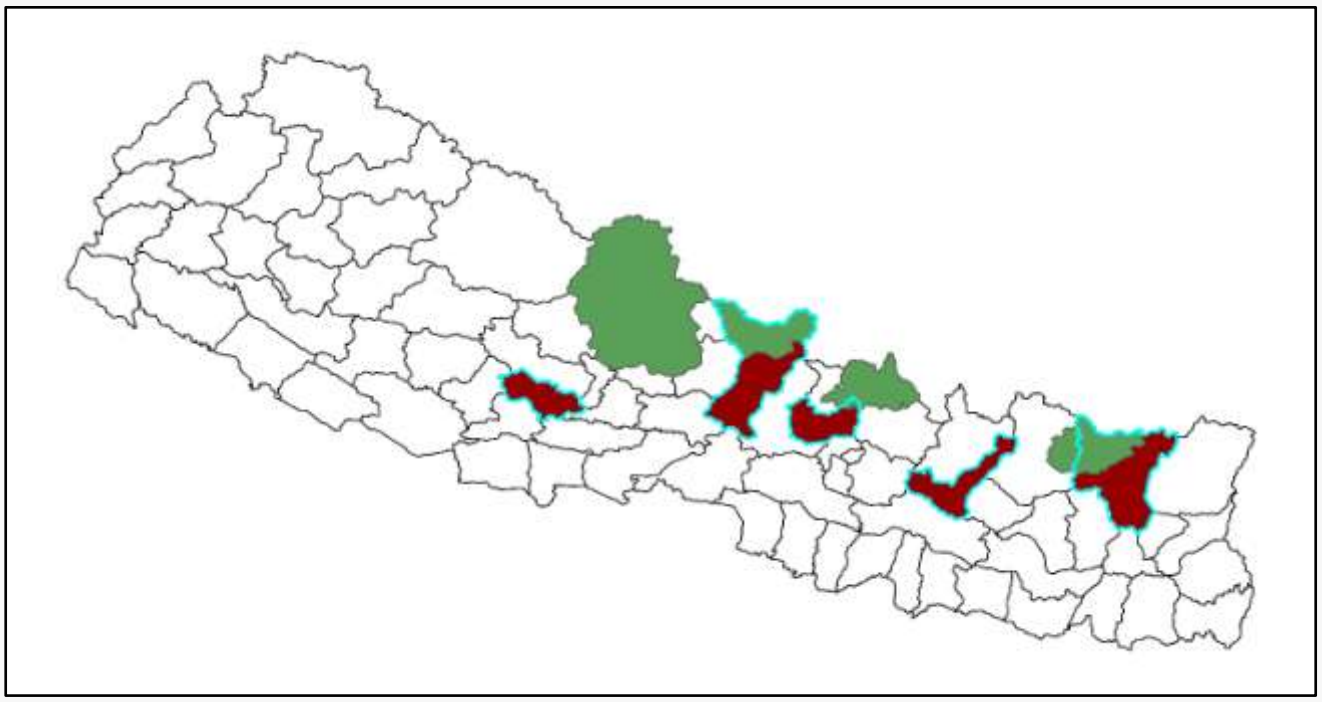


Figure 4 Distribution of *Petaurista elegans*

Habitat

It has been reported from oak-rhododendron forest of central midhills of LNP, ACA, temperate coniferous forest of MBNP, Gorkha district (Suwal and Verheugt 1995). It is found in the temperate and coniferous forests of eastern midlands (Mitchell 1979). It has also been reported from montane

sub-tropical forest in Gorkha District. Although it is found often in rhododendron scrub and on rock cliffs, it prefers tall trees. It nests in tree hollows (Smith and Xie 2008). It has been seen making the nests on the Schima wallichii on the edge of farmland in the Gulmi district. It has been seen feeding on peach, wild small pear and plum (Hari Basnet pers. Obser. 2016).

Habits

It is strictly arboreal and nocturnal in habits. It feeds upon flowers, buds and leaves of rhododendrons and fir cones. It is solitary but occasionally seen in pairs. Litter size is generally one, but sometimes two. Lactation was observed during October. It nests in hollows of oak trees and also builds dreys made of ferns and leaves in tall rhododendron and fir trees. Its continuous cry, a long drawn-out scree! during the night, is a noticeable characteristics of this species (Mitchell 1979).

Rhodenrdron forest habitat of squirrels in Nangethanti, ACA © **Hari Basnet**

Threats

Cutting down trees nested by the species is a prevailing threat. Other threats to this species in Nepal are unknown.

Petaurista magnificus(Hodgson, 1836)

Common name: Hodgson's Flying squirrel

Nepali name: सुन्दरराजपंखी लोखर्के(Baral and Shah,2008)

पहेंलोधर्केराजपंखीलोखर्के; हड्सन्कोराजपंखीलोखर्के

Sciuropterus magnificus Hodgson, 1836: 231. Central and Northern regions of Nipál

Conservation status

Global: Least Concern (Molur 2010)

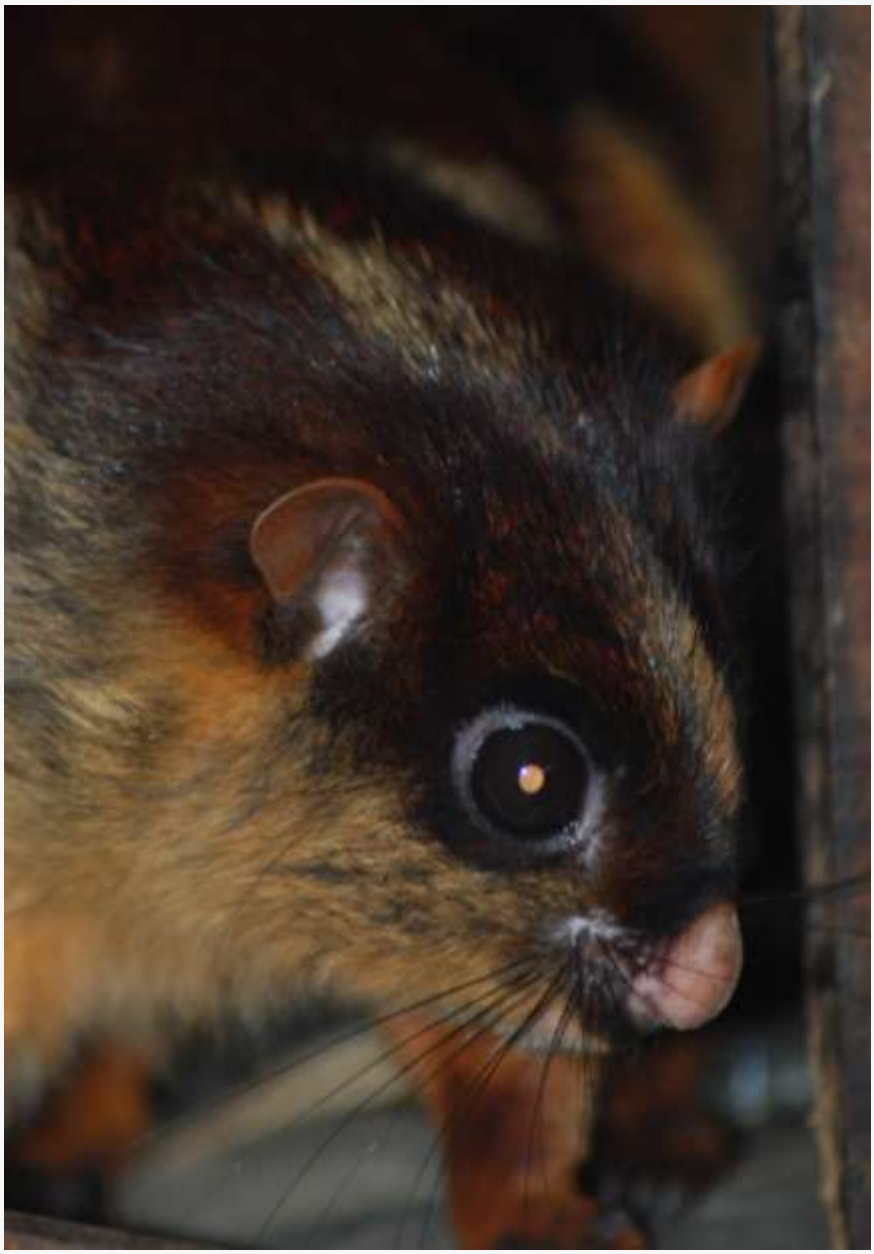
South Asia: Vulnerable (Molur et al. 2005)

National: Data Deficient (Jnawali et al. 2011)

Size:HB: 385.3-420mm,**T**:400-480mm, **HF**:75.5-84.3mm, **E:**31.1-45.9mm.

Description

This animal is larger (about 25%) than *P. elegans caniceps* in size. Colour pattern of individuals varies with season. Seasonal variation can also be observed in the mid-dorsal line, ranging from bright yellow in the summer which gradually fades to dull and even unmarked in winter. In summer generally, rump (back), neck and head above are deep maroon coloured more or less marked by bright yellow to yellow mid-dorsal line, commencing with a broad spot on the forehead. Sides of neck, inner joint of parachute to body are yellowish buffy while remainder part of gliding membrane is rufous to chestnut often. Dorsally, middle of neck and rump (back) are always strikingly darker than the sides and gliding membrane.



Captive Hodgson's Flying squirrel *Petaurista magnificus* in the vicinity of Dhap pokhari, Ilam District ©**Sanjan Thapa**

However, in winter the mid-dorsal line is faint to unmarked and the head and body is chestnut coloured grizzled with whitish hairs too. Dorsal hairs have whitish tips while base is dark ash coloured. Feet are chestnut or black coloured and tail is rufous coloured and well-marked black tipped. Females have six mammae.

Distribution

S.N.	Place (Locality)	Reference
1	Satthar, Gorkha District	Fry 1925
2	Satthar Hill, Gorkha; Naivacot ? (western Nepal Tarai)	Ellerman 1961
3	Thangme-Kharka, Bigu at an elevation of 3700m, Dolakha District	Weigel 1969
4	Kaldapeh (28° 03′ N 85° 35′ E) at an elevation of 2478m a.s.l., Sindhupalchowk District; Belumchi (27° 56′ N 85° 29′ E) at an elevation of 2270m a.s.l., Sindhupalchowk District; Kasuwa khola (27° 40′ N 87° 17′ E) at an elevation of 3245m a.s.l., Sankhuwasabha District; Mani Gayru (27° 56′ N 85° 31′ E) at an elevation of 2360m a.s.l., Sindhupalchowk District; Num (27° 30′ N 87° 16′ E) at an elevation of 2340m a.s.l., Sankhuwasbha Distict; Nangetanti (28° 22′ N 83° 44′ E) at an elevation of 2507m a.s.l., Kaski District	Mitchell 1979
5	Mangalbare (Sankhuwasabha-Terhathum Districts), eastern Nepal (N 27° 16' E 87° 30') at an elevation of 2668m a.s.l.	Johnson et al. 1980
6	Satheen hills, Gorkha (C. Srinivasulu personally commented this could be misnomen of Satthar hills (Molur et al. 2005) but probably this could be Sotti danda?)	Ghose and Saha 1981
7	ACA, MBNP, RNP, SNP (South to Mt. Everest), and perhaps in LNP	Suwal and Verheugt 1995
8	DilMare (Probably Delmara), Sankhuwasabha District (FMNH 114367); Kaldapeh, Sindhupalchowk District (FMNH 105543—FMNH 105545); Kasuwa Khola, Sankuwasabha District (FMNH 114368); Lumdumsa, Sankhuwasabha District (FMNH 114642); Mahendranagar, Kanchanpur District (FMNH 112560); Mani Gayru, Sindhupalchowk District (FMNH 105546); near Num (FMNH 114364, FMNH 114365, FMNH 114643); Suki Patyl (Probably Sukipati) Forest (FMNH 114366); Tarro Bir (Probably Taare bhir, SNNP) (FMNH 82833); Mangalbare (Sankhuwasabha-Terhathum Districts), eastern Nepal (27° 16' N 87° 30' E) at an elevation of 2668m a.s.l. (USNM 290079)	Pearch 2011
9	Across northern Nepal and within the protected areas of the ACA, LNP, MBNP and RNP	Jnawali et al. 2011
10	In the vicinity of Dhap pokhari (27.02361° N 87.98559° E at an elevation of 1694m a.s.l.), Jamuna V. D.C. ward #2, Ilam District	Sanjan Thapa pers. observ. 2008
11	Panimuhan, Shivapuri Nagarjun National Park	Sabina Koirala and Toshiyuki Kato pers.

		comm. 2015
12	Dolakha District	Rabindra Maharjan pers. comm.

The distributional range is 1800m-3700m a.s.l. (Wiegel 1969; Mitchell 1979; Suwal and Verheugt 1995). The species occurs in sympatric distribution with *P. petaurista*, *P.nobilis* and *P. elegans*.

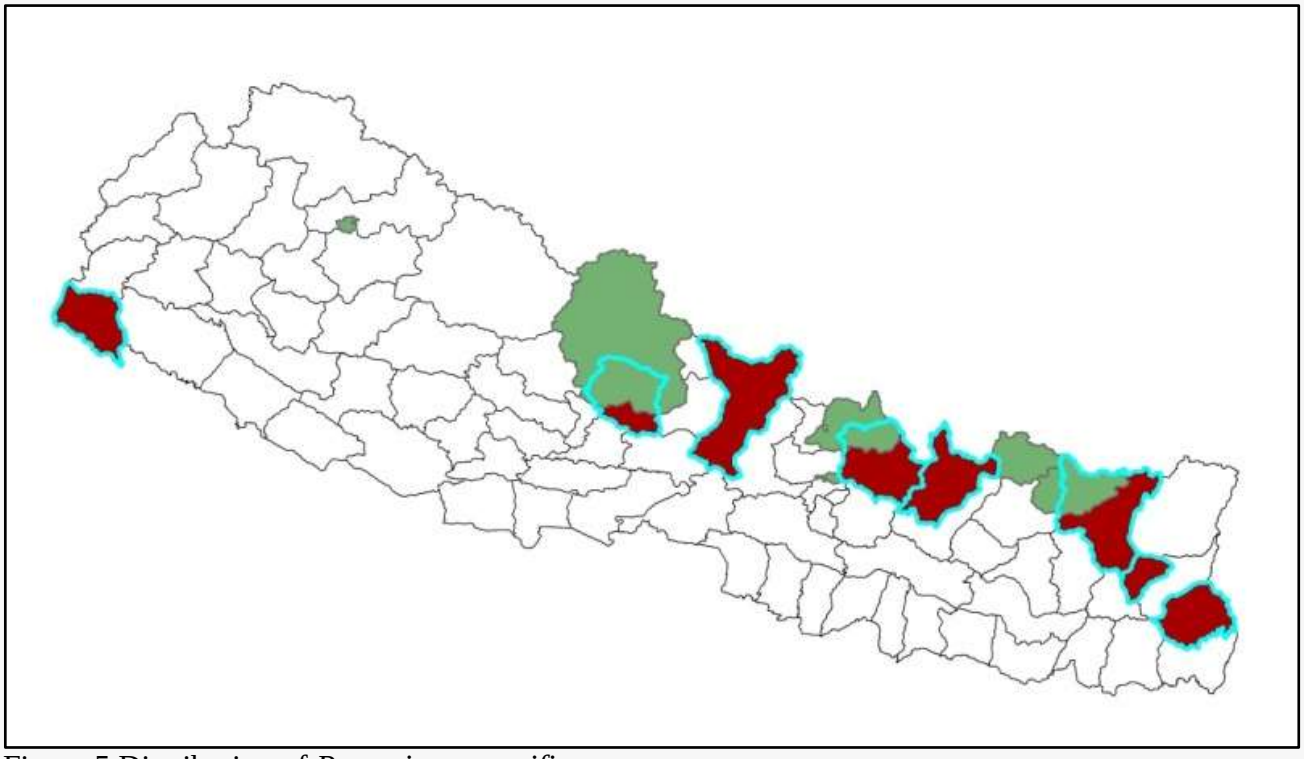


Figure 5 Distribution of *Petaurista magnificus*

Habitat

This species lives in evergreen tropical and subtropical and broad-leaf forests from the lowlands up to 3,000 m (Molur *et al.* 2005). It has been reported from oak-rhododendron forest of midhills of ACA, MBNP, RNP, SNP (South to Mt. Everest), and perhaps in LNP (Suwal and Verheugt 1995). It has also been reported from montane sub-tropical forest of Naivakot (Probably Nuwakot?), Satthar hills (Ellerman 1961) and other parts of Gorkha district at an elevation of 2890m a.s.l. (Ellerman 1961; Mitchell 1979). It seems to prefer deciduous forests (Molur *et al.* 2005; Smith and Xie 2008).

Habit

Generally, nocturnal and arboreal in habit and it feeds upon rhododendron leaves, buds and flowers. It was seen gliding distances of 60 to 100m in oak-rhododendron forest at dusk, during which it used its tail as a rudder. It has its characteristic long drawn-out call "Sreee! Sreee!" during late evening and night. It builds large nests with a round entrance made up of leaves and ferns lined with fine grass in oak trees (Mitchell 1977; 1979). The drey is situated in sub-canopy at a height of 5-15m above the ground (Smith and Xie 2008).

Drey of flying squirrel on a bamboo shoot in the vicinity of Dhap pokhari, Ilam District ©**Sanjan Thapa**

Generally, the species give birth to one (sometimes two) during February and March. Females collected in November bore single embryos 22.7-22.9mm in length (Mitchell 1977; 1979). It has longer generation time of seven to eight years (Molur et al. 2005). In captivity as pet animal it was fed on rice and maize in the vicinity of Dhap pokhari, Jamuna V.D.C. ward#2, Ilam District (Sanjan Thapa pers. observ. 2008).

Threat

In South Asia, the species is threatened by, habitat loss and degradation due to non-timber plantations (cardamom and tea), small-scale logging, human encroachments, forest fires (Molur *et al.* 2005) and hunting for subsistence food (Molur 2010). Habitat loss and degradation is the main threat to the species in Nepal (Jnawali et al. 2011). A female individual with dog bite was found dead from Panimuhan, SNNP (Sabina Koirala pers. observ.). An individual was found in captivity as pet animal in the vicinity of Dhap village Jamuna V.D.C., ward #2, Ilam District.

A locally made wooden cage for captive Hodgson's Flying Squirrel in Dhap pokhari, Ilam Distict © **Sanjan Thapa**

Confiscated hide of *Petaurista magnificus* at District Forest Office Dolakha
© Rabindra Maharjan

Flying squirrel's drey on a *Macaranga pustulata* tree in the vicinity of Dhap pokhari, Ilam District **© Sanjan Thapa**

Up: Dead individual *Petaurista magnificus* from Panimuhan, SNNP measured at NHM, Swoyambhu
© Sabina Koirala

Petaurista nobilis[1] (Gray, 1842)

Common name: Bhutan Giant Flying squirrel

Nepali name:भुटानीराजपंखी लोखर्के(Baral and Shah 2008)

Sciuropterus nobilis Gray, 1842: 263. Darjeeling.

Sciuropterus chrysotrix Hodgson, 1844: 67.

"Hills generally, but chiefly the central and northern regions".

Conservation status

Global: Near Threatened (Thapa et al. 2010)

South Asia: Endangered (Molur et al. 2005)

National: Data Deficient (Jnawali et al.

Size: **HB**490.0mm ;**T** 460.0 mm ;**Mass** 2710.0 g

Bhutan Giant Flying Squirrel *Petaurista nobilis* in captivity in the vicinity of Dhap pokhari, Ilam feeding on rice
© Sanjan Thapa

Description

The species is larger (greater in length) and strikingly dark coloured than that of *P. magnificus* but without the mid-dorsal line. Pelage is thick, woolly, soft and glossy. Dorsal pelage is bright chestnut-brown with hairs pale rufous at the base and yellow at the tip. Shoulders and thighs, ventral part of gliding membrane in between lower limbs and tail is intense orange red. Gliding membrane is larger too. Margin of gliding membrane is ochraceous. Limbs and areas surrounding eyes are black, chin dark, cheeks mixed, a plae golden spot on the nasal bridge. Tail is cylindrical and generally larger than head body; 40-50mm of the tail end is black. Sexes are alike.

Distribution

The distributional range is 1670m-3000m a.s.l. (Suwal and Verheugt 1995). *P. nobilis* and *P. magnificus* are sympatric in distribution in Dhap pokhari, Ilam while former also occurs at same habitat where *P. petaurista* and *P. magnificus* inhabit at SNNP.

[1]**This species is endemic to Bhutan, India and Nepal**

S.N.	Place (Locality)	Reference
1	Tarro Bir (probably Taare bhir, SNNP)	Fry 1925
2	Hills of Nepal, locality unknown	Ghose and Saha 1981
3	ACA and perhaps LNP	Suwal and Verheugt 1995
4	ACA and Possibly LNP	Jnawali et al. 2011
5	In the vicinity of Dhap pokhari (27.02361° N 87.98559° E at an elevation of 1694m a.s.l.), Jamuna V.D.C. ward #2, Ilam District	Sanjan Thapa pers. observ.

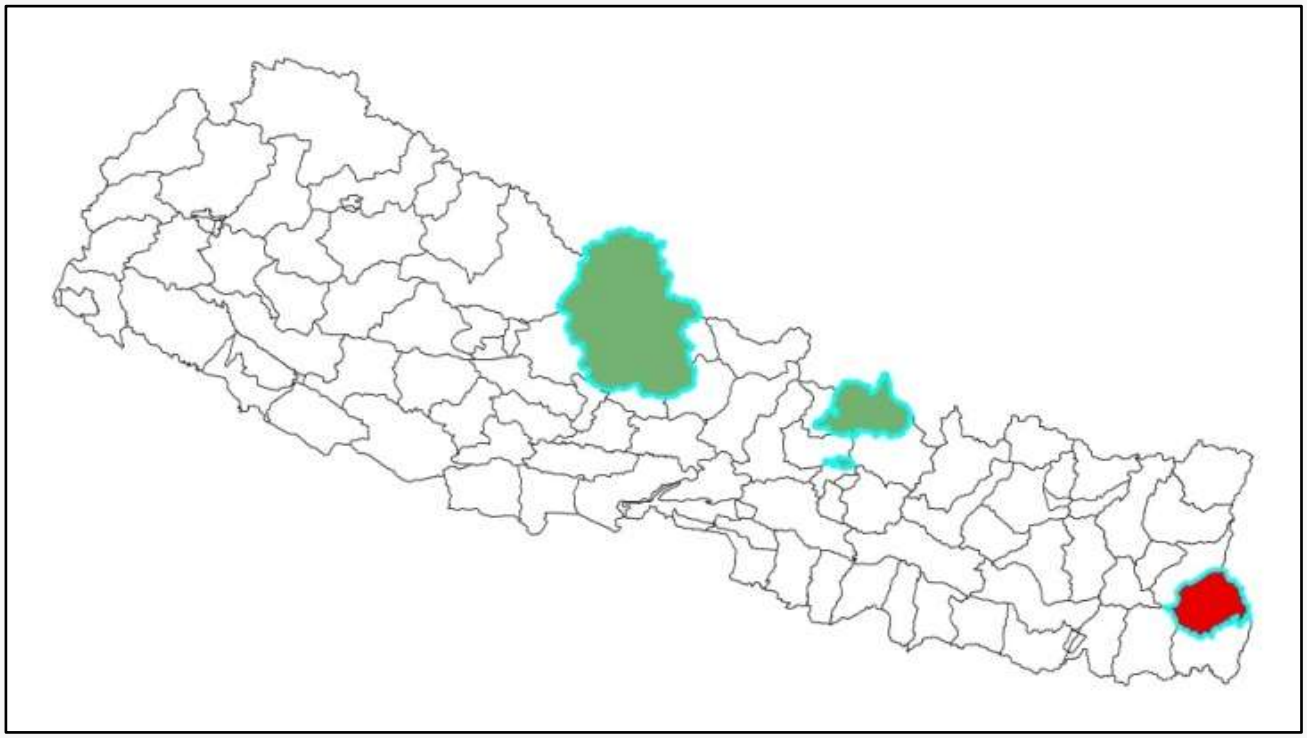


Figure 6 Distribution of *Petaurista nobilis*

Habitat

They are forest dwellers occurring in tropical and subtropical montane forests. They are found in temperate pine and rhododendron forests (Molur *et al.* 2005; T.K. Shreshta pers. comm. 2005).

Habit

It is arboreal and crepuscular/nocturnal in habit. Estimated generation time for this species is about seven or eight years (Thapa et al. 2010). In the captivity as pet animal it was fed primarily upon rice and maize in the vicinity of Dhap pokhari, Jamuna V.D.C. ward#2, Ilam District (Sanjan Thapa pers. observ. 2008).

A pup nesting a flying squirrel's drey at Nagarjun forest © **Tek Gharti Magar**

Threat

This squirrel is threatened by habitat loss and degradation due to logging and mining operations, expansion of human settlements, dam construction, and hunting for local consumption in South Asia (Molur *et al.* 2005). Habitat loss and degradation and poaching for subsistence are the major threats to this species in Nepal (Jnawali et al. 2011). An individual was found in captivity as pet animal in the vicinity of Dhap pokhari, Jamuna V.D.C. ward#2, Ilam District (Sanjan Thapa pers. observ. 2008).

Destruction of habitat of squirrel due to human induced wildfire © **Hari Basnet**

Petaurista petaurista (Pallas, 1766)

Common name: Red Giant Flying squirrel

Nepali name:रातोराजपंखी लोखर्के(Baral and Shah, 2008)

Sciurus petaurista Pallas, 1766: 54. Western Java?[1]

Pteromys nitidus Desmarest, 1818: 403. Java.

Pteromys albiventer Gray, 1834 (in 1830-1835): pl. 18. Nepal.

Pteromys inornatus Geoffroy, 1844: 62. N. India.

Conservation status

Global: Least Concern (Waltson et al. 2008c)

South Asia: Near Threatened (Molur et al., 2005)

National: Least Concern (Jnawali et al. 2011)

Size

HB: 320-490mm, **T**: 380-600mm, **HF**: 74 - 78 mm, **E**: 35.0 - 44 mm.

Red Giant Flying Squirrel *Petaurista petaurista* in captivity at Histan V.D.C., Myagdi District

© Vimal Thapa

[1]Thorington and Hoffmann (2005) state that no type locality is given in Pallas (1766) (Pearch 2011).

Description:

This large gliding squirrel lacks the characteristic colour pattern of *P. magnificus*. Dorsal pelage is reddish chestnut to dark chestnut throughout. Gliding membrane is bright chestnut. The head and back is paler than the gliding membrane. Dorsal pelage has grizzled appearance with abundant white-tipped thick hairs. It is similar to *P. magnificus* regarding the size and cranial features. Ventral pelage is buffy with ochraceous tinge. Feet are usually black, sometimes mixed with red or reddish but always with naked soles. Tail is rufous or brownish to greyish usually with a short black tip. Throat often white and cheeks tend to be white or grey. Female bears six mammae.

Distribution

The distributional range is up to 150m-3000m a.s.l. (Suwal and Verheugt 1995).

S.N.	Place (Locality)	Reference
1	Katmandu (as *Pteromys inornatus* (Geoffroy, 1844))	Blanford 1891
2	Katmandu (as *P. albiventer* Gray, 1834)	Hinton and Fry 1923
3	near Dhangarhi (Dhangadhi), Kailali District (far western Tarai); Gulari, Banke District; near Mahendranagar, Banke District	Mitchell 1977
4	Mahendranagar (28° 06′ N 81° 49′ E) at an elevation of 147m a.s.l., Banke District (as *P. p. albiventer* (Gray, 1834))	Mitchell 1979
5	MBNP, LNP, RNP, BNP, and CNP as well as Ilam, Panchthar, Taplejung and Sankhuwasabha Districts	Suwal and Verheugt 1995
6	ACA, BNP, CNP, LNP, MBNP, RNP and Tarai and mid and high hills of central and eastern Nepal.	Jnawali et al. 2011
7	East of Kaligandaki River, Histan V.D.C. (at an elevation of 2200m a.s.l.), Myagdi District	Vimal Thapa pers. observ.
8	Mardi Himal Trekking Route, Kokar, (at an elevation of 2600m a.s.l.), Lwang Ghalel V.D.C., Kaski District (in ACA)	Mann Shant Ghimire pers. comm.
9	In between Sana Gaun and Mudkhu, SNNP	Rajendra Gurung pers. comm.
10	Near Laukhani Army Post, Chitwan National Park	Balram Chaudhary and Gokarna Khanal pers. observ.

Habitat

This squirrel are found occurring in moist evergreen broadleaf forest, temperate forest, coniferous forests, scrub forest, rocky areas as inland cliffs, mountain peaks (Molur *et al.*, 2005; Smith and Xie 2008).It can be seen in Sal (*Shorea robusta*) forest of the Tarai and the mixed broadleaved forests of the Siwaliks and Mahabharats (possibly rhododendron forests) from 150-1500m a.s.l. (Mitchell 1977; 1979). It was found in and around rocky steep slope with bamboo (nigalo) forest.

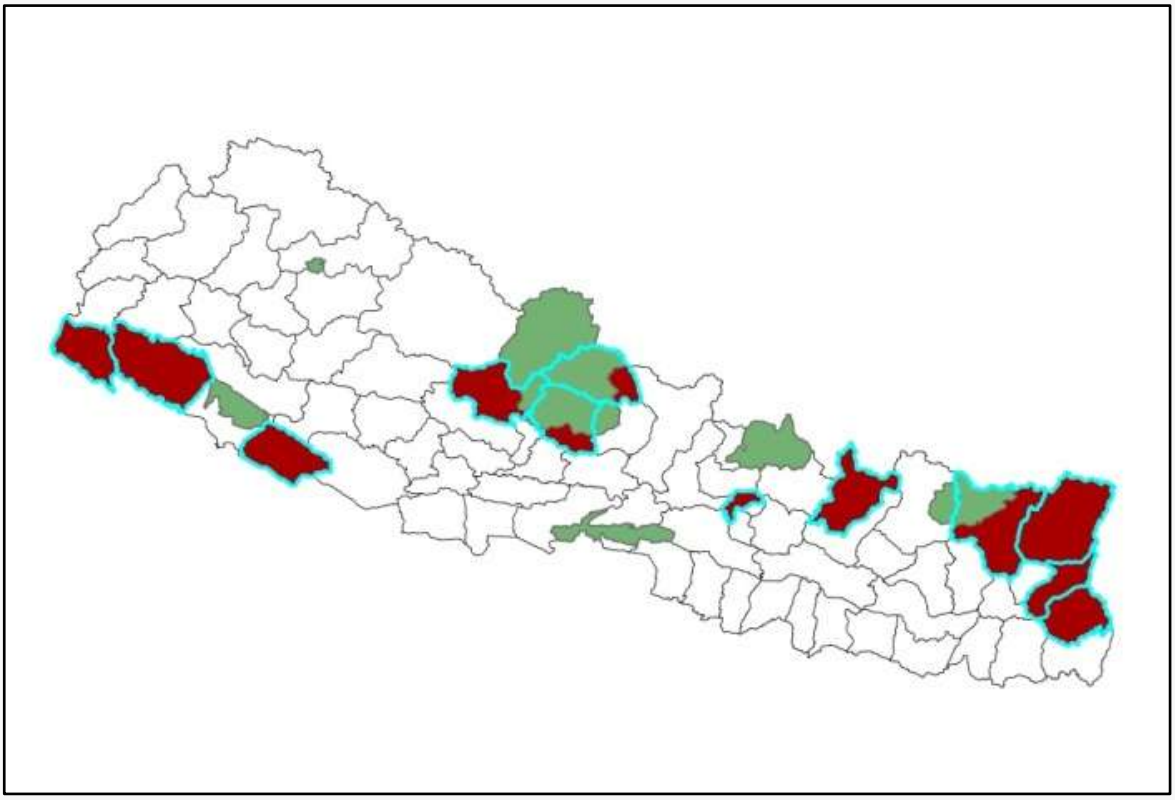


Figure 7 Distribution of *Petaurista petaurista*

Habit

This species is arboreal and nocturnal in habit. It feeds on buds, flowers and fruits of deciduous trees. Knowledge about the breeding biology is scarce, but Blanford (1891) reported that females give birth to one and sometimes two young (Mitchell 1979).

Threat

The squirrel is threatened by habitat conversion due to logging, agriculture, dam construction, infrastructure development and urbanization is occurring throughout the range of the species. In South Asia, it has been harvested for the pet and fur trade (Molur *et al.* 2005). Poaching for fur and pet trade and habitat loss are major threats to the species in Nepal (Jnawali et al. 2011). It was found in captivity as pet animal at Histan V.D.C., Myagdi District (Vimal Thapa pers. observ.). Local people in Taplejung District kill them for flesh and use their skin for decoration (Dahal and Thapa 2010).

A male individual was found dead for unknown reason in forest of Mardi Himal Trekking Route, Kokar (at an elevation of 2600m a.s.l.), Lwang Ghalel V.D.C., Kaski District (in ACA) in March 2015 (Manshant Ghimire pers. observ.). Similarly a dead individual was found at SNNP in between Mudkhu and Sana Gaun (Rajendra Gurung pers. observ.).

Hide of Red Giant Flying Squirrel (ventral view) which was culled for flesh at Taplejung District © **Badri Vinod Dahal**

A stuffed Red Giant Flying Squirrel *Petaurista petaurista* at NINS, Kathmandu © **Sanjan Thapa**

A Juvenile Red Giant Flying Squirrel in Sal forest near Laukhani Army Post, Chitwan National Park

Callosciurus pygerythrus(I. Geoffroy Saint Hilaire, 1831)

Common name: Hoary-bellied Squirrel, Irrawady squirrel

Nepali name:पहाडीवनलोखर्के (Baral and Shah 2008); सेतोपेटभएको वनलोखर्के

Sciurus pygerythrus Geoffroy, 1831 [1831-1834]: 145; pl. 7. Pegu, Burma (Myanmar)[1].

Sciurus lokroides, Hodgson, 1836: 232. Nepal.

Conservation status

Global: Least Concern (Shrestha et al. 2008)

South Asia: Least Concern (Molur et al. 2005)

National: Least Concern (Jnawali et al. 2011)

Size

HB: 147-280mm, **T**: 132-220mm, **HF**: 35-51mm.

Hoary-bellied Squirrel *Callosciurus pygerythrus at* Nagarjun forest, SNNP © **Pratap Gurung**

Description:

It is one of the small sized squirrels found in Nepal. Dorsal pelage is brown, speckled olive brown to dark greyish coloured. Limbs are usually dark grey. Seasonally a hip patch is present, light to bright red, reddish and even yellowish in color. Hairs in the dorsal pelage are dark at the base, pale yellowish and black at the tip. Muzzle is blunt so is the tail. Ventral pelage is generally greyish, brownish white to creamy. The tail is olive brown dorsally with its hair annulated to form alternating bands of black to blackish and yellowish to white. Females have two pairs of

Distribution

The northern part of their range overlaps slightly with that of *Dremomys lokriah*. The distributional range is from the Tarai (lowland) to 1500m a.s.l. (Suwal and Verheugt 1995).

[1]Thorington & Hoffmann (2005) follows a revision by Moore & Tate (1965), and suggests the species authority should be: "(I. Geoffroy Saint Hilaire, 1833)"; and the type locality should read: "from forest of Syriam,near Pegu, Burma". The 1831 date is followed here on chronological grounds (Pearch 2011).

S.N.	Place (Locality)	Reference
1	Bankalwa, Sunsari District; Chalna-Khel; Hathiban; Hazaria 26º51'N, 85º20'E" at an elevation of 91m a.s.l., Rautahat District; Hetwada (Hetauda); Kathmandu; Loharipavda (probably Laharepauwa, Rasuwa District); Nowakot (Nuwakot); Sunachir (in Rapti Valley) (Probably Sunachuri in Makwanpur District) (all as *Tomeutes lokroides*)	Hinton and Fry 1923
2	Chengli (Probably Chyangli, Gorkha District); Hathiban 5000' 27º38'N, 85º14'E at an elevation of 1523m a.s.l.; Kuwapani (Gorkha District or Kathmandu District??) (all as *Tomeutes lokroides*)	Fry 1925
3	Rapti Tal (Lake) (Chitwan) (as *C. p. lokroides*)	Weigel 1969
4	Singaul, (Russian Camp) (Probably Bharatganj Singaul in Bara District)	Chesemore 1970
5	Hetauda (27° 27′ N 85° 04′ E) at an elevation of 549m a.s.l.; Trisuli (Bidur) (27° 56′ N 85° 08′ E) at an elevation of 546m a.s.l.; near Chainpur, Sankhuwasabha District (27° 20′ N 87° 24′ E) at an elevation of 721m a.s.l. (as *C. p. lokroides*)	Mitchell 1979
6	Dharan Bazar (304m a.s.l.); Dhankutta (1280m a.s.l.) and Chatara (152m a.s.l.)	Jhonson et al. 1980
7	Langtang National Park	Green 1981
8	Trisuli (Bidur) (620m a.s.l.)	Abe 1971; 1982
9	½ mile West of Hitaura (Hetauda) (FMNH 104185—FMNH 104187, FMNH 104189—FMNH 104194); 1 km North of Tumlingtar airfield (FMNH 114355); 1 mile East of Bharabise at an elevation of 671m a.s.l., Sindhupalchowk District (FMNH 114356, FMNH 114357, FMNH 114637); 1 mile North East of Trisuli (Bidur) (FMNH 104198—FMNH 104201); 1 mile West of Hitaura (FMNH 104188); 4 miles South East of Trisuli (FMNH 57775, FMNH 57779—FMNH 57783, FMNH 104195—FMNH 104197); 5 miles North of Dholalghat (Dolalghat) (FMNH 94107—as *C. p.lokroides*); 12 km. North North-West of Chainpur, Sankhuwasabha District (FMNH 114353, FMNH 114354); Bharabise, Sankhuwasabha District (FMNH 114638); "Kankai Mulch" (Kankai River) (FMNH 94108—as *C. p. lokroides*); near Num (FMNH114352); Riri (Ridi) Bazaar, Gulmi District (FMNH 67300—as *C. p. lokroides*); Tama Khose (Tama Koshi), Kapti, above Veri (Dolakha District) (FMNH 94106—as *C. p. lokroides*); Wana, Sankhuwasabha District (FMNH 114639)	Pearch 2011
10	Chatara (USNM 290077, USNM 290078); Dharan Bazar (USNM 290074); Dhankuta (USNM 290075, USNM 290076) (as *C. p. lokroides*)	
11	4 miles S.E. of Trisuli (PSM 15541, PSM 15542, PSM 15852, PSM 27419); Hitaura (Hetauda) (PSM 14775—PSM 14780); Phulung Ghyang, Nuwakot (PSM 16608)	
12	Nuwakot; Pokharia (Rautahat District??) (YPM) (as *C.p. lokroides*)	
13	ACA, CNP, MBNP and the districts of Doti, Ilam, Kaski, Ramechhap and Sindhuli.	Jnawali et al. 2011
14	Tiger Tops Tented Camps, CNP	Dahal et al. 2011
15	Chhaling, Gundu and Sipadol, Bhaktapur District	Karki 2013

16	SNNP; CNP; MCA; Fulchoki; Ilam; Gorkha; Dhankuta; Suryabinayak Forest; Kavrepalanchowk; ACA; Gulmi; Nuwakot; Jagat, GCA	Katuwal et al. in preparation
17	Madi Rambeni Municipality, Sankhuwsabha District	Sanjan Thapa pers. observ.
18	Barabisse, Sindhupalchowk District; Nuwakot	
19	Resunga Municipality 11, Gulmi, Tansen Palpa, Karuwa Kaski	Hari Basnet pers. Observ.
20	Begnas Lake, Pokhara	Chiranjeevi Khanal pers. comm.

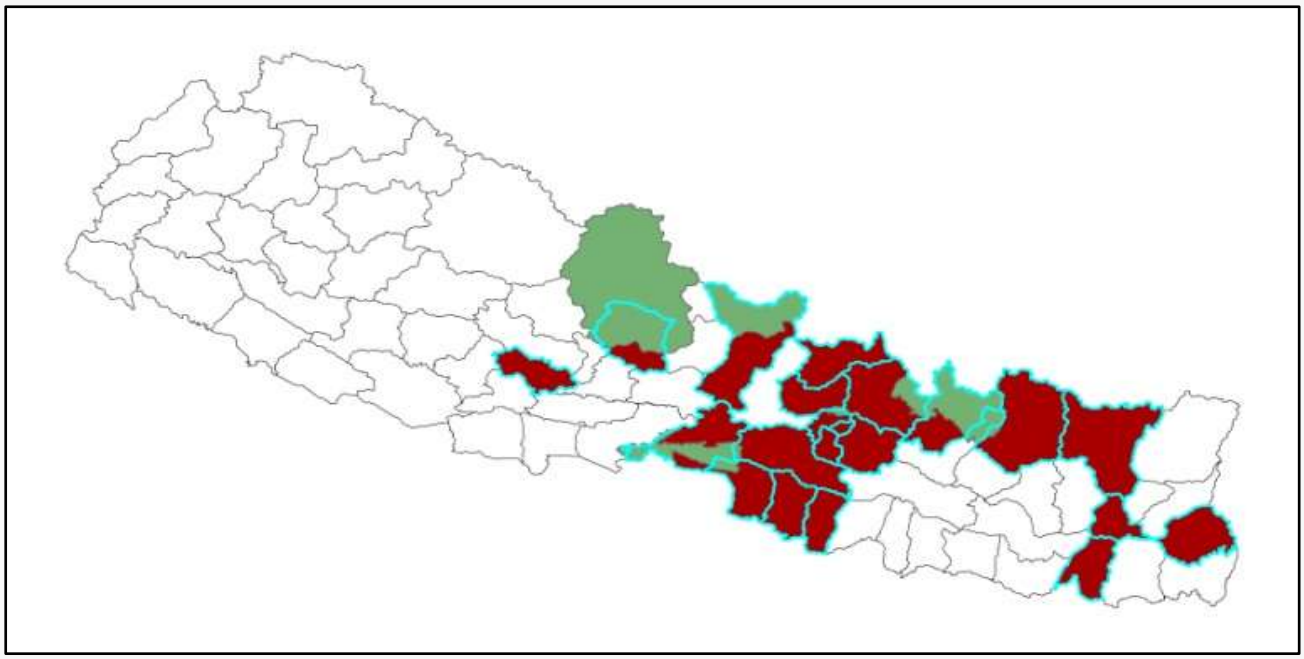


Figure 8 Distribution of *Callosciurus pygerythrus*

Habitat

The species occupies mid canopy temperate, tropical and subtropical moist forest with thick to moderate evergreen forest patches (Molur *et al.* 2005). In Nepal, it has been reported from riverine woodland (Shrestha pers. comm.). It is found throughout the mixed broad leaved forest zone in the central and eastern Siwalik foothills and Mahabharat range of 400-1500m a.s.l. (Mitchell 1979). Habitat dominating bamboo mixed with *Schima wallichii* is the preferred habitat for this species in Chhaling, Bhaktapur District (Karki 2013). Although this species is a forest dweller, it can be encountered in modified and altered habitats such as in settlements and agricultural area (Karki 2013), it has also been recorded from gardens, plantation (including bananas) and cane shrubs in certain parts of Bangladesh and China (Sarkar pers. comm.; Smith and Xie 2008).

Habit

These squirrels show habit similar to those of *Ratufa*. It is a diurnal and arboreal species. Diet consists of seeds, nuts, fruits, buds, flowers and insects (Mitchell 1979), more specifically in insects: ants, lepidopteran larva, and fruits in a stand of mango trees on the river bank (Abe 1971). It is known to live in hollow trees, but is also found building drey generally in bamboo (at Chhaling, Bhaktapur District). It feeds majorly on fruits and nuts in spring, autumn and summer seasons. While during winter it feeds mainly on cereals (wheat) and corns and moss and plant parts are the supplementary diet. It fetched collected water in bamboo and from young twigs (Karki 2013). It gives birth to three or four young (Mitchell 1979) reproducing once in a year (Smith and Xie 2008).

A drey of Hoary-bellied Squirrel *Callosciurus pygerythrus* on bamboo shoot at Chhaling, Bhaktapur District © **Sanjan Thapa**

Hoary-bellied Squirrel *Callosciurus pygerythrus* at Banana plantation at Putalibazzar Syanjha © **Hari Basnet**

Threat

Habitat loss resulting from shifting agriculture, small-scale and selective logging, clear cutting of forest, the establishment of human settlements, forest fires, and hunting for local consumption are some major threats to the species in South Asia (Molur *et al.* 2005). Habitat loss and hunting for local consumption and medicinal purposes are the major threats to the species in Nepal (Jnawali et al. 2011). It is perceived as the pest as they feed on sun-drying cereals and corns at Chhaling,

Dremomys lokriah(Hodgson, 1836)

Common name: Orange-bellied Himalayan squirrel

Nepali name:हिमाली वनलोखर्के(Baral and Shah 2008);

सुन्तला पेटभएको वनलोखर्के

Sciurus lokriah Hodgson, 1836: 232. Central and Northern regions of Nipál.

Conservation status

Global: Least Concern (Molur 2008)

South Asia: Least Concern (Molur et al. 2005)

Size

HB: 146.3-205mm, **T**: 112-220mm, **HF:** 38-47mm, **E**: 18.2-22.4mm

A male Hoary-bellied Squirrel *Callosciurus pygerythrus* at Illam District © **Ramesh Chaudhary**

Description

Dremomys lokriah is similar in size and appearance dorsally to *Callosciurus pygerythrus*, somewhat darker dorsal pelage in former. Former can be distinguished from latter by bright yellow, red to orange coloured ventral pelage. Throat and chest are always bright yellow; red to orange coloured

Orange-bellied Himalayan Squirrel at LNP © **Ramesh Chaudhary**

sometimes reaches to middle of abdomen and even passes gradually
to sides. Dorsal pelage is dark greenish or rufous brown, olive brown and even dark grey. Hair tips finely speckled (tiny mark or spot with contrasting colour). Tail is bi-coloured, dorsally often blackish, olive brown or dark brown throughout with hair base yellowish, black at the middle and hair tips often white. Ventral side of the tail is concolorous to dorsal surface, however, sometimes brown to ferruginous in the middle and black to black mixed with white at sides. Muzzle is less elongated and narrow, according to Ellerman (1940), there is tendency to lengthen the rostrum in *Dremomys*, which is not seen in *Callosciurus*. Characters of baculum support identification of *Dremomys* from *Callosciurus* (Thomas 1915).

Distribution

Distribution of the species is restricted to central and eastern part of Nepal (Mitchell 1977) within a range of 1000-2900m a.s.l. (Lewis 1971; Mitchell 1979).

S.N.	Place (Locality)	Reference
1	Chalna-Khel; Hathiban; "Sheopari Ridge in the Nepal Valley"; Sisagutu (as *Dremomys lokriah*)	Hinton and Fry 1923
2	Satthar; Sipuri (as *D. l. lokriah*)	Fry 1925
3	Satthar hills near from Gorkha District Headquarter	Ellerman 1961
4	Thangme Kharka, Bigu (3600m a.s.l.); Thingsang La (3800m a.s.l.)	Weigel 1969
5	Dhunche (2000m a.s.l.), Bokajhunda (2000m a.s.l.), Kyangjin Gompa (3600-3800m a.s.l.), west of Syng Gomba (2650-2800m a.s.l.), Khurumsang (2500m a.s.l.)	Abe 1971; 1982
6	Namsangsang (28° 03' N 85° 33' E at an elevation of 9500ft. (=2895m a.s.l.), Sindhupalchowk District (collected by R.M. Mitchell)	Lewis 1971a
7	Popti La (27° 46' N 87° 21' E at an elevation of 9600ft. (=2926m a.s.l.), Sankhuwasabha District (collected by K.H. Hyatt on 22 December 1961 as *Callosciurus pygerythrus lokroides*)	Lewis 1971b
8	Gorkha (N 28˚ 01' E 84˚ 37').	Mitchell 1977
9	Melumche (27° 56′ N 85° 32′ E) at an elevation of 2490m a.s.l.; Kaldapeh (28° 03′ N 85° 35′ E) at an elevation of 2478m a.s.l.; Kasuwa khola (27° 36′ N 85° 15′ E) at an elevation of 1910m a.s.l.; Thodung (27° 37′ N 86° 22′ E) at an elevation of 2979m a.s.l.; Phulung Ghyang (28° 07′ N 85° 22′ E) at an elevation of 2360m a.s.l.; Syabru (28° 09′ N 85° 23′ E) at an elevation of 2168m a.s.l.	Mitchell 1979
10	Chandragiri Pass (2286m a.s.l.) and Godawari (2134m a.s.l.)	Johnson et al. 1980
11	LNP	Green 1981
12	ACA, MBNP, RNP, LNP, SNNP, Ramechhap, Solukhumbu and Ilam Districts	Suwal and Verheugt 1995
13	1 km. North of Lumdumsa, Sankhuwasabha District (FMNH 114359, FMNH 114360); 3 miles above Bigu, Dolakha District (FMNH 94110); 5 miles East of Jamnagaon (Jamuna, Ilam District) (FMNH 94111); 6 km. East North-East of Chainpur, Sankhuwasabha District (FMNH 114361, FMNH 114362); Kapti, Dolakha District (27º42'N 86º15'E at an elevation of 823-2,225m a.s.l.) (FMNH 94114-FMNH 94109); Kasua Khola, Sankhuwasabha District (FMNH 114358); Melumche (FMNH 112549—FMNH 112551, collected by R.M. Mitchell); near Num (FMNH 114635, FMNH 114636); Phulung Ghyang, Nuwakot District (FMNH 104202); Sathar, Gorkha District (FMNH 82880, collected by N.A. Baptista) (all as *D. l. lokriah*)	Pearch 2011
14	Chandragiri Pass (USNM 290069—USNM 290071, USNM 290073); Godaveri (USNM 290072) (as *D. l. lokriah*)	
15	Pokhar??? (not located, Pokhara?) (MCZ 57905) (as *D. l. lokriah*)	
16	ACA, MBNP, LNP, SNNP, SNP, KCA, RNP and from the districts of Ilam, Ramechhap and Solukhumbu.	Jnawali et al. 2011
17	MCA; KCA; SNP	Katuwal et al. 2013

18	Phulchoki; Nangethati (ACA)	Katuwal et al in preparation
19	LNP	Katuwal et al. in preparation
20	Nangethali, Banthanti and on the way to Deurali, ACA	Hari Basnet pers. observ.
21	Solukhumbu; Gosainkunda, LNP, Suryabinayak area at Bhaktapur District, Pathivara area at Taplejung District	Hem Bahadur Katuwal pers. observ.
22	Bakangghyang, near Sunchaur, Sindhupalchowk District	Sanjan Thapa pers. observ.
23	on the way to Num, Madi-Rambeni, Hanglung near Chainpur, Sankhuwasabha District	

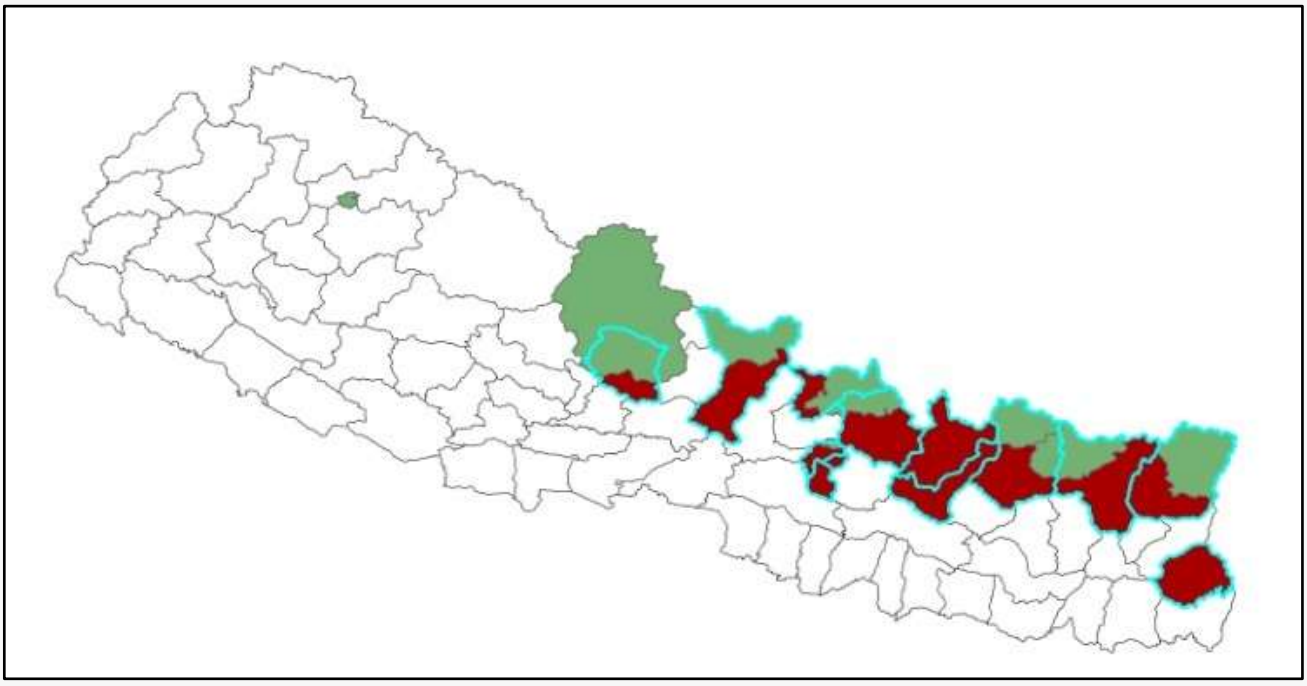


*Figure 9*Distribution of *Dremomys lokriah*

Habitat

It occupies larger hollows in the trees (Baral and Shah 2008) in the mid high canopy of oak, bamboo, fir and pine dense forest patches (Molur *et al*. 2005).

In Nepal, it inhabits montane subtropical oak-rhododendron forests in central mid-hills and subtropical forests of eastern mid-hills (Mitchell 1977; 1979). In Bangladesh it occurs in subtropical montane evergreen and broadleaved forests (also in moist semi deciduous forest) (Sarkar pers. comm.). In China, it has been recorded from rhododendron forests to subtropical forests at lower elevations as well as from high elevations conifer forests (Smith and Xie 2008). This species was also seen inhabiting and foraging in mixed forest with *Schima wallichii* (in lower elevation) and secondary forest in cardamom plantation dominated by *Alnus nipalensis* (in median elevation) at Sankhuwasabha and Sindhupalchowk Districts.

A view of Oak-coniferous and mixed forest at Bakangghyang which is a suitable habitat for *Dremomys lokriah*© **Sanjan Thapa**

Habit

This species is diurnal and arboreal in habit and forages on the forest floor (Molur et al. 2005). It nests in hollow trees and often comes to the ground to collect fruits (commonly observed feeding on the fruits of *Pandanus*

Orange-bellied Himalayan Squirrel carrying walnut on mouth at MCA © **Hem Bahadur Katuwal**

furcatus in eastern Himalayas), nuts and plant materials. Its drey is made up of fern and oak leaves lined with fine grasses. It has characteristic repeated call with sharp, squeaky chatters.

It gives birth to two to five young per litter (Smith and Xie 2008) from May to August. Lactating female was encountered in May, June and August (Mitchell 1977; 1979). Diet mainly comprised of insects and berries. It was observed in group (group of six) or paired in an oak forest at the lower part of the slope on which Syn Gompa is located (Abe 1971). This species was also seen feeding on and even playing with fruit of *Schima wallichii* and nuts such as walnut and chestnut.

Threat

In Nepal, the species is threatened by deforestation and fragmentation of habitat (Shreshta pers. comm.). The same threat prevails in Bangladeshfor this species (Sarkar pers. comm. in Molur et al. 2005). However, in northeastern India they are hunted for consumption (Molur 2008). Habitat degradation and hunting for subsistence are threats to this species in Nepal (Jnawali et al. 2011).

Funambulus pennantii Wroughton, 1905

Common name: Five-striped Palm Squirrel

Northern Palm squirrel

Nepali name: पाँचधर्के लोखर्के (Baral and Shah 2008)

Funambulus pennantii Wroughton, 1905: 411. Mandvi Taluka, Surat District, Bombay Presidency, India.

?*Funambulus pennanti gangutrianus* Ghose, Mandal, & Ghose, 2004: 94. Banaras Cant., Uttar Pradesh

Conservation status

Global: Least Concern (Nameer and Molur 2008)

South Asia: Least Concern (Molur et al. 2005)

Size

HB: 111-144.5mm, **T**: 84.8-156.8mm (generally >100mm), **HF:** 34.9-42.3mm, **E**: 14.2-16.2mm.

Description

Tail is nearly as long as HB or slightly more or less. Dorsal surface of the body has five light (whitish or pale) stripes separated by four dark brown bands. Three pale stripes in centre are very long and broad while two outer edged are relatively shorter and narrower. The two central dark bands on either side of mid-dorsal pale stripe are wider compared to two outer dark bands.

Five-striped Palm Squirrel *Funambulus pennantii* at Keshmahal, Kathmandu © **Vimal Thapa**

General colour of dorsal pelage is brownish or greyish. Head and limbs tend to be greyish but feet is pale often whitish. Sometimes the mid-dorsal pale stripe extends on to the root of the tail. The pale stripes flanking on either side of the mid-dorsal stripe tend to nearly as long. But, the outer two pale

supplementary stripes in general only extend between the arm and hind limb. Ventral pelage is white, whitish, whitish grey to dirty white in colour. Dorsal hairs of hoary tail are whitish or greyish white, flecked with black or blackish alternately and then white terminally. Ventral part of the tail is concolorous to ventral pelage. Females have two pairs of mammae (Mitchell 1979).

Distribution

S.N.	Place (Locality)	Reference
1	Tribinia (probably Tribeni? in Nawalparasi District in Tarai)	Hinton and Fry 1923
2	Naivacot??, Banbassa?? and Tribeni (all in western Nepal Tarai)	Ellerman 1961
3	"Chandranighar Par" (Probably Chandranigahapur, Rautahat District)	Worth and Shah 1969
4	Birgunj, Tekan and Simri (Probably Simra?) in Parsa District	Chesemore 1970
5	Adhavar, The Headquarter of Parsa Wildlife Reserve	Abe 1971; 1982
6	Madhuban (27° 04′ N 85° 06′ E) at an elevation of 65m a.s.l., Bara District; Bahwanipur (Bhawanipur) (27° 57′ N 81° 47′ E) at an elevation of 153m a.s.l., Banke District; Dumkauli (27° 34′ N 85° 05′ E) at an elevation of 143m a.s.l., Nawalparasi District; Mahendranagar (28° 58′ N 80° 13′ E) at an elevation of 212m a.s.l., Kanchanpur District; Hetauda (27° 27′ N 85° 04′ E) at an elevation of 549m a.s.l., Makwanpur District; Sisaiya (28° 55′ N 80° 22′ E) at an elevation of 214m a.s.l., Kanchanpur District	Mitchell 1979
7	1½ miles E. of Hitaura (FMNH 104184); Bahwanipur (Bhawanipur) (FMNH 112547—collected by R.M. Mitchell); Kaneri, 8 miles E. of Bhangadi, Kailali District (FMNH 94112); Madhuban (2) (FMNH 112548—collected by R.M. Mitchell); Simra Airport, 10 miles N. of Birgunj (FMNH 94113)	Pearch 2011
8	Madhuban (27º04'N, 85º06'E at an elevation of 372m a.s.l.) (ROM 74607 and ROM 74608)	
9	Across southern Nepal and in all protected areas of the lowlands.	Jnawali et al. 2011
10	All Tarai and Inner-Tarai (Jhapa, Morang, Sunsari, Saptari, Siraha, Udayapur District); Keshar Mahal, Bansbari (Kathmandu District); BNP	Sanjan Thapa pers. observ.
11	Janaki Mandir, Dhanusa; Kathmandu; Pokhara	Hem Bdr. Katuwal pers. observ.
12	Dang District	Chiranjeevi Khanal pers. comm.
13	Bardia District	Suraj Baral pers. comm.

They are distributed through the Tarai, Duns and Siwaliks at the range of 100-600m a.s.l. (Mitchell 1979). They are even observed from lowlands at an elevation of 70m.a.s.l. to about 1200m a.s.l. in Kathmandu.

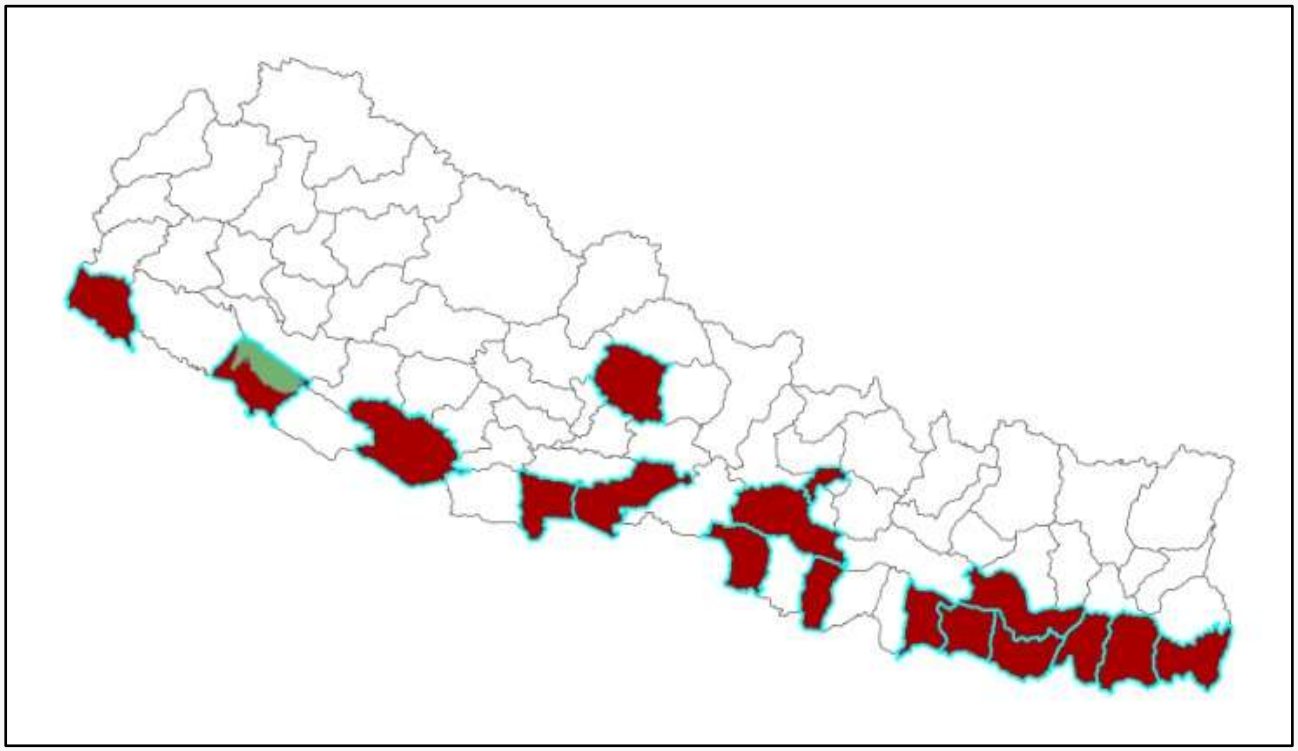


Figure 10 Distribution of *Funambulus pennantii*

Habitat

It's adapted to occur throughout Sal forest in Tarai, villages and orchards and suburbs of cities. It is also found in outskirts of the jungle in the Tarai (Abe 1971). It occurs in tropical and subtropical dry deciduous forest, montane forests, grasslands, scrublands, plantations, arable land, rural gardens, urban areas, introduced vegetation (Molur et al. 2005). However, the population in the vegetated part of cities is decreasing.

Habit

It is diurnal and semi-arboreal in habit (Molur et al. 2005). It feeds upon dropped fruits and nuts as well as directly from the trees. It is gregarious and as many as 10 individuals were sighted in a single tree. It produces characteristic bird-like repeated shrill. It actively forages both on the ground and in trees for seeds, nuts, buds, flowers, and tender shoots (Mitchell 1979). Sometimes, it is also found feeding on nectar, insects and bird eggs (Prater 1965). Its diet comprises of dipteran larvae, coleopteran larvae, berries and seeds. Generally, breeding season begins by the last week of June (Abe 1971; 1982). The gestation period is 40-45 days and litter of two to four young are borne from May to July (Mitchell 1979). Female builds a globular nest (Prater 2005).

A juvenile Five-striped Palm Squirrel *Funambulus pennantii* at Katari, Udayapur District © **Sanjan Thapa**

Male & female Five-striped Palm Squirrel *Funambulus pennantii*at Keshar mahal **© Hari Basnet**

Threat

Habitat loss and poaching for subsistence and pet trade are threats to the species in Nepal (Jnawali et al. 2011). The skins of the animal are used in butti (Tantra Mantra) for traditional healing.

Tamiops macclellandii(Horsfield, 1840)

Common name: Himalayan Striped squirrel

Nepali name:हिमाली धर्के लोखर्के (Baral and Shah 2008)

Sciurus mcclellandii Horsfield, 1840: 152. Assam.

Conservation status

Global: Least Concern (Duckworth et al. 2008a)

South Asia: Least Concern (Molur et al. 2005)

National: Least Concern (Jnawali et al. 2011)

Size :HB: 115-150mm.

Description

Tamiops maclellandii at Deurali, Sankhuwasabha District © **Yadav Ghimire**

It's the smallest squirrel found in Nepal. General dorsal pelage is dull grayish or dull brownish in colour. A narrow prominent black stripe with a narrow pale (whitish) stripe on each side of it runs down from the middle of dorsal surface. Outside to the pale stripe there is dull greyish or buffy stripe in each side which is wider than the black and pale stripes. Whitish to yellowish narrow stripe borders the dull greyish or buffy stripe in each side. Ear is hairy and slightly tufted with tuft black with conspicuous white tip to form a long white pencil. Tail is narrow, fully haired but less bushy and tapering at the end. Tail is generally shorter than HB (rarely larger). Dorsal side of tail has

alternate line of black, pale grayish to dull greyish exhibiting mottled effect. Ventral pelage is pale to dull greyish, whitish and pale buffy, rufous and brownish. Females have three pairs of mammae (Blanford 1891).

Distribution

The distributional range is up to 600m-2000m a.s.l. (Suwal and Verheugt 1995), common between 1500-2000m a.s.l. (Mitchell 1977; 1979).

S.N.	Place (Locality)	Reference
1	MBNP, RNP and Nuwakot district	Suwal and Verheugt 1995
2	Deurali (2100m a.s.l.), near Num (in dense crown cover)	Ghimire et al. 2011
3	Across Nepal and within ACA, MBNP, RNP may be present within the DHR (needs further confirmation)	Jnawali et al. 2011

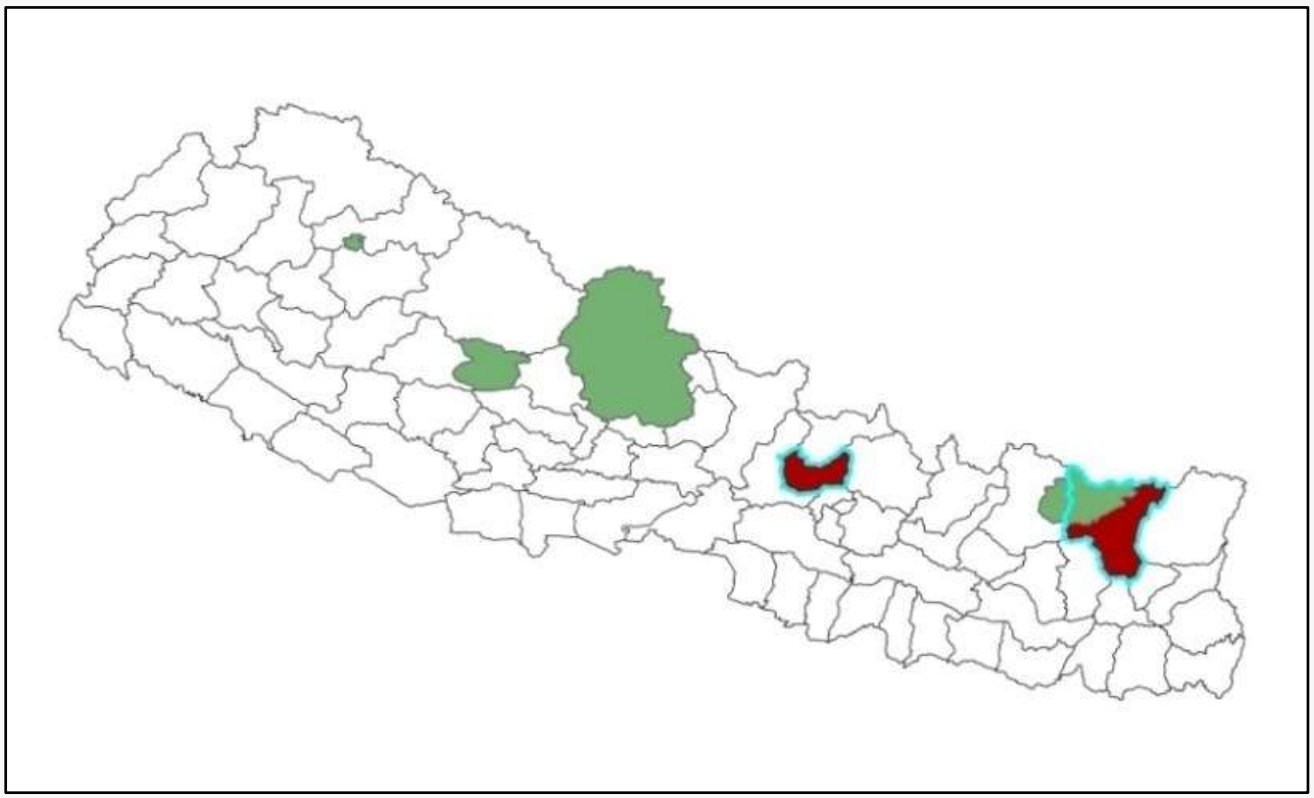


Figure 11 Distribution of *Tamiops macclellandii*

Habitat

It occurs in dense broadleaved montane forests of eastern Himalayas (Mitchell 1977) and is also found in a wide variety of habitats with trees, including secondary growth forest, scrub forest, and gardens. It is highly adaptable to habitat degradation as they are found in human dominated landscape in fruit trees and coconut palm plantations (Smith and Xie 2008).

Habit

It is strictly arboreal (Blanford 1891).

Threat

Habitat loss due to forest fire, encroachments, fragmentation, jhuming (slash and burn agriculture) and hunting is plausible threats for this species in South Asia (Molur *et al.* 2005).

Marmota himalayana(Hodgson, 1841)
Common name: Himalayan marmot
Nepali name:हिमाली फ्याउमुसो(Baral and Shah 2008)

Arctomys himalayanus Hodgson, 1841: 777. "the Himalaya, the Kachar ., and ... the sandy plains of Tibet".

Arctomys hemachalanus Hodgson, 1843: 410.

"Himalaya with the Bhote pergannahs or Cachâr in the immediate vicinity of the snows".

Arctomys tibetanus Gray, 1847: 24. (No locality given).

Arctomys hodgsoni Blanford, 1879: 35. Nepal.

Conservation status

Global: Least Concern (Molur and Shrestha 2008)
South Asia: Least Concern (Molur et al. 2005)
National: Least Concern (Jnawali et al. 2011)

Size

HB: 260-350mm, **T:** 120-155mm

An adult *Marmota himalayana* at SPNP © **Bishnu Devkota**

Description

It has stout body; badger shaped in appearance, with short and rounded ears, and a short and slightly flattened tail (not bushy). Dorsal pelage (body and limbs) is pale greyish tawny (less striking than *M.*

caudata), nearly uniform with black hairs interspersed. Hairs have dark brown base and pale tips. Ventral pelage is paler than dorsal pelage, greyish to pale yellowish. Females have six pairs of mammae (Blanford 1891). Fur is shorter than that of *Marmota caudata*. The cheeks are rufous and the face and terminal third of the tail are dark brown. Tail is considerably shorter than HB (less than one-third of HB). Tail may or may not have dark brown to black tip (terminal third). Forelimb has four fingers; middle finger is slightly greater in length. Thumb is sometime untraceable. Feet are strong with stout and prominent claws for digging. Skull is heavily built with triangular outline, strong and nearly transverse post orbital processes. The dental formula is, i: 1/1; c: 0/0; pm: 2/1; m: 3/3=22. Upper incisors white in colour.

Distribution

The distributional range is 4000-5500m a.s.l. (Mitchell 1977), however can be even found at lower elevation around 3000m a.s.l.

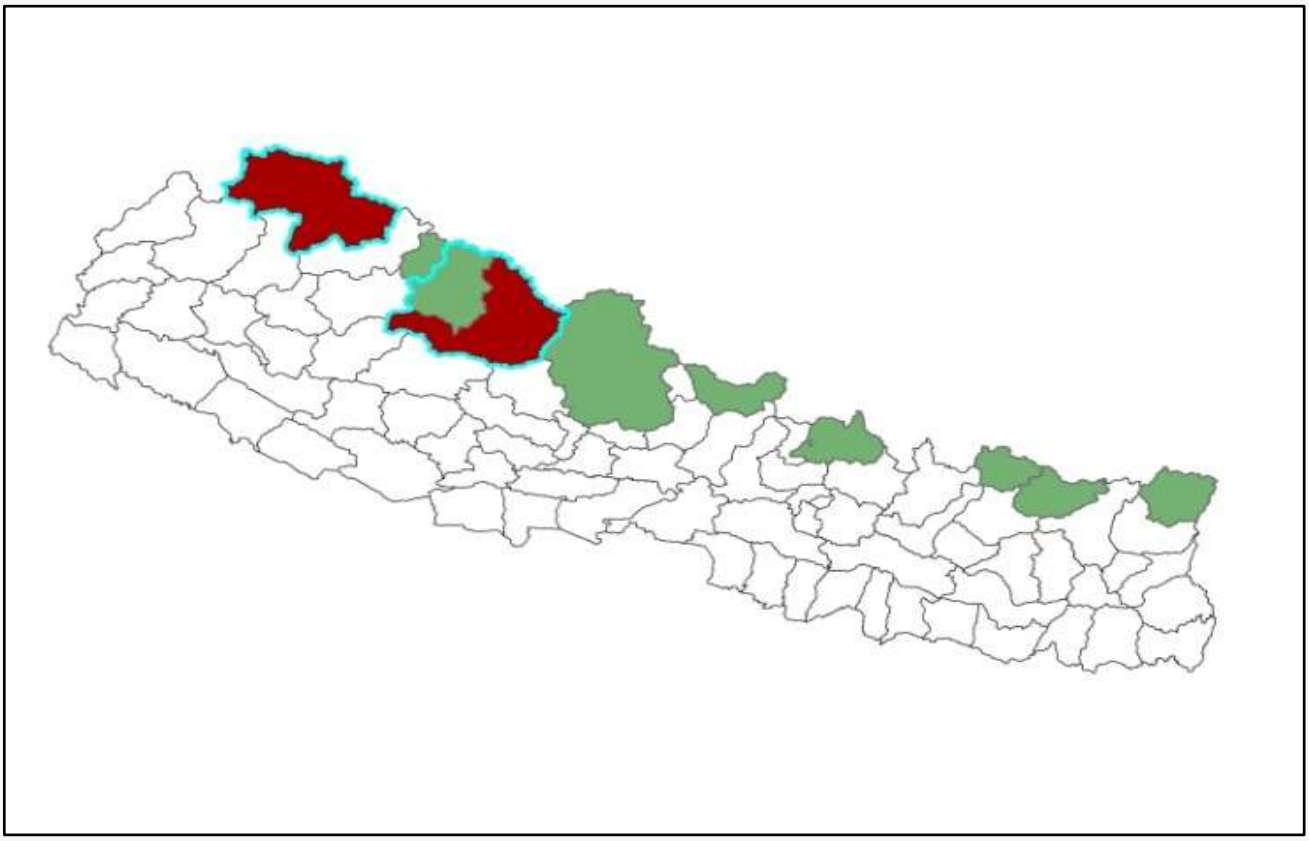


Figure 12Distribution of *Marmota himalayana*

S.N.	**Place (Locality)**	**Reference**
1	ACA, SNP, SPNP, MBNP and Mustang district	Suwal and Verheugt 1995
2	alpine and subalpine areas of Nepal lying between 27º and 28ºN (Manaslu regions, Lower Mustang and Solukhumbu District)	Nikolskii and Ulak 2005
3	Northern border of Nepal, within SPNP, LNP, SNP, ACA, KCA	Jnawali et al. 2011
4	Manaslu Conservation Area (Tsyo, Samagaun, Birendra Taal)	Katuwal et al. 2013
5	Tatagaon at an elevation of approximately 4176m a.s.l. of Vijer VDC of Dolpa District (SPNP); Tsyo (N28 34.275 E84 41.806) at an elevation of 3319m a.s.l. (MCA); Samagaun (N28 35.213 E84 38.496) at an elevation of 3526m a.s.l. (MCA); Birendra Taal (N28 35.772 E84 38.064) at an elevation of 3658m a.s.l. (MCA); Thadodhunga, 30° 7'38.17"N 81°23'31.05"E at an elevation of 4220 m. a.s.l., on the way to Hilsa, Humla District; Yarcha, Dhalung, upper Mustang (29º 12.767' N and 84° 07.564' E) at an elevation of 4765 m a.s.l.	Ghimire et al. *in litt*.2015

Habitat

This species is native to alpine meadows, grassland and desert with very low rainfall, typically inhabiting steep bush-dotted slopes and gentle slopes where soil can be readily excavated (Molur et al. 2005; Smith and Xie 2008). It occasionally excavates deep burrows, which are shared by colony members during hibernation (until March in Mustang). It inhabits the open, rocky ridges of the alpine desert biotope of the mustang district and northern Himalayan arid alpine region in Nepal (Mitchell 1979; Molur and Shrestha 2008).

Habit

It is essentially boreal. Depending on local resources it is found in small or large colonies (Smith and Xie 2008). Its diet comprises of roots, stems and seeds of various plants and grasses. Mating takes place in early spring. Litter size is reported to be two to eleven young, after a gestation period of one month (35 to 42 days). Females become reproductively active only in their second spring (April to June) (Mitchell 1979; Molur and Shrestha 2008).

Threat

Hunting for food and medicinal use, mortality from domestic predators, habitat disturbance resulting from civil unrest, and overgrazing of its habitat by domestic livestock are some threats to the survival of the species in South Asia (Molur et al. 2005).

An adult Himalayan Marmot at Samagaun, MCA © **Hem Bahadur Katuwal**

Burrow of Himalayan Marmot at Samagaun, MCA © **Hem Bahadur Katuwal**

Threats to Himalayan Marmot at Manaslu Conservation Area© **Hem Bahadur Katuwal**

References

Abe, H. 1971. Small Mammals of Central Nepal - Mammalia. *Journal Faculty of Agriculture, Hokkaido University, Sapporo, Japan* 56: 396–403.

Abe, H. 1982. Ecological distributions of small mammals in central Nepal. *Mammalia* 46: 477–503.

Baral, H.S. and K.B. Shah 2008. Wild Mammals of Nepal. Himalayan Nature, Kathmandu, 72-77pp.

Blanford, W.T. 1891. *The fauna of British India. Mammalia*. Taylor & Francis, London. 617pp.

Chesemore, D.L. 1970.Notes on the mammals of southern Nepal. *Journal of Mammology* 51: 162–166.

Corbet, G.B. and J.E. Hill 1992. *The Mammals of the Indomalayan region: A systematic review*. Oxford UniversityPress, Oxford, 488pp.

Dahal, S., D.R. Dahal and H.B. Katuwal 2011. Report on Survey of Small Mammals of Chitwan National Park. A report submitted to National Trust for Nature Conservation, Sauraha, Chitwan, Nepal. 30pp.

Dahal, S. and S. Thapa 2010. An Overview Report on Squirrel of Nepal. Small Mammals Conservation and Research Foundation, New Baneshwor, Kathmandu, Nepal, 17 pp.

Duckworth, J.W., D. Lunde and S. Molur 2008a. Tamiops macclellandii. The IUCN Red List of Threatened Species 2008: e.T21379A9276681. http://dx.doi.org/10.2305/IUCN.UK.2008.RLTS.T21379A9276681.en. Downloaded on 20 February 2016.

Duckworth, J.W., R.J. Tizard and S. Molur 2008b. Hylopetes alboniger. The IUCN Red List of Threatened Species 2008: e.T10600A3203422. http://dx.doi.org/10.2305/IUCN.UK.2008.RLTS.T10600A3203422.en. Downloaded on 19 February 2016.

Duckworth, J.W. and S. Molur. 2008. Belomys pearsonii. The IUCN Red List of Threatened Species 2008: e.T2756A9477117.http://dx.doi.org/10.2305/IUCN.UK.2008.RLTS.T2756A9477117.en. Downloaded on 10 March 2016.

Ellerman, J.R. 1940. The families and genera of living rodents. Vol. 1. British Museum (Natural History), London. 689pp.Ellerman, J. R. 1947. A key to the Rodentia inhabiting India, Ceylon and Burma, based on collections in the British Museum. Part I. *Journal of Mammology* 28(3): 249-278.

Ellerman, J.R. 1961.*The Fauna of India, including Pakistan, Burma and Ceylon: Mammalia, 2nd Edition, Vol. 3; Rodentia (Part 1 & 2)*. Zoological Survey of India. Calcutta, India, 1: 1-482; 2: 483-884.

Ellerman, J.R. and T.C.S. Morrison-Scott 1951.*The checklist of Palearctic and Indian Mammals: 1758-1946.* Trustees of the British Museum (Natural History), London,810pp.

Fry, T.B. 1925.Report No. 37a: Nepal. Bombay Natural History Society's Mammal Survey of India, Burma, and Ceylon. *Journal of the Bombay Natural History Society* 30: 525–530.

Green, M.J.B. 1981.A check-list and some notes concerning the mammals of the Langtang National Park, Nepal. *Journal of the Bombay Natural History Society* 78(1): 77–87.

Geoffroy, I. (1831–1834) Mammifères. *In*: Belanger, C. *Voyage aux Indes-Orientales, par le nord de l'Europe, les provinces du Caucase, la Géorgie, l'Arménie et la Perse, suivi de détails topographiques, statistiques et autres sur le Pégou, les Isles de Java, de Maurice et de Bourbon, sur le Cap-de-bonne-Espérance et Sainte-Hélène, pendant les années 1825, 1826, 1827, 1828 et 1829: la Zoologie*. Bertrand, Paris. 535pp.

Ghimire, Y., R. Acharya, B. Ghimire and V. Koirala 2011. Presence/Absence and Status of Squirrels (Sciuridae) in Makalu-Barun National Park. Proceedings of Second Seminar on Small Mammals Issues, Lalitpur, Nepal, 25-30pp.

Ghose, R.K. and S.S. Saha 1981.Taxonomic review of the Hodgson's giant flying squirrel, *P. magnificus* (Hodgson) (Sciuridae: Rodentia) with descriptions of a new subspecies from Darjeeling district, West Bengal, India. *Journal of theBombay Natural History Society* 78: 93-102.

Ghose, R.K., A.K. Mandal and P.S. Ghose 2004.A contribution to the taxonomy of Indian Five striped Squirrel (*Funambulus pennanti* Wroughton), with description of two new subspecies. *Records of the Zoological Survey of India* 102(3-4): 89-103.

Gray, J.E. 1842. Description of some new genera and fifty unrecorded species of Mammalia. *Annals and Magazine of Natural History* 10: 255–267.

Gray, J.E. 1846. *Catalogue of the specimens and drawings of Mammalia and birds of Nepal and Tibet presented by B. H. Hodgson, Esq., to the British Museum*. London, 156pp. (Dated 1846, published in January, 1847).

Hinton, M.A.C. and T.B. Fry 1923. Report No. 37: Nepal. Bombay Natural History Society's Mammal Survey of India, Burma, and Ceylon. *Journal of the Bombay Natural History Society* 29: 399–428.

Hodgson, B.H. 1836. Synoptical description of sundry new animals, enumerated in the Catalogue of Nipálese Mammals. *Journal of the Asiatic Society of Bengal*, 5, 231–238.

Hodgson, B.H. 1841. Notice of the Marmot of the Himalaya and of Tibet. *Journal of the Asiatic Society of Bengal* 10: 777–778.

Hodgson, B.H. 1844. Summary description of two new species of flying squirrel. *Journal of the Asiatic Society of Bengal* 13: 67–68.

Hoffmann, R.S., C.G. Anderson, R.W. Thorington Jr. and L.R. Heaney 1993.Family Sciuridae, pp. 419-465. In: Wilson,D.E. and D.M. Reeder (eds.) *Mammal species of the World: Ataxonomic and geographic reference*. Smithsonian InstitutionPress. Washington, D.C., 1206pp.

Horsfield, T. 1840. List of Mammalia and Birds collected in Assam by John McClelland, Esq., Assistant-Surgeon in the service of the East India Company, Bengal Establishment, Member of the late Deputation which was sent into that country for the purpose of investigating the nature of the Tea Plant. *Proceedings of the Zoological Society of London* (1839), 146–167.

IUCN 2015. IUCN Red List of Threatened Species. Version 2015.1. <www.iucnredlist.org>. Downloaded on 08 December 2015.

Jnawali, S.R., H.S. Baral, S. Lee, K.P. Acharya, G.P. Upadhyay, M. Pandey, M., R. Shrestha,D. Joshi, B.R. Laminchhane, J. Griffiths, A.P. Khatiwada, N. Subedi and R. Amin. (compilers) 2011. *The Status of Nepal Mammals: The National Red List Series*, Department of National Parks and Wildlife Conservation, Kathmandu, Nepal, viii+266pp.

Johnson, S.D., S.D. Ripley and K. Thonglongya 1980.Mammals from Nepal. *Journal of the Bombay Natural HistorySociety* 77: 56-62.

Karki, R. 2013. Distribution and behavioral ecology of Irrawaddy Squirrel (*Callosciurus pyerythrus*) in urban habitats of Bhaktapur. A Dissertation for the Partial Fulfillment of the Requirements for the Completion of Master's Degree (M.Sc. Part II) in Environmental Science Majoring in Wildlife Management submitted to Central Department of Environmental Science
Tribhuvan University Kirtipur, Nepal, ix+56pp.

Katuwal, H.B., B. Khanal, K. Basnet, B. Rai, S. Devkota, S.K. Rai, M. Nobis and C. Scheidegger 2013. The mammalian fauna from the Central Himalaya, Nepal. *Asian Journal of Conservation Biology*2: 21–29.

Katuwal, H.B., H.P. Sharma, P-J.L. Shaner, R. Gurung, V. Thapa, T.G. Magar, T.B. Gurung, K. Parajuli, M.B. Gurung, H. Basnet, S. Koirala, M.S. Ghimire, S. Yadav , J.L. Belanti and K. Shah (In preparation).Updating Spatial Information of 27 Mammal Species in Nepal.

Lewis, R.E. 1971a. *Rowleyella arborea*, a New Genus of Squirrel Flea from Nepal (Siphonaptera: Ceratophyllidae). *The Journal of Parasitology* 57(6): 1349–1353.

Lewis, R. E. 1971b. A New Genus and Species of Flea from the Lesser Giant Flying Squirrel in Nepal (Siphonaptera: Ceratophyllidae). *The Journal of Parasitology* 57(6): 1354–1361.

Lindsay, H.M. 1929. Scientific results from the mammal survey No. XLIX. A new flying squirrel from Nepal. *Journal of the Bombay Natural History Society* 33: 565–569.

Majupuria, T.C. and R. Kumar [Majupuria] 2006. *Wildlife and Protected Areas of Nepal [Resources and Management]*. S. Devi. Sharanpur, India, 427pp.

Mitchell, R.M. 1977. Accounts of Nepalese mammals and analysis of the host-ectoparasite data by computer techniques. A Dissertation Submitted to the Graduate Faculty in Partial Fulfillment of the Requirements for the Degree of Doctor of Philosophy, Department of Zoology, Iowa State University, xiii+558. Retrospective Theses and Dissertations. Paper 7626. http://lib.dr.iastate.edu/cgi/viewcontent.cgi?article=8625&context=rtd. Downloaded on 03 December 2015.

Mitchell, R.M. 1979. The Sciurid rodents (Rodentia: Sciuridae) of Nepal. Journal of Asian Ecology 1: 21-28.

Molur, S. 2008. Dremomys lokriah. The IUCN Red List of Threatened Species 2008: e.T6821A12808972. http://dx.doi.org/10.2305/IUCN.UK.2008.RLTS.T6821A12808972.en. Downloaded on 19 February 2016.

Molur, S. 2010. Petaurista magnificus. The IUCN Red List of Threatened Species 2010: e.T16721A6315419. http://dx.doi.org/10.2305/IUCN.UK.2010-2.RLTS.T16721A6315419.en. Downloaded on 19 February 2016.

Molur, S., C. Srinivasulu, B. Srinivasulu, S. Walker, P.O. Nameer and L. Ravikumar 2005. Status of South Asian Non-volant Small Mammals: Conservation Assessment and Management Plan (C.A.M.P.) Workshop Report. Zoo Outreach Organisation / CBSG-South Asia, Coimbatore, India, 618pp.

Molur, S. and T.K. Shreshtha 2008. Marmota himalayana. The IUCN Red List of Threatened Species 2008: e.T12826A3386710.
http://dx.doi.org/10.2305/IUCN.UK.2008.RLTS.T12826A3386710.en. Downloaded on 20 February 2016.

Müller, S. 1840. Over de zoogdieren van den indischen archipel. Pp. 35, 36. *In*: Temminck, C.J. 1839–45. *Verhandelingen over de Natuurlijke Geschiedenis der Nederlandsche Overzeesche Bezittingen door de leden natuurkundige commissie in Indie andere Schrijvers*. *Zoologie*. Leiden. 3 volumes.

Nameer, P.O. and S. Molur 2008. Funambulus pennantii. The IUCN Red List of Threatened Species 2008: e.T8702A12926206.

http://dx.doi.org/10.2305/IUCN.UK.2008.RLTS.T8702A12926206.en. Downloaded on 20 February 2016.

Nikolskii, A.A. and A. Ulak 2005. On a range of Marmota himalayana (Rodentia, Sciuridae) in Nepal as the southernmost border of its distribution. Zoologicheskii Zhurnal 84(2): 282–284.

Pallas, P.S. 1766. *Miscellanea Zoologica, quibus Novae Imprimis atque Obscurae Animalium Species Describuntur et Observationibus Iconibusque Illustrantur*. *Hagae Comitum*. Petrum van Cleef, Holland. 224pp.

Pearch, M.J. 2011.A review of the biological diversity and distribution of small mammal taxa in the terrestrial ecoregions and protected areas of Nepal. *Zootaxa* 3072: 286.

Prater, S.H, 2005. *The Book of Indian Animals*. Third Edition. Bombay Natural History Society, Mumbai, India, 194-201pp.

Scully, J. 1879. On Contribution to the Ornithology of Nepal. *Stray Feathers* 8: 204-368.

Shrestha, N., S.K. Sarkar, D. Lunde, W.J. Duckworth, B. Lee, R.J. Tizard and S. Molur 2008. Callosciurus pygerythrus. The IUCN Red List of Threatened Species 2008: e.T3604A9976717. http://dx.doi.org/10.2305/IUCN.UK.2008.RLTS.T3604A9976717.en.

Shrestha, T.K. 1997.*Mammals of Nepal.* Published by Mrs Bimala Shrestha. Kathmandu, Nepal, 371pp+xvii.

Smith, A. and Y. Xie 2008.*The Mammals of China*. Princeton University Press, Princeton, New Jersey, 576pp.

Sparrman, A. 1778. Beskrifning pa *Sciurus bicolor*, et nytt species Ikorn, fran Java. *Handlingar Göthebborgska Wetenskapsoch Witterhets Samhällets* 1: 70–71.

Srinivasulu, C., S. Chakraborty and M.S. Pradhan 2004.Checklist of sciurids (Mammalia: Rodentia: Sciuridae) of SouthAsia. *Zoos' Print Journal* 19(2): 1351-1360.

Suwal, R. and Y.J.M. Verheugt 1995.*Enumeration of Mammals of Nepal.* Biodiversity Profiles Project Publication No. 6. Department of National Parks and Wildlife Conservation. Ministry of Forest and Soil Conservation. His Majesty's Government, Kathmandu, 218pp.

Temminck, C.J. 1837. *Coup de l'oeil sur la faune des Iles de la Sonde et de l'empire du Japon: discours préliminaire destiné àservir d'introduction à la Faune du Japon*. Leiden. 30pp.

Thapa, J., S. Molur and P.O. Nameer 2010. Petaurista nobilis. The IUCN Red List of Threatened Species 2010: e.T16722A6317327. http://dx.doi.org/10.2305/IUCN.UK.2010-2.RLTS.T16722A6317327.en.

Thapa, S. 2014. A checklist of mammals of Nepal. *Journal of Threatened Taxa* 6(8): 6061–6072; http://dx.doi.org/10.11609/JoTT.o3511.6061-72

Thomas, O. 1915. The Penis-bone, or "Baculum", as a Guide to the Classification of certain Squirrels. The Anals and Magazine of Natural History, Series 8, 15: 383-387.

Thorington, R. W., J. L. Koprowski, M. A. Steele and J. F. Whatton. 2012. Squirrels of the World. The John Hopkins University Press, Baltimore, Maryland, U.S.A. 472pp.

Walston, J., W.J. Duckworth, and S. Molur 2008a. Petaurista elegans. The IUCN Red List of Threatened Species 2008: e.T16719A6313283. http://dx.doi.org/10.2305/IUCN.UK.2008.RLTS.T16719A6313283.en. Downloaded on 19 February 2016.

Walston, J., W.J. Duckworth and S. Molur 2008b. Ratufa bicolor. The IUCN Red List of Threatened Species 2008: e.T19377A8872000. http://dx.doi.org/10.2305/IUCN.UK.2008.RLTS.T19377A8872000.en. Downloaded on 19 February 2016.

Walston, J., W.J. Duckworth, S.U. Sarker and S. Molur 2008c. Petaurista petaurista. The IUCN Red List of Threatened Species 2008: e.T16723A6317740.http://dx.doi.org/10.2305/IUCN.UK.2008.RLTS.T16723A6317740.en

Weigel, I. 1969. Systematische Ubersicht uber die Insektenfresser und Nager Nepals nebst Bemerkungen zur Tiergeographie. Ergebnisse der Forschunternehmens Nepal Himalaya 3: 149-196.

Wilson, D.E. and D.M. Reeder (eds.) 2005. Mammal Species of the World, 3rd Edition, Volume 1. The John Hopkins University Press, Baltimore, MD, USA, 2142pp.

Worth, R.M. and N.K. Shah 1969. Nepal Health Survey, 1965–1966. University of Hawaii Press, Honolulu, USA. 158pp.

Wroughton, R. C. 1905. The common striped palm squirrel. Journal of the Bombay Natural History Society, 16: 406–413, 1 pl.

Wroughton, R.C. 1911. Oriental Squirrels of the Pteromys group. Journal of the Bombay Natural History Society 20(4): 1012-1023.

Photoplates

Juvenile Five-striped palm squirrel in Keshar Mahal, Kathmandu © **Kanchan Parajuli**

Himalayan Marmot **© Pratap Gurung**

White-bellied Squirrel at Bhaktapur **© Sanej Prasad Suwal**

White-bellied Squirrel **© Rajan Poudel**

Orange-bellied Squirrel at Nangethali, Annapurna Conservation Area **© Hari Basnet**

Small mammals comprise more than 60 % of all mammalian species found in Nepal but they are not given any importance for their research and conservation. Small Mammals Conservation and Research Foundation (SMCRF), established in 2009, is committed to the research and development of most neglected species of Nepal: the small mammals. "Save Small Mammal - Enrich Biodiversity" is the mission of SMCRF. SMCRF is a non-profit making, non-governmental organization based at Kathmandu, Nepal.

Objectives

- Fund raising and undertaking projects for conservation initiatives and research.
- Organizing workshops/training/seminars and conferences on small mammals.
- Publishing relevant articles of conservationists and researchers through newsletters and journals.
- Support freelancers/students/conservationists technically and financially for the conservation and research of small mammals in terms of the thesis/case studies/individual research.
- Encouraging conservationists in this field with recognition and awards.

Small Mammals Conservation and Research Foundation

P.O. Box 9092, Sundhara, Kathamandu, Nepal

E-mail: info@smcrf.org

www.smcrf.org