

PIKAS IN NEPAL



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Cover Photo:

Front: Nubra Pika at Khaikyuu of upper Dolpa (Photo: Naresh Kusi)

Back (up): Pika (probably Royle's Pika) in the vicinity of Phokshundo (originally Phoksumdo) Lake, Dolpa District (Photo: Bishnu Devkota).

Back (below): A Royle's pika (morphologically similar with Sikkim Pika) at Khaptad Daha, Khaptad National Park (Photo: Raj Prasai)

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Photographs by:

Naresh Kusi, Ashish Shrestha, Hem Bahadur Katuwal, Svetlana Vashkevich, Sanjan Thapa, Badri Vinod Dahal, Hari Basnet, Kiran Maski, Manoj Ayer, Geraldine Werhahn, Bishnu Devkota, Yadav Ghimirey, Rajendra Gurung, Susanne Kühnel, Arjun Thapa, Min Bahadur Gurung, Mary Crosby, Prem Bahadur Budha, Vimal Thapa, Tshiring Lhamu Lama, Tek Gharti Magar, Biraj Shrestha, Raj Prasai

Contributors:

Sanjan Thapa, Hem Bahadur Katuwal, Rajendra Gurung, Naresh Kusi, Bishnu Devkota, Bikram Shrestha, Tulshi Laxmi Suwal

Maps prepared by:

Sanjan Thapa

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Foreword



Government of Nepal
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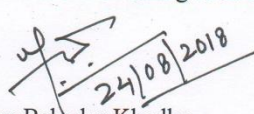


FOREWORD

Nepal is rich in biodiversity which constitutes 4.5 percentages of global mammals. It has been claimed that more than 60% of known mammals of Nepal constitute small mammalian fauna and these are least studied taxa and have, therefore, received least attention towards its conservation. The natural history of these small mammals in Nepal is not well known, especially to that of high altitude occurring species like pika. On the top of that, taxonomy of pika is complex, and so often confused, as a result, species richness and the species of pika has been fluctuating in different periods of time. Pikas are small and adorable animal that belong to the order Lagomorpha and family Ochotonidae.

This book is based on the existing literatures and photographic evidences on the species of pika collected from researchers, tour guides, enthusiasts and local people from different parts of Nepal. The book reports the presence and occurrence of four species of pika hitherto in Nepal. In addition, this book comprehends species profile that includes information on taxonomy, ecology, distribution and threats. I hope this book is crucial and will provide information to all the researchers, conservationists, managers and other concerned people.

I would like to extend special thanks to Small Mammals Conservation and Research Foundation for taking such a great effort in bringing out this valuable publication.


 Man Bahadur Khadka
 Director General

Preface

Small Mammals Conservation and Research Foundation published a report “A Review on Pikas of Nepal” in 2011. There was exceeding need for some corrections and update after publication of “Taxonomic revision of pikas *Ochotona* (Lagomorpha, Mammalia) at the species level” by (Lissovsky, 2014), update of species information sheet by IUCN Red List in 2016 and Handbook of the Mammals of the World. We collected additional information on pikas since 2011 based on literatures and opportunistic photographs from different parts of Nepal. By compiling all the available information, we produce a book on pikas of Nepal. We hope this document will be helpful for government authorities and agencies, academic and touristic purposes. We would like to get feedback and suggestion.

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We would like to express esteem acknowledgements to Dr. Andrew T. Smith, Chair and Red List Authority Focal Point, IUCN Lagomorpha Specialist Group; Dr. Andrey Lissovsky, Research and Scientific Museum of Zoology, Lomonosov Moscow State University, Moscow, Russia for Identification and confirmation, literatures and for review and guidance. We would like to express our sincere gratitude to Dr. Maheshwar Dhakal, Ministry of Forests and Environment; Mr. Man Bahadur Khadka, Director General, Department of National Parks and Wildlife Conservation (DNPWC), Babar Mahal, Kathmandu; Dr. Shant Raj Jnawali, Hariyo Ban Program, WWF Nepal; Mrs. Sarita Jnawali, National Trust for Nature Conservation, Khumaltar, Lalitpur; Mr. Laxman Poudyal, Ecologist, DNPWC; Dr. William J. Duckworth; Dr. Debbie Bartlett, University of Greenwich; Prof. Dr. John L. Koprowski, University of Arizona; Dr. Sanjay Molur and Dr. B.A. Daniel, Zoo Outreach Organization, India; Dr. Gabor Csorba, Hungarian Natural History Museum, Hungary; Dr. Nakul Chettri, ICIMOD; Dr. Sarala Khaling, ATREE, India; Ang Phuri Sherpa, Red Panda Network; Dr. Raj Amin, Dr. Hem Sagar Baral and Dr. Bhagwan Raj Dahal, Zoological Society of London; Dr. Joseph Kolowoski, Smithsonian-Mason School of Conservation; USA; Prof. Dr. Kristopher Helgen, University of Adelaide, Australia for inspiration and encouragements. We are indebted to Malcolm Pearch and Harrison Institute, Kent, UK for providing literatures, Prof. Karan Bahadur Shah for review and comments.

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Abbreviations and Acronyms

ACA	Annapurna Conservation Area
ANCA	Api-Nampa Conservation Area
CAMP	Conservation Assessment and Management Plan
DHR	Dhorpatan Hunting Reserve
FMNH	The Field Museum of Natural History, Chicago, U.S.A.
KCA	Kanchanjunga Conservation Area
KNP	Khaptad National Park
LNP	Langtang National Park
MBNP	Makalu Barun National Park
MCA	Manaslu Conservation Area
MVZ	Museum of Vertebrate Zoology, University of Berkeley, California, U.S.A.
PA	Protected Area
PSM	Puget Sound Museum, Tacoma, Washington, U.S.A. (now known as the James R. Slater Museum or the Slater Museum of Natural History)
RNP	Rara National Park
ROM	Royal Ontario Museum
SNP	Sagarmatha National Park
SNNP	Shivapuri-Nagarjun National Park
SPNP	Shey-Phoksundo National Park
DD	Data Deficient
E	Ear
HB	Head Body
HF	Hind Foot
LC	Least Concern
m asl	metre above sea level
N. E.	north east
sq. m.	square metre

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Introduction

Pikas are small lagomorphs belonging to the monophyletic genus *Ochotona* Link, 1795 and the family Ochotonidae Thomas, 1897. It is clearly differentiated from other lagomorphs and has evolved since early Oligocene. Pika resembles a guinea pig in a general structure (Sharma, 1999). Pikas have shorter hind legs compared to forelegs. Tail is concealed, ears are rounded, the skull lacks supra-orbital bones, and relatively short nasal region consists of a large foramen present on both sides (Smith & Xie, 2008; Chapman & Flux, 1990).

Photo 1: A pika (unidentified species) at Jhong, Muktinath region (Photo: Ashish Shrestha)

Pikas are endemic, small in size, diurnal and non-hibernating herbivores, thriving in some of the most remote landscapes in the Holarctic region (Hoffman & Smith, 2005). Some species inhabit rock and talus; and exhibit generally long life span, and has populations in low density since bear low reproductive rates (Smith & Xie, 2008). The animal is highly territorial with remarkably similar behavioral patterns throughout their distribution range and both sexes uphold their territories by scent marking and vocalization (Chapman & Flux, 1990; Smith & Xie, 2008). Most species stores *haypiles* during the winter. It is prey species for several predators in the higher elevations (Chapman & Flux, 1990).

Pikas in Nepal

There are 28 recognized species of pikas (*Ochotona* spp.) distributed throughout the world (Lissovsky, 2014). Five species of pikas have been reported from Nepal; Black-lipped Pika *Ochotona curzoniae*, Moupin Pika *O. thibetana*, Nubra Pika *O. nubrica*, Large-eared Pika *O. macrotis* and Royle's Pika *O. royllii* (Thapa et al., 2011). However, in absence of voucher specimen of *O. thibetana* from Nepal, Thapa (2014) listed only four species of pikas excluding *O. thibetana* in the checklist of mammals of Nepal.

In contrast, Jnawali et al. (2011) and Amin et al. (2018) have included seven species of pikas; adding Moupin Pika *O. thibetana*, Himalayan Pika *O. himalayana* and *O. lama*. Recently, *O. himalayana* is re-considered subspecies of *O. royllii*. Similarly, *O. lama* is considered a sub species of *O. nubrica*. According to recent researches, *O. thibetana* is confined to China and Myanmar (Lissovsky, 2016). *O. sikimaria* is possibly occurring in Nepal, albeit explicit evidence has yet to be documented.



Photo 2: Royle's Pika on the way towards Dudhkunda from Taksindu, Solukhumbu District (Photo: Hem Bahadur Katuwal)

Distribution of pikas in Nepal

Pikas have been reported from an elevation of 2180 m asl at Ulleri, ACA (Abe, 1971) to 6126 m asl at Nepal-Tibet border (Thomas & Hinton, 1922), however, in Nepal highest elevation record for pika (*O. royllii*) is 5950 m asl from the base of the south western face of the Mt. Makalu (Daniel & Hanzák, 1985), whereas, the highest elevation record for *O. macrotis* is 5630 m asl (at Kalapatthar) (Kawamichi, 1971). Since, *O. macrotis* was found occurring at higher elevations than that of *O. royllii* in the Everest region and the Central Nepal (Kawamichi, 1971).

According to Kawamichi (1971), glacier and ever snow layer above this elevation might have limited their elevation extension, but pikas have been encountered at elevations higher than this at Makalu region as reported by Daniel & Hanzák (1985). It has been recorded from mountainous areas within the habitat range of rhododendron (*Rhododendron* spp.) and oak (*Quercus* spp.) mixed forest, fir (*Abies* spp.) and hemlock (*Tsuga dumosa*) mixed forest, birch (*Betula utilis*) and rhododendron mixed forest, rhododendron and juniper (*Juniperus* sp.) mixed forest to shrubby and alpine meadows. It can be seen in agricultural fields, patans (rangelands and pasturelands), and steep slopes to igneous rocks (slide rocks). It has been recorded from protected areas: KCA, Taplejung District in the east to the ANCA, Darchula District in the west.



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Pikas are not found in the lower elevations.

Kawamichi (1971) recorded pikas based on fecal pellets deposition from an elevation of 2650 m asl.

Abe (1971) reported pika even from lower elevation than this at Ulleri, ACA (2180 m asl). Thermal

condition (temperature) is one of the important limiting factors. However, they can adapt humidity fluctuations (Kawamichi, 1971). Pikas were found

distributed along an elevation range from 2854 m asl at Jomsom to 4632 m asl at Ghakthang (Nepal-Tibet

Border) in ACA based upon observation of signs and the animals. However, maximum occurrence of

pikas was found within an elevation range of 3500-4000 m asl and within less than one km from the

water source. They do not prefer greater slopes.

South east aspect, less crown cover but high ground cover favours the animals (Lama, 2013).



Photo 4: Pika habitat at Phulung Ghyang, LNP
(Photo: Sanjan Thapa)



Photo 5: Pika habitat at Phulung Ghyang, LNP
(Photo: Sanjan Thapa)

There exists elevation segregation between *O. macrotis* and *O. royllii* within 3965-4421 m asl as suggested by 1921 Expedition to Mount Everest reconnoitered from the Tibetan side (Thomas & Hinton, 1922) and also in the southern part of the Great Himalayas from southern side of the Mt. Everest, where the line of segregation coincides with tree line, to the central Nepal (Kawamichi, 1971). However, tree line sometime varies according to aspects from sunny southern to northern shaded slopes (Mani, 1962). For examples, tree line reach 4300 m asl in the northern slope while 3900 m asl in the southern slope at Deboche. On the other hand the line of segregation of both species could not be differentiated at Ummakha valley, Solukhumbu district where rhododendron forests were exclusively predominant (Kawamichi, 1971). But, the tree line was far below the records of the Royle's Pika at a base camp (4900 m asl) on the route to Mt. Makalu (Gregori & Petrov, 1976) and even the records of Royle's Pika are from above of the snow line (Daniel & Hanzák, 1985).

Ridge of the Great Himalayas probably acts as an important geographic isolation barrier for these two species (Kawamichi, 1968; 1971). In addition, rivers channeling from Tibet to the mid-hills such as Bhotekoshi River flowing into Sunkoshi River and glacial ridges of the Great Himalayas acts as effective barrier for the dispersal of pikas (Kawamichi, 1971).

History of studies on pika in Nepal

As for the other taxa of mammals, in Nepal, the history of pika study begins with notes on *Lagomys nepalensis* obtained from Gosainthan by Hodgson (1841). Thomas & Hinton (1922) surveyed *Ochotona* spp. in Tibetan side of the Everest region and recommended for the study in Nepal side (Kawamichi, 1971). Thomas (1922) recorded four new species of pika from other parts of the Himalaya (Mitchell & Punzo, 1975). Hinton & Fry (1923) reported specimens of Royle's Pika (as *O. roylei nepalensis*) from Patibhanjyang, Nuwakot District. Fry (1925) reported specimens of Royle's Pika (as *O. roylei nepalensis*) from Gorkha. Biswas & Khajuria (1955; 1957) published on zoological results of 'Daily Mail' Himalayan Expedition in 1954. They described a new pika *O. angdawi* from Khumbu region of eastern Nepal (Mitchell, 1978). Khajuria (1961) dealt with *O. macrotis* collected from Khumbu (Solukhumbu) District during Indian Expedition to Mt. Cho oyu. Ellerman & Morrison-Scott (1966) listed two species of pikas namely Large-eared Pika and Royle's Pika from Nepal in a list of *Ochotona* occurring from Asia. Gruber (1969) during Khumbu Himal Expedition collected several specimens of Royle's Pika from several locations in Solukhumbu and Dolakha Districts. Worth & Shah (1969) studied on ecto-parasites from four specimens of Royle's Pika collected from Langtang valley during Nepal Health Survey in October 1965. During 1967-1968, Takeo Kawamichi carried out a study on ethology (winter behavior) of Royle's Pika at Central Nepal (Kawamichi, 1968). Chesemore (1970) observed Royle's Pika at Thorong La (pass) and Helambu area. Richard Merle Mitchell collected different species of pikas from different parts of Nepal in between July, 1966 to July 1970. R. M. Mitchell collected Royle's Pika specimens from Khumjung, Solukhumbu

district in October, 1968 and also M. K. Lama collected specimens of the same species from Muktinath, Mustang district in March, 1970 (Lewis, 1971). Nepal Ecto-parasite Program (NEP) from September 1966 to August 1970 collected field data and specimens of terrestrial mammals including pikas (Mitchell, 1977). Dr. Kawamichi continued with study on elevational segregation, daily activities and social pattern of Large-eared Pika and Royle's Pika at Mount Everest region of Eastern Nepal in 1971 (Kawamichi, 1971). Agrawal & Chakraborty (1971) reported a new Pika, *O. mitchelli* from Gosainkunda, central Nepal (Mitchell, 1978). In the same year Hisashi Abe published his 26 collections of three species of pika (including *Ochotona* sp.) from three locations (Abe, 1971). Lewis (1971) discovered a new species of flea namely *Chaetopsylla gracillis* infesting Royle's Pika from Nepal. Arun



Photo 6: A juvenile pika (probably Large-eared Pika) at Paanch Pokhari, Solukhumbu District in July, 2009 (Photo by: Badri Vinod Dahal)

Valley Wildlife Expedition (AVWE) during July 1972 to December 1973 collected four specimens of Royle's Pika (Mitchell, 1977). Rausch & Ohbayashi (1974) reported three species of parasites from two pikas; Large-eared Pika and Royle's Pika from Central Nepal.

Mitchell & Punzo (1975) reported a new pika, *O. lama* and also collected *O. daurica* and *O. macrotis* from Tibetan plateau of Nepal (Mustang District). Yugoslav Himalayan Expedition in 1972 collected three specimens of Royle's Pika and photographed the pika from Makalu Base Camp (Gregori & Petrov, 1976). Mitchell (1978) presented detailed information on six species of pikas reported hitherto including new pikas *O. angdawi* and *O. mitchelli*. Abe (1982) presented ecological distribution and faunal structure of small mammals including *Ochotona*. He plotted distribution of *O. lama* and *O. daurica* from alpine deserts of Mustang district with variation in an elevation.

Green (1981) included Royle's Pika in the checklist of mammals of LNP and added brief notes on observation of pikas in LNP. Czechoslovak expedition to Mt. Makalu during pre-monsoon in 1973 collected 10 skins, four complete and six damaged skulls of Royle's Pika (Daniel & Hanzák, 1985). Then after, a significant gap can be seen in pika study in Nepal, literatures based on reviews and speculations were the only outputs (Smith et al., 1990; Corbet & Hill, 1992; Suwal & Verheugt, 1995; Shrestha, 1997; Srinivasulu et al., 2004; Molur et al., 2005). Shrestha et al. (1999) studied on foraging and haying plants of Royle's Pika in Bajura District of Far Western Nepal and identified 33 species of plants from its hay pile. Khanal & Shrestha (2000) studied on habitat preferences by Royle's Pika in Gosainkunda, Rasuwa District of Central Nepal. Khanal (2007) reported symbiotic relationship of Royle's Pika and Scaly Breasted Wren Babbler (*Pnoepyge albiventer*) from Somdang, a village near Ganesh Himal at an elevation of 3300 m asl. Aryal et al. (2010) reported Royle's Pika (may be other pikas too) as the opportunistic diet of Red Fox in the spring.



Photo 7: A pika (probably Royle's Pika) showing inspection (behaviour) at DHR (Photo: Hari Basnet)

Suwal & Verheugt (1995) enumerated six species of *Ochotona* from Nepal. Shrestha (1997) also mentioned six pikas [slight changes from the Suwal & Verheugt (1995)]. Majupuria & Kumar [Majupuria] (2006) further added *O. himalayana* to the list of pika species occurring in Nepal. Srinivasulu et al. (2004) reviewed and prepared checklist of nine species of pika occurring in South Asia including six from Nepal. They included *O. forresti*, but excluded *O. thibetana*. Khatiwada (2004) estimated the total density of pikas (Large-eared Pika and Royle's Pika) based on head counts to be 370 per ha in ten sites within Langtang Lirung area of LNP. This estimation is an over estimate (erroneous) as they deployed 10X10 sq. m plot for this. Since, the density of Royle's Pika is low (12.5 per ha), which is characteristics of talus-dwelling pika species (Smith et al.,1990). Molur et al. (2005) lowered the species number to five again excluding *O. thibetana* and also *O. forresti*. Thapa et al. (2011) compiled literature review and opportunistic occurrence information on five species of pikas occurring in Nepal. Pearch (2011) presented a comprehensive literature review and additional information from museum specimen collection on four species of pikas excluding

the Moupin Pika. Jnawali et al. (2011) presented species information sheet in brief for seven species of pikas including *O. lama* and *O. himalayana*.

Chand (2012) conducted a B.Sc. Thesis entitled “Distribution and Density of Pika (*Ochotona* spp.) in Dhunche-Gosainkundaa Trekking Route, Langtang National Park, Nepal” in which density of pikas was estimated to be 15 pikas (Large-eared Pika and Royle’s Pika) per ha based on fecal pellets and direct observation counts in 24 m diameter circular 36 plots. A PhD study was focused on two species of pikas (Large-eared Pika and Royle’s Pika) dealing with population, forage selection, food hoarding behavior (Koju et al., 2012; 2013b; Koju & Chalise, 2014) , ecology (Koju et al., 2013a) and conservation threats (Koju et al., 2013b) in LNP. Koju & Chalise (2013) published on observation of Royles’ Pika in ANCA, Far western Region, Nepal. Koju et al. (2013a) estimated density of 21 per ha for *O. macrotis* and 14 per ha for Royle’s Pika in Gosainkundaa area, LNP based on head counts. Koju & Chalise (2013) estimated the density of Royle’s Pika to be 7.2-8 per ha during 2012 and 2013 at ANCA. Population abundance was found higher in summer than in winter and



Photo 8: Juvenile pika (probably Large-eared Pika) at Dudhkunda (lake) in Solukhumbu at an elevation around 4000 m asl (Photo: Hem Bahadur Katuwal)

lower at forest edges (Koju et al., 2012).

M.Sc. dissertation study was undertaken on feeding ecology of Royle's Pika (as *O. roylei*) in highland of LNP (Koju, 2013). Joshi (2013) conducted a M.Sc. Thesis entitled "Habitat Utilization, Feeding Ecology and Conservation Threats to Royle's Pika *Ochotona roylei* (Ogibly, 1839) in Khaptad National Park, Nepal". Lama (2013) conducted a B.Sc. Thesis entitled "Spatial Distribution and Habitat Preference of Pikas (*Ochotona* species) Along the Elevational Gradient of Central Himalaya (Study from Mustang District, Annapurna Conservation Area, Nepal)". Amin et al. (2018) updated the status of Nepal's mammals which included seven species of pikas in Nepal.

Threats to Pika

Mass collection of Yarchagumba (*Ophiocordyceps sinensis*) by community in higher Himalayas, the habitat of pikas may pose disturbance to the animal (Koju et al. 2013b). On the other hand, pikas invade into the temporary collector's hut and take away green vegetables, rice, wheat and other grain flour. Local residents at Dingboche (within the distribution range of *O. macrotis*) informed pika carrying away potatoes and stalks and wheat grains from the store at houses (Kawamichi, 1971). It is killed for fun by children throwing stones over them and using catapult (Koju et al., 2013b).

Traditionally its' flesh is roasted over smoke and fire and then sundried. In the alpine communities, there is a belief that the meat has some medicinal value and thus consumed for the treatment of hypothermia, asthma, cold diarrhea etc. However, the consumer suffers from dizziness after the consumption and later physiological relaxation occurs. The communities also consume such meats during body pain, arthritis and cough and cold (Koju et al., 2013b). Plastics have reached the pika habitat, and an individual pika was observed carrying plastics into its burrows (Chand, 2012; Koju et al., 2013b). This may pose a threat

to the species; however, detailed study on the impact of plastics is needed. Although respondents denied on the killing of pikas (Chand, 2012), a hotelier (anonymous) reported to the author (Sanjan Thapa) that there are very few cases for killing pikas at Chandanbari from the outsiders. They kill pikas for the flesh which they believe has some aforementioned medicinal values. Unmanaged grazing by cattle and livestock in meadows, rangelands and pasturelands (kharka in Nepali) inhabited by pikas may impose disturbance to pikas at KNP (Joshi, 2013), Ramaroshan area, Gosainkundaa, ACA and elsewhere. Collection of forest resources also impact disturbances to pikas (Lama, 2013). In addition, festivals (cultural) organized every year attract millions of pilgrims and visitors in these areas and results dumping of large mass of garbage there may have impacted them, which needs to be studied. Recently, free roaming feral dogs in the Everest Trail above 4300 m asl (Dingboche, Chhukung, Thugla, Lubuche, Pyramid camp (Upper Lubuche) and Gorakshep area have been observed killing pikas (Rajendra Gurung pers. obs.2018).



Predators

Siberian Weasel *Mustela sibirica* and Yellow Throated Marten *Martes flavigula* were trapped in the pika habitat where pika burrows were abundant and these mustelids were largely infested with ecto-parasites found associated with lagomorphs (Mitchell, 1977). Red Fox *Vulpes vulpes* (Aryal et al., 2010), Snow Leopard *Panthera uncia* (Jackson, 1996; Khatiwada, 2004), Yellow Throated Marten, birds of prey (Green, 1981), weasels *Mustela* spp. (Gregori & Petrov, 1976), Yellow Throated Marten (Kawamichi, 1971), Eurasian Lynx *Lynx lynx*, Pallas's Cat *Otocolobus manul* (Werhahn et al., 2018), Grey wolf *Canis lupus*, Golden Jackal *Canis aureus*, Tibetan Fox *Vulpes ferillata* and feral dogs (Rajendra Gurnung pers. obs. 2018) prey upon this species in higher Himalayas of Nepal. A hotelier (anonymous) informed an author (Sanjan Thapa) that a house cat killed the pikas (probably Royle's Pika) at Chandanbari in LNP.

Photo 9: Pika captured in mouth of Mountain Weasel at Mathillo Shree Kharka, Manang at an elevation of 4000 m asl (Photo: Kiran Maski)

Objective

The species account of *Ochotona* spp. has been fluctuating. The exact figure will not be unveiled until and unless a long time confirming survey adopting phylo-geographic and other advanced genomics will be undertaken. Therefore we have tried to present a tentative condition of pikas in Nepal from possible valid sources and opportunistic data.

Methods

Relevant literatures and species information sheet were thoroughly reviewed. Also, information from photographers (tourist guides, nature guides, university students, wildlife researchers and conservation professionals) who could take opportunistic photographs of pikas from different parts of Nepal was referred to update the latest information on pikas.

Result

In total four species of *Ochotona* are distributed in Nepal.

Table 1: Checklist of pikas occurring in Nepal

Order: Lagomorpha

Family: Ochotonidae

1	<i>Ochotona curzoniae</i> (Hodgson, 1858)	Black-lipped Pika
2	<i>Ochotona nubrica</i> Thomas, 1922	Nubra Pika
3	<i>Ochotona macrotis</i> (Günther, 1875)	Large-eared Pika
4	<i>Ochotona roylei</i> (Ogilby, 1839)	Royle's Pika

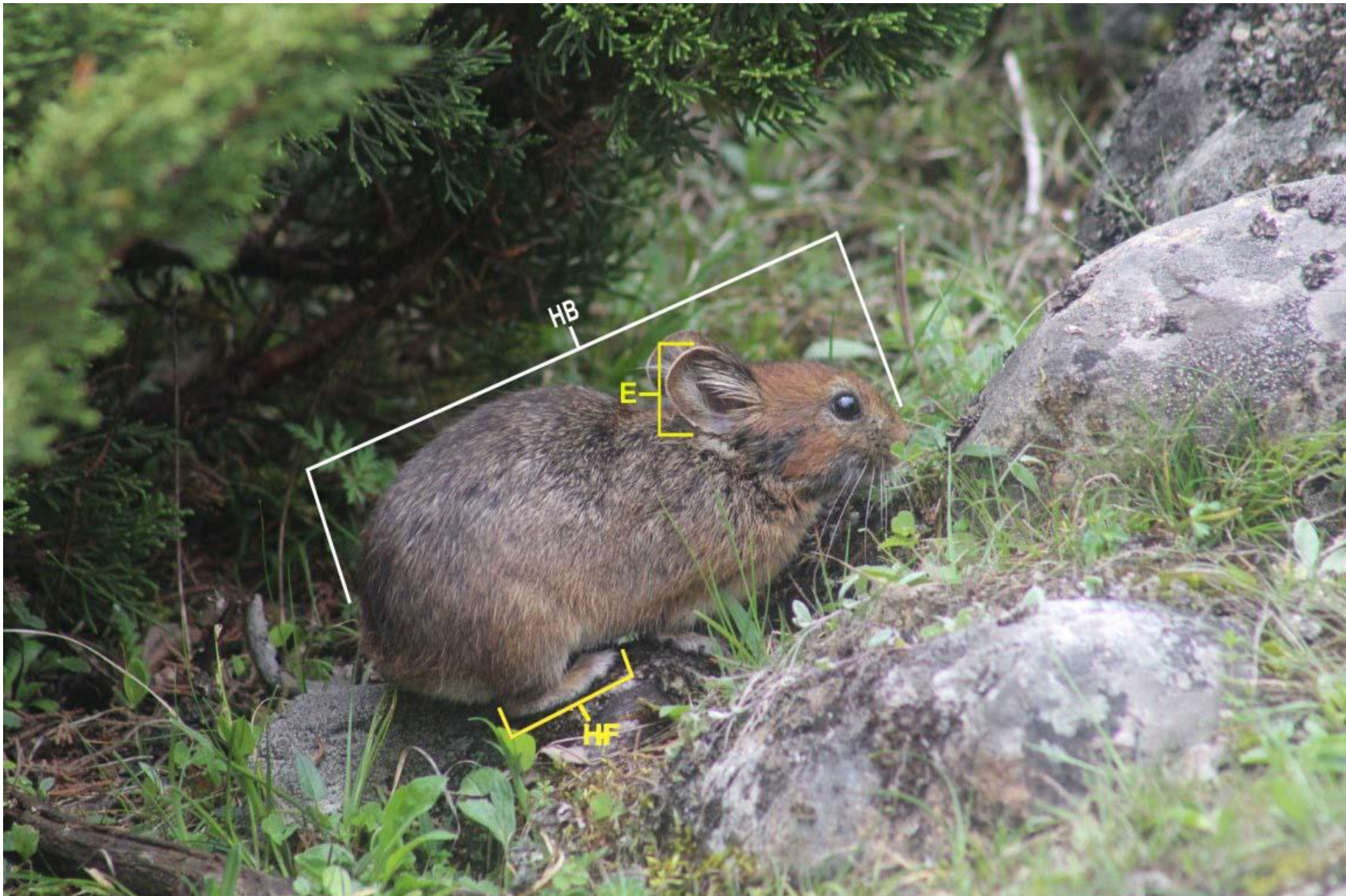


Photo 10: Large-eared Pika from Tadache in MBNP (Photo: Manoj Ayer)

Species Profile

Ochotona curzoniae (Hodgson, 1858)

Plateau Pika; Black-lipped Pika

Kalomukhe Thutekharayo (Baral & Shah, 2008); Kaloonthu Thutekharayo

Taxonomic Note

Ochotona curzoniae was included in *O. dauurica* before and this species apparently include two recognized subspecies of which *O. c. curzoniae* occurs in Nepal. It is possibly a sister taxa to *O. nubrica* (Lisovsky, 2014; Smith & Liu, 2016) since recent genomics reveal hybridization between *O. curzoniae* and *O. nubrica* (Lisovsky, 2016). *O. dauurica curzoniae* reported by Mitchell & Punzo (1975) and *O. dauurica* reported by Abe (1982) is *O. curzoniae* (Smith et al., 1990).



Photo 11: A Black-lipped Pika at Chyakpalung meadow of upper Humla (Photo: Naresh Kusi)

Identifying Character/s

HB=140-192 mm (170-192.5mm, Mitchell, 1978); HF=28-37mm (33.9-36.1mm, Mitchell, 1978); E=18-26mm (21.1-23.9mm, Mitchell, 1978); Mass=130-195gm (Smith & Xie, 2008). Black-tipped nose and black lips and a buffy marking above nose are distinguishing characteristics but not always. Summer pelage is sandy-brown to sandy russet dorsally and dirty yellowish-white to grayish white ventrally. Winter pelage is light sandy yellow, yellowish white to greyish. In overall, the fur in winter pelage is softer and longer than that in summer pelage. There is a rust-colored patch on the dorsal part of each ear and a white margin on the broader edge of the pinnae. Ventral part of the pinnae is not naked (which is normally naked in Royle's Pika), but moderately to heavily furred. The skull is of medium sized and sharply elevated in the frontal area. The inter-orbital region is moderately narrow. The tympanic bullae are of moderate size (Smith et al., 1990).

Conservation Status

Global: Least Concern (LC) (Smith & Liu, 2016)¹

National: Data Deficient (DD) (Jnawali et al., 2011)

Distribution and Habitat

It is distributed in ACA (Mitchell & Derksen, 1976; Mitchell, 1978; Abe, 1982; Suwal & Verheugt, 1995; Shrestha, 1997; Majupuria & Kumar [Majupuria], 2006; Jnawali et al., 2011; Lama, 2013) and may be in SPNP (Suwal & Verheugt, 1995; Shrestha, 1997; Majupuria & Kumar [Majupuria], 2006; Jnawali et al., 2011). However, not a single individual was seen during 75 days in upper Dolpa during May-July 2016. As such upper Dolpa does not have a Tibetan Plateau landscape where the species thrives (Naresh Kusi pers. obs. 2017).

¹ Smith, A.T. and Liu, S. 2016. *Ochotona curzoniae*. The IUCN Red List of Threatened Species 2016: e.T41258A45182665. <http://dx.doi.org/10.2305/IUCN.UK.2016-3.RLTS.T41258A45182665.en>. Downloaded on 13 February 2018.

Mitchell & Derksen (1976) described on five specimens of this species collected from Lho Chhoga, Mustang District, which is the first record of the species from Nepal (Mitchell, 1978). Abe (1982) plotted its distribution near Tibetan border of Mustang district. It is distributed throughout Trans-Himalaya above 3000 m asl (Suwal & Verheugt, 1995; Shrestha, 1997; Majupuria & Kumar [Majupuria], 2006; Jnawali et al., 2011). It occurs at Chhorten Markok (4391 m asl) and Chhuhare (4632 m asl) of Ghakthang area in ACA (Lama, 2013). It was observed at Chyakpalung meadow of upper Humla at 4954 m asl. The species was also observed in Koralla in 2016 and photographed from Dhalung rangelands of upper Mustang in 2017. The species are commonly seen in the areas of Mansarovar in Tibet adjoining the Humla District of Nepal (Rajendra Gurung pers. obs.2018).

They inhabit open grass and scrubland dominated by *Caragana* sp. and *Juniperus* sp. Sometimes seen rushing from scrubs to scrubs and among rocks, boulders, talus and base of cliffs (Suwal & Verheugt, 1995; Shrestha, 1997; Majupuria & Kumar [Majupuria], 2006).

Habit

Black-lipped Pika lives in burrows in open alpine meadow (Smith & Xie, 2008). The breeding season for this species extends from April, possibly into late August (Smith et al., 1990). *O. curzoniae* has three to five litters per year with two to eight young per litter (Smith & Xie, 2008). Generation length is estimated to be 1.2 years for *O. curzoniae* (Wang & Dai, 1989).

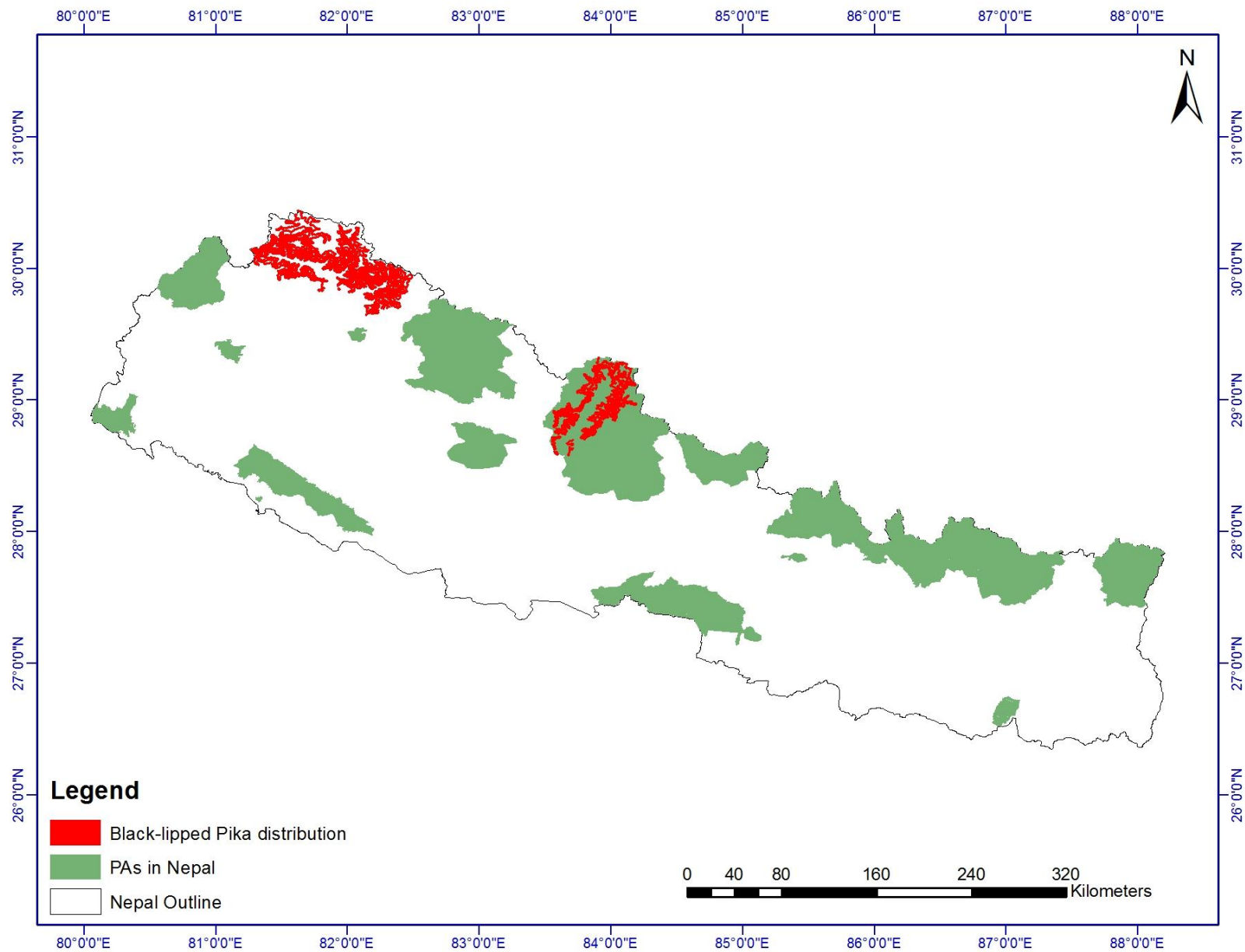


Figure 1: Distribution map of Black-lipped Pika in Nepal

Ochotona nubrica Thomas, 1922

Nubra Pika

Nubri Thutekharayo (Baral & Shah, 2008); Nubra Upatyaka ko Thutekharayo

Taxonomic Note

Apparently two subspecies of *Ochotona nubrica* are recognized: *O. n. lhasaensis* and *O. n. nubrica* (including *O. n. aliensis* and *O. n. lama*). Recently *O. nubrica* is a separate species, however, in the past *O. nubrica* was synonym to *O. pusilla*, *O. roylii*, and *O. thibetana* respectively. Based upon morphological and molecular analyses, it is considered an independent species and found widely divergent from these forms. In addition, these analyses indicated that *O. nubrica* does not form a single clade, but has undergone significant introgression with *O. curzoniae* (Lissovsky, 2014; Smith & Li, 2016). *O. lama* reported by Mitchell & Punzo (1975), Mitchell (1978) and (Abe (1982) is *O. nubrica* (Smith et al., 1990).



Photo 12: Nubra Pika at Kuwagaun in upper Dolpa (Photo: Geraldine Werhahn)



Photo 13: A Nubra Pika at upper Dolpa (Photo: Naresh Kusi)

Identifying Character/s

The total length of this species is 140.0-184.0 mm [HB=163.8-166.2 mm (Mitchell, 1978); TL=170.2-171.4 mm (Mitchell & Punzo, 1975)] (Smith & Xie, 2008). HF=34.2-34.8mm; E=19.8-20.1mm (Mitchell & Punzo, 1975; Mitchell, 1978). The skull is fairly flat, larger than the Moupin Pika but smaller than Royle's Pika, relatively narrow, but with a fairly broad inter-orbital and short rostrum. Palatal foramina are widely expanded posteriorly, whereas the bullae are relatively small and narrow (Smith et al., 1990).

Conservation Status

Global: LC (Smith & Li, 2016²)

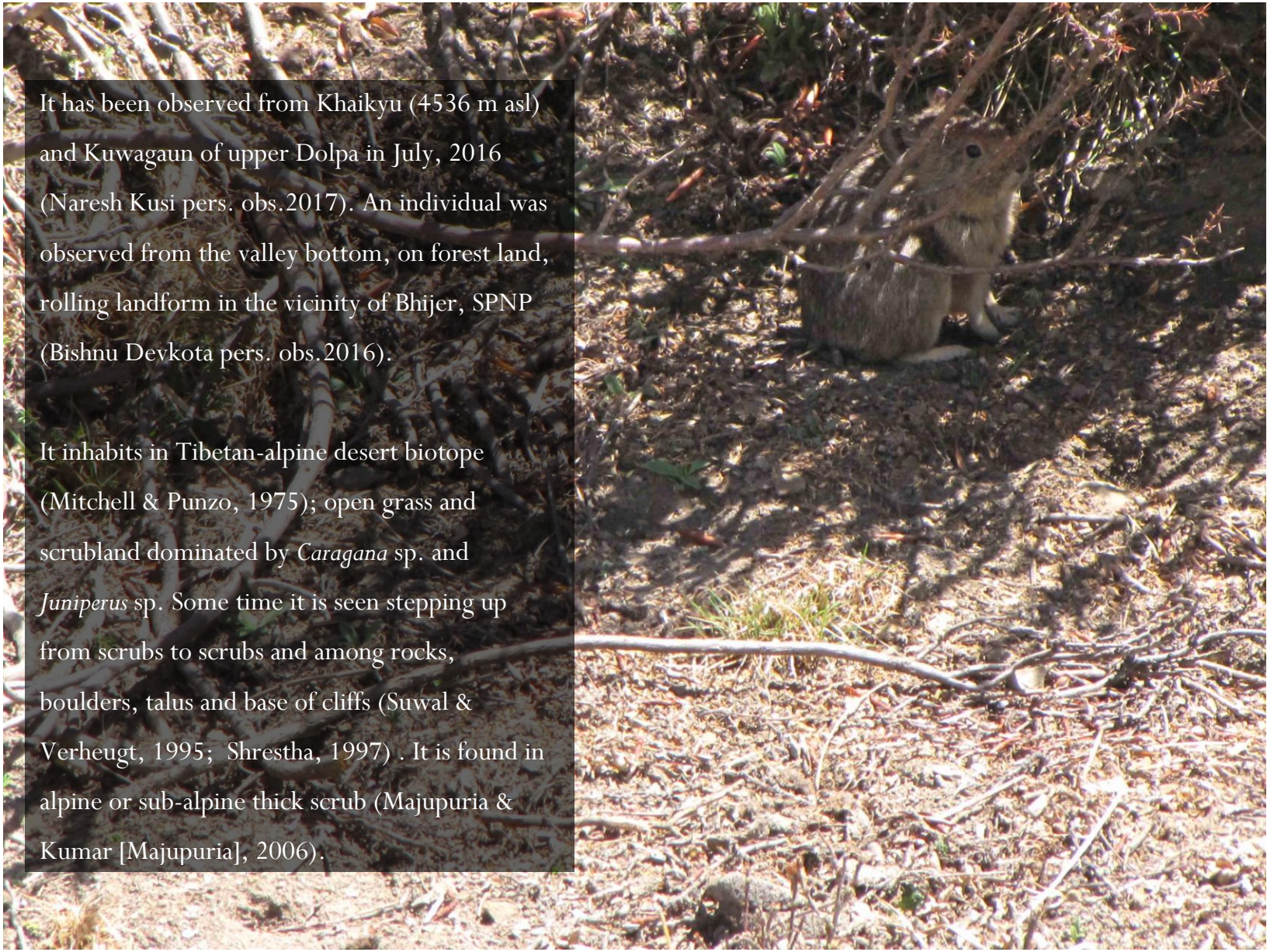
National: DD (Jnawali et al., 2011)

Distribution and Habitat

This species occurs in ACA and SPNP (Mitchell & Punzo, 1975; Mitchell, 1978; Abe, 1982; Suwal & Verheugt, 1995; Shrestha, 1997; Majupuria & Kumar [Majupuria], 2006; Jnawali et al., 2011; Pearch, 2011).

² Smith, A.T. & Li, W. 2016. *Ochotona nubrica*. The IUCN Red List of Threatened Species 2016: e.T15051A45179343. <http://dx.doi.org/10.2305/IUCN.UK.2016-3.RLTS.T15051A45179343.en>. Downloaded on 13 February 2018.

Mitchell & Punzo (1975) described on three specimens of this species (as *O. lama*) collected by M.K. Lama from Lupra (3640 m asl) and Bathang (3030 m asl), also additional observation near Jomsom of Mustang district. The skin and skull of these specimens are deposited in Royal Ontario Museum (ROM), Toronto, Canada (Mitchell & Punzo, 1975; Pearch, 2011). Abe (1982) plotted its distribution in Mustang district. This species is distributed throughout Trans-Himalaya above 3000 m asl. This species is found in ACA (Suwal & Verheugt, 1995; Shrestha, 1997; Majupuria & Kumar [Majupuria], 2006). It is found throughout higher Himalayas in the northern part of the country and within all protected areas sharing the border to the Tibet (Jnawali et al. 2011). However, corroboration is further required.



It has been observed from Khaikyu (4536 m asl) and Kuwagaun of upper Dolpa in July, 2016 (Naresh Kusi pers. obs.2017). An individual was observed from the valley bottom, on forest land, rolling landform in the vicinity of Bhijer, SPNP (Bishnu Devkota pers. obs.2016).

It inhabits in Tibetan-alpine desert biotope (Mitchell & Punzo, 1975); open grass and scrubland dominated by *Caragana* sp. and *Juniperus* sp. Some time it is seen stepping up from scrubs to scrubs and among rocks, boulders, talus and base of cliffs (Suwal & Verheugt, 1995; Shrestha, 1997) . It is found in alpine or sub-alpine thick scrub (Majupuria & Kumar [Majupuria], 2006).

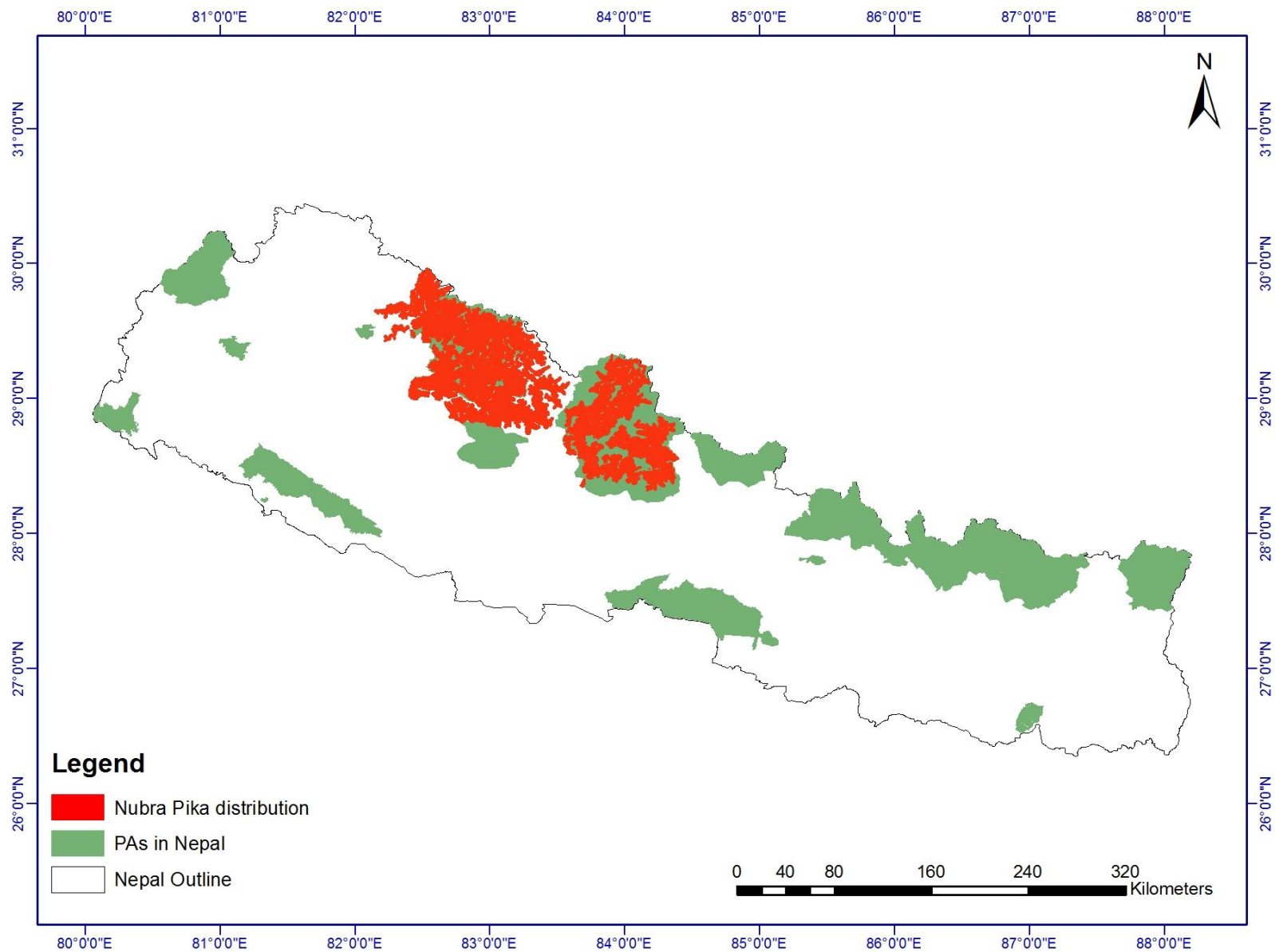


Figure 2: Distribution map of Nubra Pika in Nepal

Ochotona macrotis (Günther, 1875)

Large-eared Pika

Laamkaane Thutekharayo (Baral & Shah, 2008)

Taxonomic Note

Apparently four subspecies of *O. macrotis* is recognized: only one subspecies *O. m. wollastoni* occurs in Nepal (Lissovsky, 2016). Based on morphological and ecological similarities, previously the species was considered to be allogenic (a subspecies) of *O. roylli*. This was further confirmed from molecular data from Genbank that included mis-identified material: namely *O. macrotis chinensis* that was labelled as *O. roylei chinensis*. Recent molecular and morphological analyses revealed both species can be clearly distinguished and clarified not to be sister species (Smith & Lissovsky 2016).

According to Kawamichi (1971), *O. angdawi* from head of the Khumbu Glacier reported by Biswas and Khajuria (1955; 1957), is an individual variant of *O. macrotis*, based upon the area of distribution and the mode of life and behaviour. Abe (1971) considered *O. mitchelli* as a young of *O. macrotis* (Smith et al., 1990). However, both variants are now reconsidered as *O. roylli* (Hoffmann & Smith, 2005).

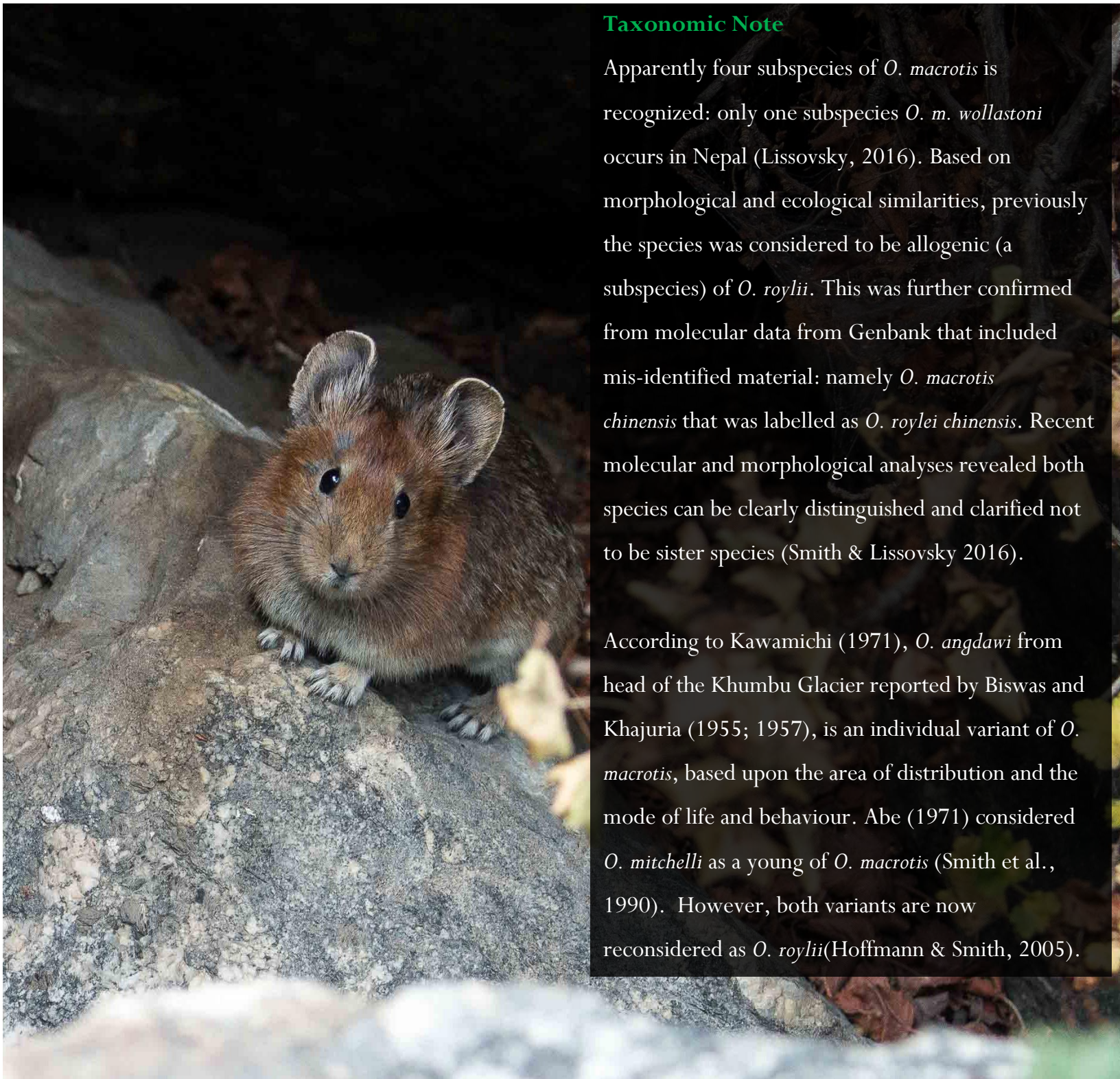


Photo 15: Large-eared Pika at Jhompalaya, Limi Valley, Humla District (Photo: Yadav Ghimirey)

Identifying Character/s

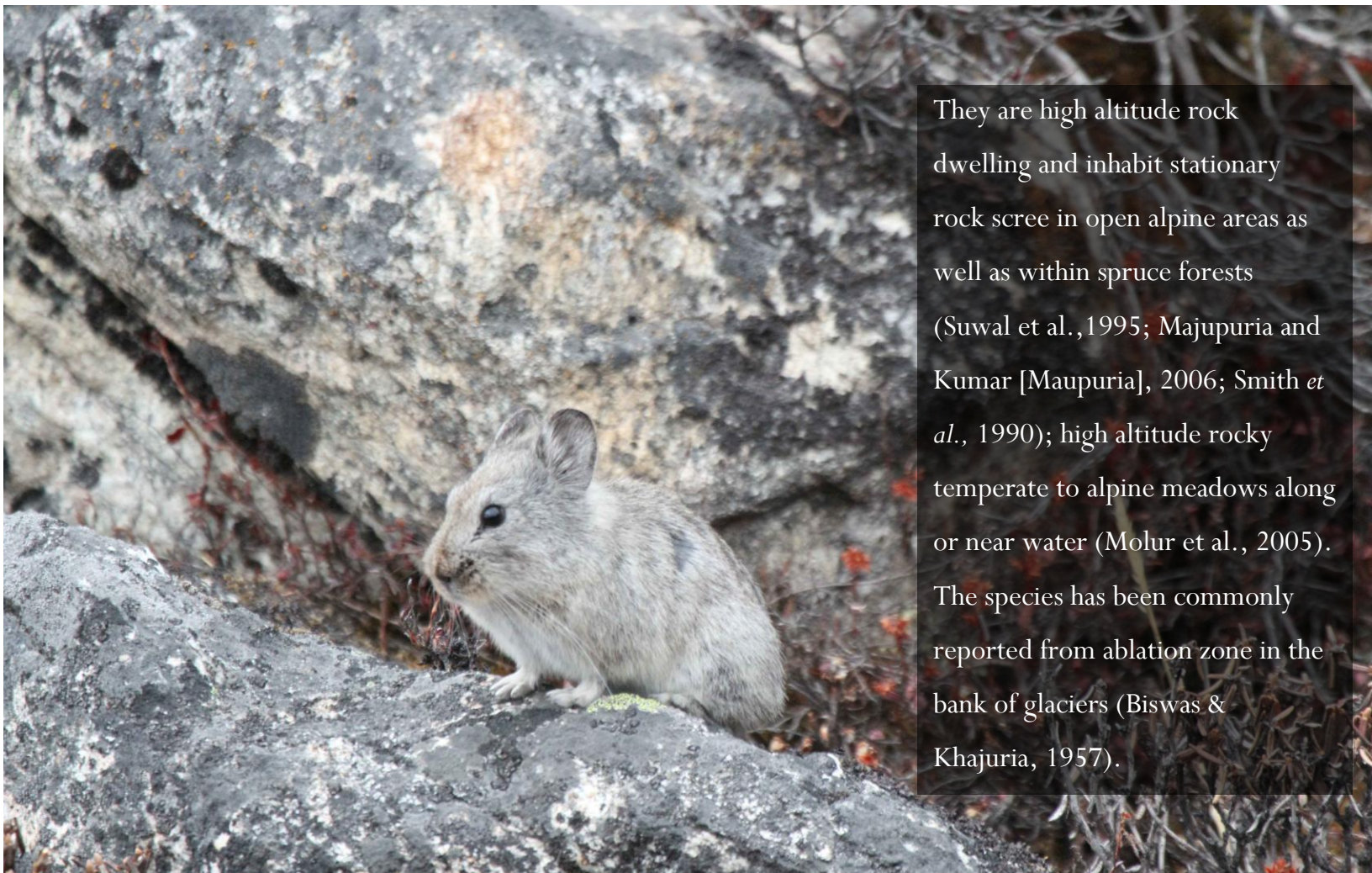
The total length of this species is 150-204 mm (Smith & Xie, 2008); .However, a female specimen from Gosainkunda measured; HB= 187mm; Mass= 160gm; HF= 33.0mm; E= 26.5mm (Abe, 1971). Measurement of ear ranges from 23.1-29.0mm, in an average 26.8mm (Kawamichi, 1971). Similarly, a male specimen from Muktinath area measured; HB=182.7mm; HF=33.4mm; E=38.8mm (Mitchell, 1978). However, specimens from the Everest region has shorter HF=29 mm (Khajuria, 1961)-29.2mm (Biswas & Khajuria, 1957) and also shorter E=23.5mm (Biswas & Khajuria, 1957)-24.5mm (Khajuria, 1961).The species is of moderate size, but in an average larger than most Royle's Pikas. The general color above is pale brownish gray with an ochre tinge. Along the sides of the face, across the shoulders and from the nose over the occiput, the general grayish color is tinged with rufous, this is more marked during summer. In winter the dorsal color changes to a dense fluffy pale gray with a tinge of straw-yellow. The belly ranges from white to dirty white in summer and winter. There are usually two small (3 mm by 1.5 mm) oval foramina above and in front of the orbit at the anterior end of the frontal bones. As can be surmised by the apparent close taxonomic relationship between the Large-eared Pika and Royle's Pika, the appearance of these two species is superficially similar.

The Large-eared Pika can be distinguished from Royle's Pika using the following characteristics: the inside of the ears is thickly clad with longer hairs in the large-eared pika; the head and front are washed with a pale russet color instead of the brilliant rufous brown in Royle's pika; and on average the ears are broader in the large-eared pika (Feng & Zheng, 1985). According to Kawamichi (1971), ear length of *O. macrotis* at the northern side of the Everest (Tibetan region) is 31.0-36.0mm, which is larger than that from the Khumbu region (23.1-29.0mm, in an average 26.8mm).

Distribution and Habitat

This species is distributed in and outside protected areas east to west throughout the higher Himalayas in Nepal from KCA to ANCA.

It can be found in LNP, MBNP, RNP and SNP (Suwal & Verheugt, 1995; Shrestha, 1997; Majupuria & Kumar [Majupuria], 2006). It has been reported from most of the protected areas throughout higher Himalayas in the northern part of the country (Jnawali et al. 2011). They are distributed between elevations of 2500 m asl to 6130 m asl [4000 m asl to 5630 m asl in the Khumbu region (Kawamichi, 1971)] (Suwal & Verheugt, 1995; Majupuria & Kumar [Majupuria], 2006). However, *O. macrotis wollastoni* had been reported even at 6126 m asl, (20,100 ft.) at Tibetan side of Mt. Everest (Thomas & Hinton, 1922). Density of the species was estimated to be 21 per ha based on head counts in Gosainkunda area, LNP (Koju et al., 2012). *O. macrotis* prefer rocky habitats at higher elevations; the species widely



They are high altitude rock dwelling and inhabit stationary rock scree in open alpine areas as well as within spruce forests (Suwal et al., 1995; Majupuria and Kumar [Maupuria], 2006; Smith *et al.*, 1990); high altitude rocky temperate to alpine meadows along or near water (Molur et al., 2005). The species has been commonly reported from ablation zone in the bank of glaciers (Biswas & Khajuria, 1957).

Photo 16: Large-eared Pika at Amadablam Base Camp photographed on April 19 2017 (Photo: Rajendra Gurung)

uses moraines (regolith and rock, glacial debris). Specifically it is reported from the head of the Khumbu Glacier (Biswas & Khajuria 1955; 1957); Gokyo (Biswas & Khajuria, 1957); Gorashan (Probably Gorakshep) at an elevation of 5334 m asl (Khajuria, 1961) en route to



Photo 17: Juvenile Large-eared Pika at Numbur Cheese Trek, before the pass near the lake there (Photo: Susanne Kühnel)

the Cho oyu peak (Pearch, 2011); arid alpine zone at top of Kalapattar (Kalapatthar) at an elevation 5,630 m asl; Gorak Shep; Lobuche; in between Lobuche and Pheriche; Pheriche (4243 m asl); Pangboche; in between Pheriche to Pangboche; Dingboche; Chukung; Makyong in the vicinity of Deboche in Khumbu region of eastern Nepal (Kawamichi, 1971); slide rock area in Gosainkunda at an elevation 4300 m asl (Abe, 1971; 1982); Muktinath, Mustang District (Mitchell, 1977; Mitchell, 1978); Panchpokhari (Pradhan et

al., 2009); Gosainkunda (Prem Budha pers. comm. 2009; Rabindra Parajuli pers. comm. 2009); Mongola and Phorche rangeland, a part of Khumbu region, on the way to Gokyo lake of SNP (Arjun Thapa pers. comm. 2010); Surya Kunda at an elevation 4800 m asl, Tharepati at an elevation 3636 m asl, Phedi at an elevation 3764 m asl, Gosainkunda at an elevation 4436 m asl, Lauribina at an elevation 3951 m asl, Pulagpatilekh at an elevation 3879 m asl (Koju et al., 2012; 2013a); Olangchungola and its vicinity (Hem Bahadur Katuwal pers. obs.2013) and Yangma (Naresh Kusi pers. obs.2018),KCA; Muktinath area within an elevation range of 3735-3810 m asl (Lama, 2013); Bagala Pass, SPNP; Amadablam Base Camp, SNP (Rajendra Gurung pers. obs.2017); near Ghopte, LNP (Phurkel Sherpa pers. comm. 2017); way to Gosainkunda from Syabru side (up from Lauribina), around

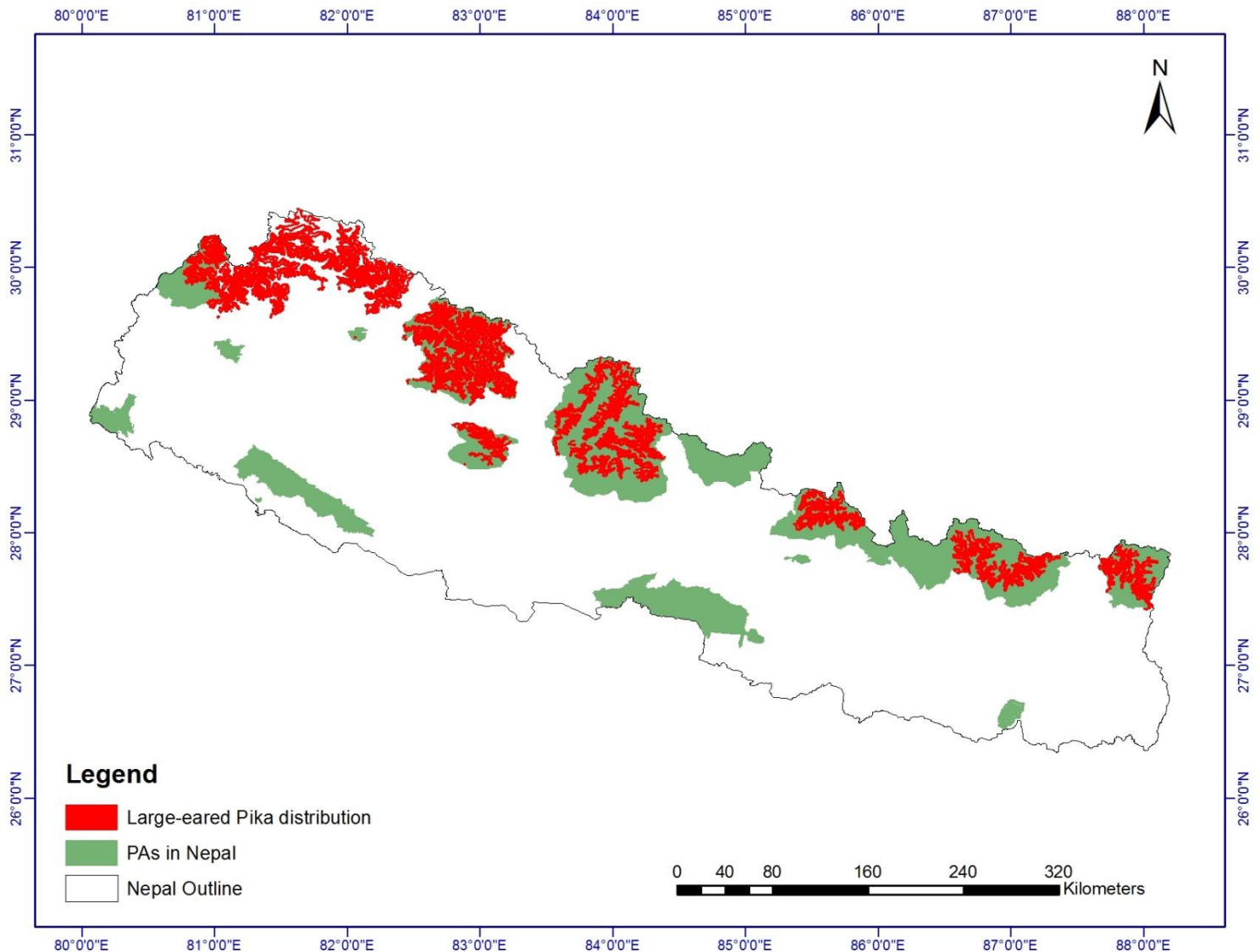


Figure 3: Distribution map of Large-eared Pika in Nepal



Photo 18: Different postures of Large-eared Pika at Mongola and Phorche rangeland, a part of Khumbu region, on the way to Gokyo Lake of SNP in August, 2010 (Photo: Arjun Thapa)

Annapurna Base Camp before Thorung La (Susanne Kühnel pers. comm. 2017); Daulichaur VDC, Bajhang District (Rishi Baral pers. comm. 2017); Syanmochen, upper Mustang (Tek Gharti Magar pers. comm. 2017); DHR (Hari Basnet pers. comm. 2017); South-east part of RNP roughly three hours trek from Murma top (Rabin Maharjan pers. comm. 2017); Tadache (approx. 4100 m asl) and Dobato (approx. 4000 m asl) in MBNP (Manoj Ayer pers. comm. 2018); Lai Samba from upper Dolpa (Naresh Kusi pers. obs. 2018); Jhompalaya area of Limi Valley, Humla District (Yadav Ghimirey pers. comm. 2018); near Kuntisong, ANCA (Jeevan Rai pers. comm. 2018).

Habit

O. macrotis is generally herbivore in diet (Smith & Xie, 2008) feeding typically on grasses, leaves, twigs, mosses, and lichens (Gurung and Singh 1996). It is primarily a diurnal species (Gurung & Singh, 1996). Longevity of this species of pika is three years of age (Bernstein & Klevezal, 1965). *O. macrotis* usually has two litters per year. Yearlings of a population are able to breed (Smith *et al.*, 1990). The reproductive periodicity of *O. macrotis* is from April to mid-August. Gestation is approximately 30 days (Sokolov *et al.*, 1994).

Musing in *O. macrotis* is exhibited from several seconds to 22 minutes, and can be arbitrarily divided into three types; short (within one minute), intermediate (1-3 minutes) and long (more than 4 minutes). Short musing is generally for inspection occurring in an average for 30 seconds. Intermediate musing is probably for warning when some threat approaches nearer, in which loud cries or sudden motions (also escaping into holes, reappearance and return) occurs, hence, such musings are sometimes interrupted. Long musing occurs sometime for sunbathing or resting. Their calls are rare and even their calls are feeble (not loud) in both sexes. Most of these calls are produced during feeding, musing and when they come out from nest holes (Kawamichi, 1971).



Photo 19: Large-eared Pika at Lai Samba, Dolpa District (Photo: Naresh Kusi)

Except a few cases, Large-eared Pika normally does not hoard food (store hay piles) in the winter in Nepal Himalayas from Khumbu region and in and around Langtang region (Kawamichi, 1971; Khanal & Shrestha, 2000; Koju & Chalise, 2013; 2014). However, Pikas in the Tibetan side of the Everest were observed with large hoardings of vegetation accumulated at rock fissures during winter. The inactiveness of hay piles collection in the pikas (including *O. macrotis*) may be an adaptive strategy towards unavailability of forage plants during winter (as ground covered under the snowfall) and overcome the risk of predation.

So far, *O. macrotis* has not been witnessed hibernating. Even at elevations higher than 5500 m asl, it is quite active in December (November to January), however, a shift in their diurnal rhythm can be observed may be due to delay in sunshine (Kawamichi, 1971). Diurnal rhythm in *O. macrotis* differs from that in *O. roylei*, maximum extranidal activities occurs later than that of *O. roylei*, generally after the sunrise and before the sunset, however, time of sunrise and sunset differs according to the topography and season and so in some place, Large-eared Pika can be seen active about 15 minutes before the sunrise. Diurnal rhythm includes altogether four activity periods throughout the day time which majorly includes musing and foraging (sometimes five activity periods during longer summer days in which they just reappeared for fixed period in the dawn) (Kawamichi, 1971). In case any danger

appears, *O. macrotis* hides in the shades of rocks and inspect by stretching neck with upward ears. Such inspection behaviour is repeatedly exhibited during musing and also during foraging. They carry forage plants and their parts up to a rock often. Amazingly, the locomotion in the species were not found affected by winds or breeze so strong to turn their fur coat since they do not utilize inter-rock spaces despite ample presence of slide rocks. Each nest range structure is common in *O. macrotis* and *O. roylei*, which includes set, defecation place and musing point. Each nest range can be occupied by one to three occupants (constant residents), mostly by two (pair) and rarely by one (single) or three (trio). These occupants can be divided into two categories; one which is limited within ones' nest range (generally females) and one which invades occasionally to adjacent nest range/s specially for copulation (generally males). However, the frequency and duration of invasion are varying; invading males take fixed routes and use sets of the invaded ranges as in their own nest range. When there is more than one occupant in a common nest range, each occupant moves separately but communally uses same set, musing points and extranidal routes, however, encounters between occupants are occasional and between occupant and invaders are rare and occurs under several conditions and cases (Kawamichi, 1971).

Predator

Mountain Weasel *Mustela altaica* (Kiran Maski pers. comm. 2018), Snow leopard, Grey Wolf, Golden Jackal, Yellow Throated Marten are the predator of the species.

Threats

Koju et al. (2013b) reported observation of an individual carrying plastic inside its burrow from garbage in pika habitats. This might pose a threat to the species. Yet, detailed study on the impact of plastics has to come forth.

Ochotona roylli (Ogilby, 1839)

Royle's Pika

Muse Thutekharayo (Baral & Shah, 2008)

Taxonomic Note

Apparently two recognized subspecies of *O. roylli* has been considered: *O. r. nepalensis* and *O. r. roylli* and both subspecies occur in Nepal. The former is distributed west from Kali Gandaki River and the latter is distributed east from the Kali Gandaki River (Lissovsky, 2016). It is another species with several controversies in its taxonomy and systematics since a long time, *O. roylli* has been considered allogenic to *macrotis*, *cansus*, *forresti*, *himalayana* and *nubrica*. However, *macrotis*, *cansus*, *forresti* and *nubrica* are currently considered as independent species. *O. himalayana*, once considered an independent form, is reconfirmed a subspecies of *O. roylli*. On the other note, based upon morphological and ecological similarities, *roylli* and *macrotis* was considered sister species; this was supported by molecular data from Genbank, where the *roylli* sample is actually *O. macrotis chinensis*. However, the recent molecular studies of these forms reveal sufficient dissimilarity and confirms both species cannot be further considered sister species (Lissovsky, 2014).

O. angdawi reported by Biswas & Khajuria (1955) and *O. mitchelli* by Agrawal & Chakraborty (1971) is *O. roylli* (Hoffmann & Smith, 2005). Prior to this, Kawamichi (1971) and Abe (1971) considered *O. angdawi* as individual variant of *O. macrotis* where as Abe (1971) considered *O. mitchelli* as a young of *O. macrotis* (Smith et al., 1990).

Identifying Character/s

The total length of this species is 15.5-20.4 cm (Smith & Xie, 2008). Specimens from Gosainkundaa area measures; HB: 192.0-204.0 mm (avg. 198.0mm) for male and 188.0-

207.0mm (avg. 195.3mm) for female; mass: 148.0-153.0gm (avg. 150.5gm) for male and 144.0-199.0gm (avg. 163.5gm) for female; HF: 33.0-34.5mm (avg. 33.8mm) for male and female both; E: 22.5-26.0mm (avg.24.3mm) for male and 23.0-24.3mm (avg. 23.8mm) for female (Abe, 1971). Specimens collected by R.M. Mitchell measures: HB=170.3-195.4mm; HF=33.1-34.8mm; E=21.0-25.2mm (Mitchell, 1978). Surprisingly, the specimen identified as *O. angdawai* measures: HB=110.0mm; HF=29.0mm; E=19.0mm (Biswas & Khajuria, 1955) and *O. mitchelli* measures: HB=168.0mm; HF=33.0mm; E=24.5mm (Agrawal & Chakraborty, 1971). Specimens collected by Czechoslovak Expedition from Mt. Makalu area measures; Mass=144-185gm (avg. 159.4gm); HB=165.0-195.0mm (avg. 178.2mm); HF=30.0-35.0mm (avg. 33.6mm); E=24.0-28.0mm (avg.26.4mm) (Daniel & Hanzák, 1985). Most specimens examined had winter fur except for the facial parts in which new rufous summer fur is coming up. One from the



Photo 20: Royle's Pika at Dobate (approx. 4000 m asl) in MBNP (Photo: Manoj Ayer)

southern ridge of Thare Pati, however, finished already the molting to the summer fur.

Adult males have a wide chestnut color band on the throat in summer (Abe, 1971). During summer the head, shoulders and fore part of the body are bright chestnut colored, becoming more vinaceous on the throat. The remaining dorsal surface is dark grayish rufous.

Ventrally, the coloration ranges from white to grayish-white to dark gray. The winter coat is similar, but may show only traces of, or lack, rufous coloration. In the field the pelage of Royle's Pika is very similar to that of the Afghan Pika *O. rufescens* (Smith et al., 1990). There may be considerable variability among the various forms. *O. roylei* is generally dark. Ears are moderate in size and are sparsely haired. The skull is of moderate size and only slightly arched, less so than in the Large-eared Pika. The rostrum is short and bullae are relatively



Photo 21: Royle's Pika at Everest Base Camp, above 5000 m asl (Photo: Rajendra Gurung)

small. Frontal fenestrae are present in juveniles, but this condition tends to disappear in adults, in contrast to the Large-eared pika. Royle's pikas have two pairs of mammae (Mitchell, 1978). Distinguishing characteristics between Royle's pikas and Large-eared pikas are given in the account on the latter (Smith et al., 1990).

Conservation Status

Global: LC (Smith and Bhattacharyya 2016³)

National: DD (Jnawali et al., 2011)

Distribution and Habitat

This species is distributed in and outside protected areas east to west throughout the higher Himalayas in Nepal in between KCA to ANCA.

The species was first recorded from Gosaitan (Hodgson, 1841). Then after it was reported from Patibhanjyang (Hinton & Fry, 1923 as *O. roylei nipalensis*); Sathar (probably Charthar), Apoon Hill (Aapu), Apoon Sottidanda, Barpak (Fry, 1925 as *O. roylei nepalensis*); head of the Khumbu Glacier, west of the Mt. Everest (Sagarmatha) (Biswas & Khajuria, 1955 as *O. angdawai*); Gosainkunda Village at elevation 4,300 m asl; between Dhounche (Dhunche) and Gosainkunda Village (3500 m asl), Tharepati, south of Gosainkunda Village at an elevation of 3500 m asl, upper course of Drandi (probably Daraudi) Khola, northern valley of Gurkha (Gorkha district) at an altitude of 3300 m asl (Kawamichi, 1968); Pangboche, Tengboche, Lamjura, Pike, above Junbesi, above Ringmo in Everest trekking route and Bigu in Dolakha District (Gruber, 1969); (Weigel, 1969); Langtang valley (Worth & Shah, 1969); west side of Thorong La (pass) between Muktinath and Manangbhot (approx. 5300 m asl) and Helambu area (approx. 4500-5000 m asl) (Chesemore, 1970); Gosainkundaa

³ Smith, A.T. and Bhattacharyya, S. 2016. *Ochotona roylei*. The IUCN Red List of Threatened Species 2016: e.T41268A45184591. <http://dx.doi.org/10.2305/IUCN.UK.2016-3.RLTS.T41268A45184591.en>. Downloaded on 13 February 2018.

Pass (c. 4750 m asl)(Agrawal & Chakraborty, 1971; Mitchell, 1978); along Dudh Koshi River below Namche Bazar (2800 m asl) to Makyong near Deboche (4150 m asl), Seti Gompa (2650 m asl) in between Phaplu and Those, near Thyangboche (Tengboche) Gompa at an altitude of 3800-4000 m asl, Khumjung (Kawamichi, 1971); Gosainkunda (4300 m asl), Thare Pati, top (3300 m asl) of the south ridge of Thare Pati (Abe, 1971); Khumjung at an elevation of 3673 m asl, Solukhumbu district, Muktinath at an elevation of 3581 m asl, Mustang district (Lewis, 1971); Arun Valley (Mitchell, 1977); Makalu Base Camp (4900 m asl)(Gregori & Petrov, 1976); Lobuche (5300 m asl as *O. angdawai*), Gosainkunda Pass and the lakes, Langtang valley (3300 m asl), Phulung Ghyang (2550 m asl, should be 3550 m asl), Tharepati (3385 m asl), Dhukpu (3864 m asl), Namsangsang (4360 m asl), Maharigaun (3060 m asl) (Mitchell, 1978); LNP (2590-5090 m asl) (Green, 1981); Ghora Tabela (Ghodatabela), Syng Gompa, Gosainkunda, Tharepati (Abe, 1982); Phematan, Yanle Kharka, front of Barun Glacier (4900 m asl), base of the south western face of Mt. Makalu (5950 m asl) (Daniel & Hanzák, 1985).

This species can be found in SNP, SPNP, RNP, MBNP, LNP, SNNP, Taplejung, Ramechhap and Ilam Districts (Suwal & Verheugt, 1995); SNP, LNP and RNP (Shrestha, 1997; Jnawali et al. 2011); SNP, SPNP, RNP, MBNP, LNP, Taplejung, Ramechhap and Ilam Districts (Majupuria & Kumar [Majupuria], 2006); Bagkal and Ramaroshan, Achham District, Bajura District (Shrestha et al., 1999); Gosaikund and its vicinity (Khanal & Shrestha, 2000; Prem Bahadur Budha pers. comm. 2009, Rabindra Parajuli pers. comm. 2009, Rajendra Gurung pers. obs. 2017); Lama hotel area (Khanal & Shrestha, 2000); Kyangjin at an elevation 3800m, Gosainkunda, Pulagpatilekh, Ghodatabela, Lauribina, Phedi, Tharepati, Surya Kunda, LNP ; Tunda, Loal Meadow, Chalaune (Chameliya) Muhan, ANCA (Koju, 2013; Koju et al., 2012; 2013a; 2013b; Koju & Chalise, 2014); near Salpa Pokhari at the altitude of 3440 m asl, Bhojpur District (Badri Binod Dahal pers. comm. 2009); near

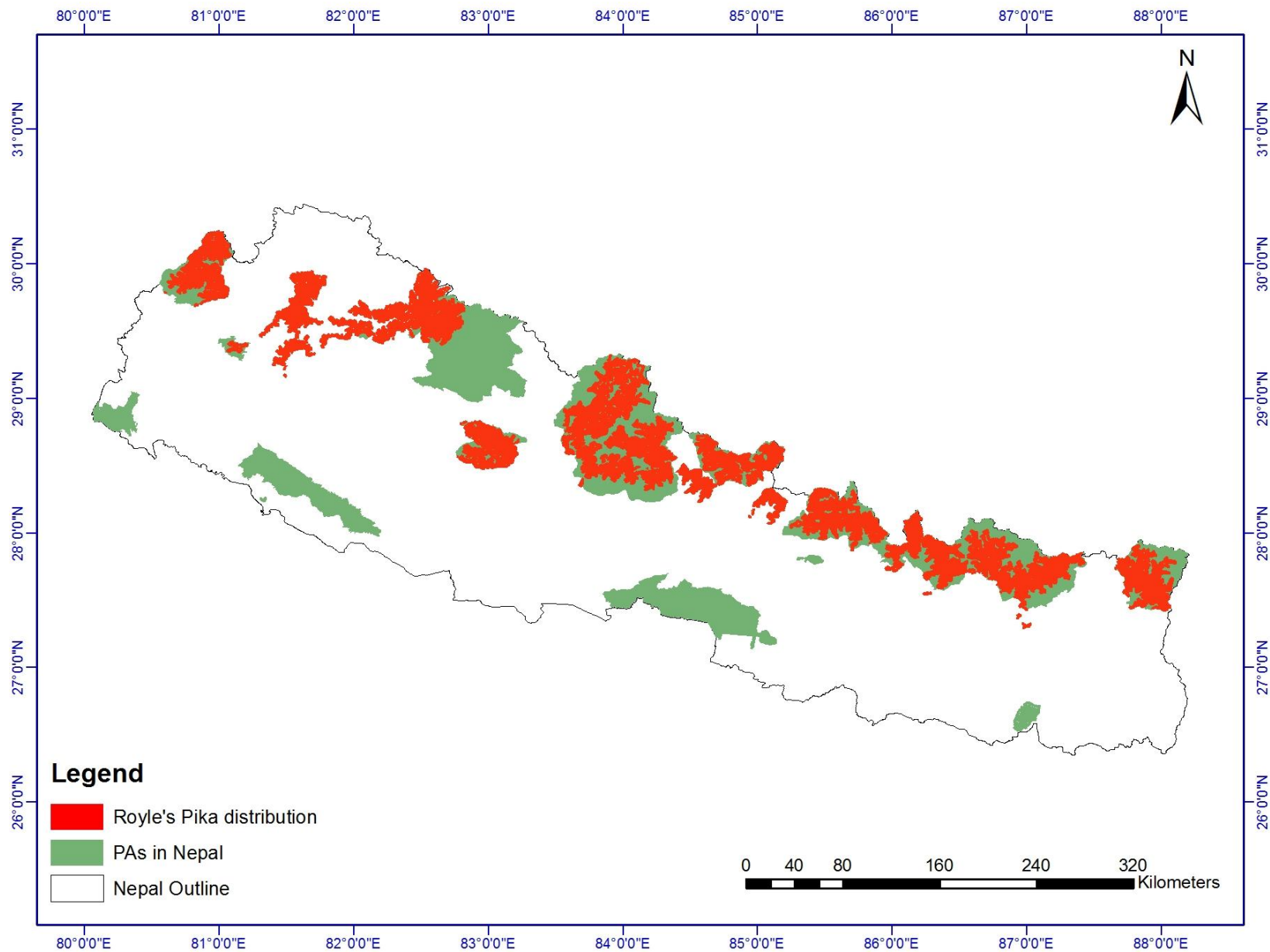


Figure 4: Distribution map of Royle's Pika in Nepal

Somdang (3300 m asl) of Ganesh Himal (Khanal, 2007); Panchpokhari (Pradhan et al., 2009; DHR situated at 23°30'N, 82°50'E and 28°50'N, 83°15'E (Aryal et al., 2010); KNP (Joshi, 2013); Kaustuv Raj Neupane pers. comm. 2012); Khaptad Daha, in the vicinity of Bichpani, KNP (Jeevan Rai pers. comm. 2018; Raj Prasai pers. comm. 2018); Nyalamo at an elevation of 3479 m asl and Aalobari at an elevation of 3700 m asl in Marpha, ACA (Lama, 2013 as *O. himalayna*); Ghopte bhir (cliff), LNP, Everest Base Camp at an elevation more than 5000 m asl (Rajendra Gurung pers. obs. 2018); Parbati Kunda, Gatlang, Rasuwa District (Mohan Bikram Shrestha pers. comm. 2018); Above Sing Gompa, LNP (Ashish Shrestha pers. comm. 2017); above Torongden, KCA, Machhapuchhre Base Camp (Phurkel Sherpa pers. comm. 2017); Annapurna Base Camp, a little up on the slope toward the glacier, almost at the edge of the plateau (Svetlana Vashkevich pers. comm. 2017); Tilicho Lake, Ghunsa behind Selele pass, Tseram, way to Gosainkundaa from Syabru side above lauribina, Gosainkundaa, Panchpokhari, Sindhupalchok District, behind Thorong La, way to Muktinath (Susanne Kühnel pers. comm. 2017); Chhonhup, upper Mustang (Rishi Baral pers. comm. 2017); Ghodatabela, LNP (Tek Gharti Magar pers. comm. 2017); Chhongor, Manang District (https://tashirghale.com/portfolio_animal.html); in between Annapurna Base Camp and Machhapuchhre Base Camp, ACA (Mary Crosby pers. comm. 2017); in the vicinity of Beding village, Dolakha District (Vimal Thapa pers. comm. 2018); Topkegola, Taplejung District (Min Bahadur Gurung pers. comm. 2018); Mugu village, Mugu District (Jeevan Rai pers. comm. 2018; Raj Prasai pers. comm. 2018).

Museum specimens of the species revealed following localities: Dhobann (Dovan), 6 miles N.E. of Those (FMNH 94087); Dhobann, 8 miles N.E. of Those (FMNH 94088); Gosenkunde (Gosainkunda) (FMNH 104180—FMNH 104183); Khumjung (FMNH 142073—FMNH 142075); Num (near) (FMNH 114631, FMNH 114632); Num (near) (FMNH 114633, FMNH 114634); Phulung Ghyang (FMNH 57767, FMNH 57785—FMNH

57789, FMNH 104176); Sottidanda (FMNH 82824 and FMNH 82825); Uring Ghyang (FMNH 142072) (F.M.N.H., all as *O. r. nipalensis*); Barun River Valley (MVZ 119401); Phulung Ghyang (PSM 14769—PSM 14772, PSM 15547—PSM 15549, PSM 16345); Dhukphu (ROM 74721); Gosainkunda Lakes (ROM 74659); Khumjung (ROM 74672); Maharigaon (ROM 74697); Thare Pati, Uring Ghyang (ROM 74657) (Pearch, 2011).

They are distributed between elevations of 2650 m asl (fecal pellets deposition) (Kawamichi, 1971) to 4300 m asl (Kawamichhi, 1968; Abe, 1971). Even much higher than this elevation; For example, an individual has been photographed from Everest Base Camp at an elevation above 5000 m asl (Rajendra Gurung pers. obs.2018); a specimen was collected from Lobuche (5300 m asl as *O. angdawai*; Mitchell, 1978); base of the south western face of Mt. Makalu (5950 m asl) (Daniel & Hanzák, 1985). Specifically it is reported from ablation zone with moraines covered with patches of alpine scrubs and grasses, surrounded by numerous ice pinnacles in the close vicinity of Khumbu Glacier (Biswas & Khajuria, 1955); rhododendron and alpine scrub just above the coniferous forest at upper boundary of Gosainkunda Village at elevation 4300 m asl; grassy pastures between Dhounche (Dhunche) and Gosainkunda Village (3500 m asl) and Juniper-Rhododendron forest near Tharepati, south of Gosainkunda Village at an elevation of 3500 m asl) in central Nepal as well as pasturelands in between rhododendron forest at upper course of Drandi (probably Daraudi) Khola, northern valley of Gurkha (Gorkha District) at an altitude of 3300 m asl (Kawamichii, 1968); dense rhododendron forest along Dudh Koshi River below Namche Bazar (2800 m asl) to Makyong near Deboche (4150 m asl), Seti Gompa (2650 m asl) in between Phaplu and Those, near Thyangboche (Tengboche) Gompa at an altitude of 3800-4000 m asl, Khumjung (Kawamichi, 1971); slope around the lake, covered with boulders and scanty alpine plants such as primulas, sedges, and mosses at Gosainkunda (4300 m asl), summer pasture land surrounded by stony slope which is covered with mosses,

dwarf rhododendrons, and junipers at Thare Pati, top (3300 m asl) of the south ridge of Thare Pati (Abe, 1971); terraces densely overgrown with low creeping shrubs in the bank of Barun River, accumulated pile of rock fall or landslide debris covered with turf and moss and forest edge at Phematan (3450 m asl), forest edge dominated by fir trees with boulders in which turf are scattered at Yanle Kharka (3600 m asl), boulders scattered at the base of a large fossil moraine in close vicinity of the base camp in front of the Barun Glacier (4900 m asl), granite debris eluvium at the edge of pronounced rock ridge between glaciers above the snowline at the base of the southwestern face of Mt. Makalu at an elevation of 5950 m asl (Daniel & Hanzák, 1985). *Betula-Rhododendron* mixed forest in ANCA. Koju et al. (2012) estimated a density of 14 per ha for *O. roylli* in Gosainkundaa area, LNP and 7.2 -8 per ha in ANCA (Koju & Chalise, 2013) based on head counts.



Photo 22: Royle's Pika at Topkegola, Taplejung (Photo: Min Bahadur Gurung)

The main habitat of the Royle's Pika is slide rock area in which there are many interspaces for the subterranean runway and also for the nest chamber (Kawamichi, 1971). The habitat which is usually situated at the alpine zone is covered with lichens, mosses or grasses. It sometime extends into the lower rhododendron forest zone. The summer huts in the pasturelands or rangelands of the natives are also used as a part of the habitat at Gosainkunda and Thare Pati (Abe, 1971).

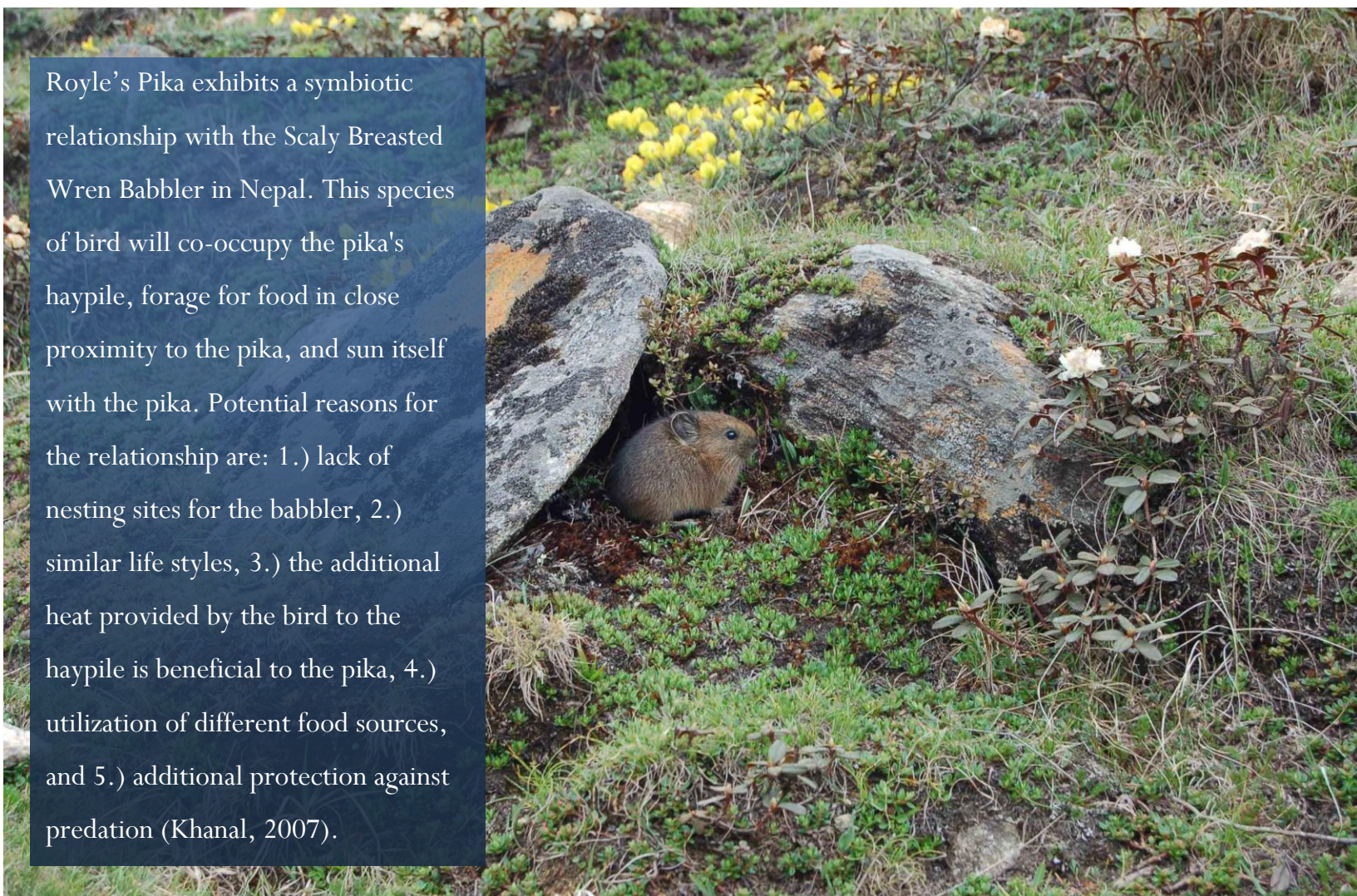
They are found in open and forested areas too, however, not deep as suggested from the deposition of fecal pellets (Kawamichi, 1971). They often prefer pine forests on steep slopes and can be seen sheltering under rocks and piles of litter debris (Suwal & Verheugt, 1995); Majupuria & Kumar [Majupuria], 2006); inhabits boulder strewn slopes and talus in temperate zone (Molur et al., 2005); talus-dwelling species (Smith et al., 1990).



Photo 23: Royle's Pika in between Annapurna Base Camp and Machhapuchhre Base Camp, ACA (Photo: Mary Crosby)

Habit

Royle's Pika is a primarily crepuscular and coprophagous in nature. They live in groups composed of parents and their offspring, with low densities (12.5 per ha) characteristic of talus-dwelling pikas. Females of the species may produce one or two litters annually with an average of three offspring per litter (Smith et al., 1990). Two adult females from Gosainkunda had already given birth to the young and had placental scars in the uteri, the number being three and two, respectively. Moreover, one of them contained a second litter consisting of five embryos. On the other hand, many juveniles were observed on the slide rock area and around the Kharka at Thare Pati. Two adult females from this locality still contained two and four embryos, respectively. The adult males examined also retained well developed reproductive organs (Abe, 1971).



Royle's Pika exhibits a symbiotic relationship with the Scaly Breasted Wren Babbler in Nepal. This species of bird will co-occupy the pika's haypile, forage for food in close proximity to the pika, and sun itself with the pika. Potential reasons for the relationship are: 1.) lack of nesting sites for the babbler, 2.) similar life styles, 3.) the additional heat provided by the bird to the haypile is beneficial to the pika, 4.) utilization of different food sources, and 5.) additional protection against predation (Khanal, 2007).

Its overall activities include running, leaping, musing and foraging. Leaping is similar to that in hares despite short hind paws. Musing mostly occurs during intermittent light conditions and can be categorized into three types; short, intermediate and long musings similar to that of *O. macrotis*, the only difference is occurrence of dreamy musing in long musing.

Surprisingly, observer disturbance do not affect during such dreamy musings (Kawamichi, 1971). One of the most characteristic habits of the pika is the calling behavior. The pikas of the Gosainkunda range, however, by no means makes the posture of the behavior and hence produce no characteristic high calls (Kawamichi, 1968), however, produce a low guttural



Royle's Pika forages on various plant species. Royle's Pika is synanthropic, especially in Dewche village and Gosainkunda area where these animals use interspaces between walls made from piles of flat rocks (suggested by the fecal pellets deposited) (Kawamichi, 1971). In general, Royle's Pika was not observed active during winter in storing hay pile (hoarding forage plants) besides few exceptions in eastern and central Nepal (Kawamichi, 1971; Khanal and Shrestha, 2000; (Koju & Chalise, 2014) and also in ANCA during 2012 and 2013 (Koju & Chalise, 2013). In contrast to this, in Bajura District, far western of Nepal, it accumulated 33 plant species in its hay piles amongst 48 species of plants within its home range. Those contain herbs, shrubs and grasses along with their flower and fruits (Shrestha et al., 1999).

Photo 25: Royle's Pika at Beding village in Dolakha (Photo: Vimal Thapa)

sound sometimes heard at nearer distance (Abe, 1971). In Khumbu area, calls of Royle's Pika are comparatively frequent (63 calls heard by two days produced by 3 individual) but feeble than that of *O. macrotis* (the calls was lost at 10m apart) (something like faint and high tone bell ringing). They utter calls mostly in the morning and evening during October, and even while in locomotion, musing, foraging and while escaping to holes. Green herbs (73.9%) and mosses (26.1%) were found in its stomach of nine individuals examined (Abe, 1971). The maximum number of this species is seen near water bodies. They spend most of the time inside their burrows and appear out of their burrows for foraging generally during dawn and dusk. Species richness of plants foraged by the species depends upon the availability of vegetation in the area, however, correlation was not found on foraging plant species composition with elevation. It feeds upon small grasses, moss, lichens and small shrub, preferably easier to collect. The foraging plant species includes *Poa* spp., *Fragaria nubicola*, *Rumex nepalensis*, *Ligularia amplexicaulis*, *Fragaria daltoniana*, *Potentilla flugens*, *Ranunculus* sp., *Caltha palustris* and unidentified species of families Graminae and Apiaceae at Gosainkundaa area (Koju, 2013).

The species does not hibernate in higher Himalayas in Nepal (Kawamichi, 1968; 1971). During mid of October to end of December, a few individuals were noticed inactive despite the absence of snow layer, however, several individuals exhibited similar trends of behaviour during October but long musing was absent and diurnal extra-nidal activities gets reduced in winter, even they continue some activities at very low temperatures. In Gosainkunda area, size of home range of two individuals was estimated 30X42 sq. m. (actual extent 82 m²) and 25X39 sq. m. (actual extent 83 m²). About 60% of the home range was communally used. Two individuals consciously encountered with each other but the encounter was rarely accidental. The response during the encounter indicates occurrence of relationship suggesting a social order. Orange colored mites are found infested largely in their ears. It exhibits trembling (shaking whole body or body parts) along with biting and scratching

probably to avoid nuisance by parasites during and at the end of musing. It also exhibits inspection during musing, foraging and after entering the nest hole. Diurnal rhythm (activities) of *O. roylli* is similar to that of *O. macrotis*, however, differs in the time of activities. Maximum activity in *O. roylli* occurs before sunrise (dawn) and after sunset (dusk). Structure of nest range is similar to that of *O. macrotis*. While chasing, it produce feeble calls which possibly serve for a communicative device. Winter activities, call production, food hoarding (storing haypile) exhibited by the species differs according to habitat and locations. Prematurely, this difference may be either due to environmental or genetic or both differences (Kawamichi, 1971).

Predator

Royle's Pika was most frequently found in the Red Fox diet during the spring at DHR (Aryal et al., 2010). This species are also preyed by the rapture birds found in high altitudes. It is prey of snow leopard (Jackson, 1996), Yellow Throated Marten and bird of prey (Holzner & Kriechbaum, 2001). Weasels and Yellow Throated Marten regularly visit its nest holes and habitat, however, direct attack or preying was not confirmed (Kawamichi, 1971). Weasels, Grey wolf, Golden Jackals prey upon this species in higher Himalayas of Nepal.



Photo 26: Royle's Pika near Salpa Pokhari at the altitude of 3440 m asl, Bhojpur District in August, 2009 (Photo: Badri Binod Dahal)



Discussion and Conclusion

Nepal harbors altogether four species of Pikas. Previously, *O. himalayana* Feng, 1923 (Himalayan Pika) had been included as a species in Nepal by Shrestha (1997), Srinivasulu et al. (2004), Majupuria & Kumar [Majupuria] (2006), Jnawali et al (2011), Amin et al. (2018). The latter authors followed Chapman & Flux (1990). However, Suwal & Verheugt (1995) did not include it. Similarly, T.P. Bhattacharya and S. Chakraborty placed personal comment on authenticity of this species identification and report from SNP in Nepal based upon Shrestha (1997) as doubtful (Molur et al., 2005).

Photo 27: Pika (unidentified species) at Tugling, upper Humla (Photo: Naresh Kusi)

Smith & Johnston (2008) remarked “CAMP speculate that the form may cross the Himalayan crest and enter Nepal; there currently is no evidence to support this claim”. Until recently *O. himalayana* was suggested synonyms or sub species of *O. roylli* (Lissovsky, 2014). Similarly, *O. lama* reported in Mitchell & Punzo (1975), Mitchell (1978), Abe (1982) and Jnawali et al. (2011) exist no longer separately, but has been included in *O. nubrica* (Hoffmann and Smith, 2005). Similarly, *O. daurica curzoniae* (Hodgson, 1858) reported by Mitchell & Derksen (1976) and Mitchell (1978) and *O. daurica* reported by Abe (1982) exist no longer separately, but has been included in the group *O. curzoniae* (Hoffmann & Smith, 2005).

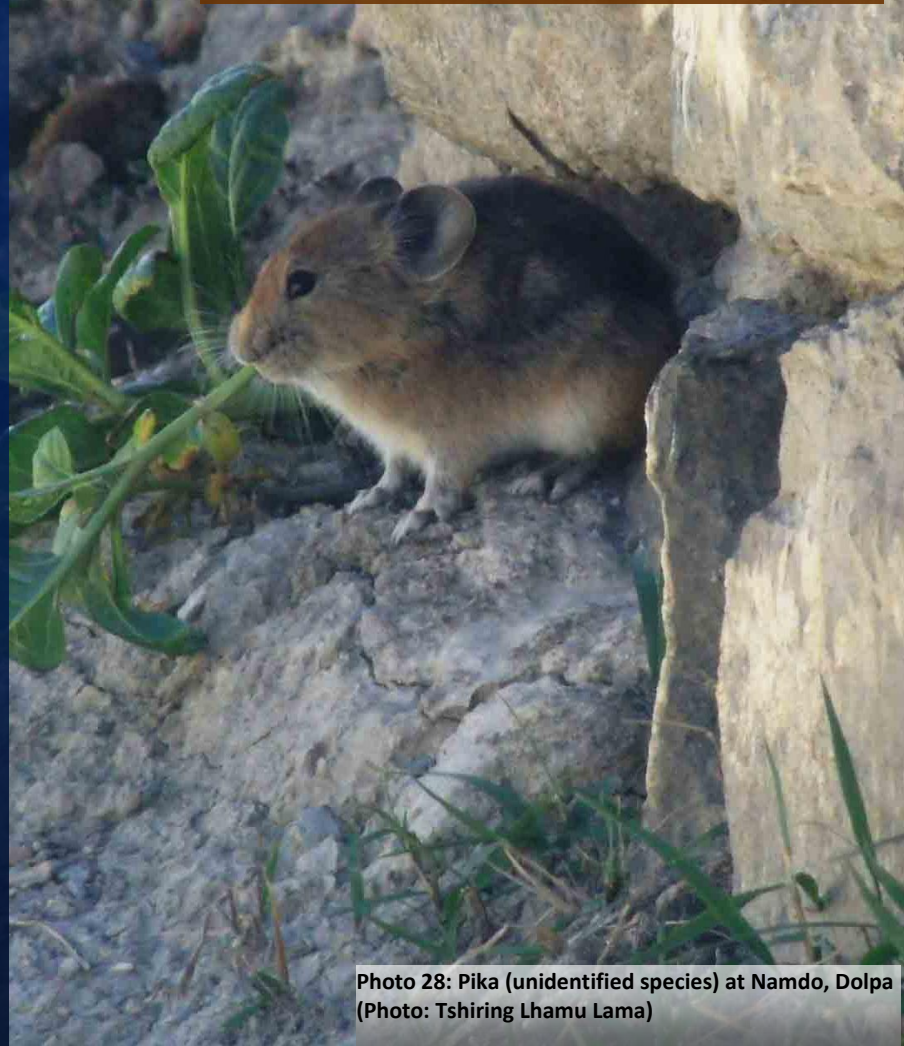


Photo 28: Pika (unidentified species) at Namdo, Dolpa (Photo: Tshiring Lhamu Lama)

Distribution range and localities are confusing in the case of SPNP, RNP, and Shivapuri Watershed and Wildlife Reserve (currently SNNP) (Suwal & Verheugt, 1995), as there is no supporting literature or any evidence so far. Srinivasulu et al. (2004) included Forrest's Pika *O. forresti* Thomas, 1923 in the list of pikas from Nepal but excluded *O. thibetana*. Molur et al. (2005) again excluded *O. thibetana* and also *O. forresti*. However, recent investigations have revealed that *O. forresti* ranges from North West Yunnan to northern Myanmar (Smith & Liu, 2016⁴).



Photo 29: Pika (unidentified species) at Machhermo, Everest Region
(Photo: Tek Gharti Magar)

⁴ Smith, A.T. & Liu, S. 2016. *Ochotona forresti*. The IUCN Red List of Threatened Species 2016: e.T15048A45178927. <http://dx.doi.org/10.2305/IUCN.UK.2016-3.RLTS.T15048A45178927.en>. Downloaded on 06 July 2018.

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Photo 30: A pika (probably juvenile Royle's Pika) at Birendra Tal, Samagaun, MCA (Photo: Biraj Shrestha)

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.
- Supporting freelancers/ students/ conservationists technically and financially for the conservation and research of small mammals in terms of the thesis/case studies/individual research.



Small Mammals Conservation and Research Foundation

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

E-mail: info@smcrf.org

www.smcrf.org