

Building evidence for conservation globally

Journal of Threatened Taxa



10.11609/jott.2022.14.9.21751-21902
www.threatenedtaxa.org

26 September 2022 (Online & Print)
14(9): 21751-21902
ISSN 0974-7907 (Online)
ISSN 0974-7893 (Print)

Open Access



ISSN 0974-7907 (Online); ISSN 0974-7893 (Print)

Publisher
Wildlife Information Liaison Development Society
www.wild.zooreach.org

Host
Zoo Outreach Organization
www.zooreach.org

No. 12, Thiruvannamalai Nagar, Saravanampatti - Kalapatti Road, Saravanampatti,
Coimbatore, Tamil Nadu 641035, India
Ph: +91 9385339863 | www.threatenedtaxa.org
Email: sanjay@threatenedtaxa.org

EDITORS

Founder & Chief Editor

Dr. Sanjay Molur

Wildlife Information Liaison Development (WILD) Society & Zoo Outreach Organization (ZOO),
12 Thiruvannamalai Nagar, Saravanampatti, Coimbatore, Tamil Nadu 641035, India

Deputy Chief Editor

Dr. Neelesh Dahanukar

Noida, Uttar Pradesh, India

Managing Editor

Mr. B. Ravichandran, WILD/ZOO, Coimbatore, India

Associate Editors

Dr. Mandar Paingankar, Government Science College Gadchiroli, Maharashtra 442605, India

Dr. Ulrike Streicher, Wildlife Veterinarian, Eugene, Oregon, USA

Ms. Priyanka Iyer, ZOO/WILD, Coimbatore, Tamil Nadu 641035, India

Dr. B.A. Daniel, ZOO/WILD, Coimbatore, Tamil Nadu 641035, India

Editorial Board

Dr. Russel Mittermeier

Executive Vice Chair, Conservation International, Arlington, Virginia 22202, USA

Prof. Mewa Singh Ph.D., FASC, FNA, FNASC, FNAPsy

Ramanna Fellow and Life-Long Distinguished Professor, Biopsychology Laboratory, and
Institute of Excellence, University of Mysore, Mysuru, Karnataka 570006, India; Honorary
Professor, Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore; and Adjunct
Professor, National Institute of Advanced Studies, Bangalore

Stephen D. Nash

Scientific Illustration, Conservation International, Dept. of Anatomical Sciences, Health Sciences
Center, T-8, Room 045, Stony Brook University, Stony Brook, NY 11794-8081, USA

Dr. Fred Pluthero

Toronto, Canada

Dr. Priya Davidar

Sigur Nature Trust, Chadapatti, Mavinhalla PO, Nilgiris, Tamil Nadu 643223, India

Dr. Martin Fisher

Senior Associate Professor, Battcock Centre for Experimental Astrophysics, Cavendish
Laboratory, JJ Thomson Avenue, Cambridge CB3 0HE, UK

Dr. John Fellowes

Honorary Assistant Professor, The Kadoorie Institute, 8/F, T.T. Tsui Building, The University of
Hong Kong, Pokfulam Road, Hong Kong

Prof. Dr. Mirco Solé

Universidade Estadual de Santa Cruz, Departamento de Ciências Biológicas, Vice-coordenador
do Programa de Pós-Graduação em Zoologia, Rodovia Ilhéus/Itabuna, Km 16 (45662-000)
Salobrinho, Ilhéus - Bahia - Brasil

Dr. Rajeev Raghavan

Professor of Taxonomy, Kerala University of Fisheries & Ocean Studies, Kochi, Kerala, India

English Editors

Mrs. Mira Bhojwani, Pune, India

Dr. Fred Pluthero, Toronto, Canada

Mr. P. Ilangoan, Chennai, India

Web Development

Mrs. Latha G. Ravikumar, ZOO/WILD, Coimbatore, India

Typesetting

Mrs. Radhika, ZOO, Coimbatore, India

Mrs. Geetha, ZOO, Coimbatore India

Fundraising/Communications

Mrs. Payal B. Molur, Coimbatore, India

Subject Editors 2019–2021

Fungi

Dr. B. Shivaraju, Bengaluru, Karnataka, India

Dr. R.K. Verma, Tropical Forest Research Institute, Jabalpur, India

Dr. Vatsavaya S. Raju, Kakatiya University, Warangal, Andhra Pradesh, India

Dr. M. Krishnappa, Jnana Sahyadri, Kuvempu University, Shimoga, Karnataka, India

Dr. K.R. Sridhar, Mangalore University, Mangalagangothri, Mangalore, Karnataka, India

Dr. Gunjan Biswas, Vidyasagar University, Midnapore, West Bengal, India

Plants

Dr. G.P. Sinha, Botanical Survey of India, Allahabad, India

Dr. N.P. Balakrishnan, Ret. Joint Director, BSI, Coimbatore, India

Dr. Shonil Bhagwat, Open University and University of Oxford, UK

Prof. D.J. Bhat, Retd. Professor, Goa University, Goa, India

Dr. Ferdinando Boero, Università del Salento, Lecce, Italy

Dr. Dale R. Calder, Royal Ontario Museum, Toronto, Ontario, Canada

Dr. Cleofas Cervancia, Univ. of Philippines Los Baños College Laguna, Philippines

Dr. F.B. Vincent Florens, University of Mauritius, Mauritius

Dr. Merlin Franco, Curtin University, Malaysia

Dr. V. Irudayaraj, St. Xavier's College, Palayamkottai, Tamil Nadu, India

Dr. B.S. Kholia, Botanical Survey of India, Gangtok, Sikkim, India

Dr. Pankaj Kumar, Kadoorie Farm and Botanic Garden Corporation, Hong Kong S.A.R., China

Dr. V. Sampath Kumar, Botanical Survey of India, Howrah, West Bengal, India

Dr. A.J. Solomon Raju, Andhra University, Visakhapatnam, India

Dr. Vijayasankar Raman, University of Mississippi, USA

Dr. B. Ravi Prasad Rao, Sri Krishnadevaraya University, Anantpur, India

Dr. K. Ravikumar, FRLHT, Bengaluru, Karnataka, India

Dr. Aparna Watve, Pune, Maharashtra, India

Dr. Qiang Liu, Xishuangbanna Tropical Botanical Garden, Yunnan, China

Dr. Noor Azhar Mohamed Shazili, Universiti Malaysia Terengganu, Kuala Terengganu, Malaysia

Dr. M.K. Vasudeva Rao, Shiv Ranjani Housing Society, Pune, Maharashtra, India

Prof. A.J. Solomon Raju, Andhra University, Visakhapatnam, India

Dr. Mandar Datar, Agharkar Research Institute, Pune, Maharashtra, India

Dr. M.K. Janarthanam, Goa University, Goa, India

Dr. K. Karthigeyan, Botanical Survey of India, India

Dr. Errol Vela, University of Montpellier, Montpellier, France

Dr. P. Lakshminarasimhan, Botanical Survey of India, Howrah, India

Dr. Larry R. Noblick, Montgomery Botanical Center, Miami, USA

Dr. K. Haridasan, Pallavur, Palakkad District, Kerala, India

Dr. Analinda Manila-Fajard, University of the Philippines Los Baños, Laguna, Philippines

Dr. P.A. Sinu, Central University of Kerala, Kasaragod, Kerala, India

Dr. Afroz Alam, Banasthali Vidyapeeth (accredited A grade by NAAC), Rajasthan, India

Dr. K.P. Rajesh, Zamorin's Guruvayurappan College, GA College PO, Kozhikode, Kerala, India

Dr. David E. Boufford, Harvard University Herbaria, Cambridge, MA 02138-2020, USA

Dr. Ritesh Kumar Choudhary, Agharkar Research Institute, Pune, Maharashtra, India

Dr. Navendu Page, Wildlife Institute of India, Chandrabani, Dehradun, Uttarakhand, India

Dr. Kannan C.S. Warrior, Institute of Forest Genetics and Tree Breeding, Tamil Nadu, India

Invertebrates

Dr. R.K. Avasthi, Rohtak University, Haryana, India

Dr. D.B. Bastawade, Maharashtra, India

Dr. Partha Pratim Bhattacharjee, Tripura University, Suryamaninagar, India

Dr. Kailash Chandra, Zoological Survey of India, Jabalpur, Madhya Pradesh, India

Dr. Ansie Dippenaar-Schoeman, University of Pretoria, Queenswood, South Africa

Dr. Rory Dow, National Museum of Natural History Naturalis, The Netherlands

Dr. Brian Fisher, California Academy of Sciences, USA

Dr. Richard Gallon, Ilandudno, North Wales, LL30 1UP

Dr. Hemant V. Ghate, Modern College, Pune, India

Dr. M. Monwar Hossain, Jahangirnagar University, Dhaka, Bangladesh

Mr. Jatishwor Singh Irungbam, Biology Centre CAS, Branišovská, Czech Republic.

Dr. Ian J. Kitching, Natural History Museum, Cromwell Road, UK

For Focus, Scope, Aims, and Policies, visit https://threatenedtaxa.org/index.php/JoTT/aims_scope

For Article Submission Guidelines, visit <https://threatenedtaxa.org/index.php/JoTT/about/submissions>

For Policies against Scientific Misconduct, visit https://threatenedtaxa.org/index.php/JoTT/policies_various

continued on the back inside cover

Cover: *Pipistrellus tenuis* recorded during the small mammalian fauna study, Manipur, India. © Uttam Saikia.



First camera-trap confirmation of Tibetan Brown Bear *Ursus arctos pruinosus* Blyth, 1854 (Mammalia: Carnivora: Ursidae) with a review of its distribution and status in Nepal

Madhu Chetri 

National Trust for Nature Conservation, P.O. Box.3712, Khumaltar, Lalitpur, Nepal.
Faculty of Applied Ecology, Agricultural Sciences and Biotechnology, Inland Norway University of Applied Sciences,
NO-2480 Koppang, Norway.
mchetri@gmail.com

Abstract: The Tibetan Brown Bear *Ursus arctos pruinosus* is a large mammalian carnivore of high-altitude environments that is closely associated with the pastoral landscape. Limited information is available on this species, probably due to its rarity in the Himalaya. To date, scientific evidence of the presence of Tibetan Brown Bears has not been reported officially. The information presented here is based on data collected in the central Himalayan region of Nepal in 2003–2014 during biodiversity surveys and other research. Methods included random walks along livestock trails, transect surveys, opportunistic camera trapping, and herders' reports & interviews. This is the first camera-trap confirmation of the Tibetan Brown Bear in the central Himalaya. The distribution map was updated based on direct observation, signs and field reports gathered from reliable sources. The presence of signs (diggings, footprints, and feces) and direct observation in the Annapurna-Manaslu landscape reveal that bears are closely associated with Himalayan marmots and other small rodents. Local folklore, legends, and cultural beliefs have played important roles in Brown Bear conservation in the central Himalaya.

Keywords: Distribution, first record, central Himalaya, subspecies.

Editor: Anwaruddin Choudhury, The Rhino Foundation for Nature in North East India, Guwahati, India. **Date of publication:** 26 September 2022 (online & print)

Citation: Chetri, M. (2022). First camera-trap confirmation of Tibetan Brown Bear *Ursus arctos pruinosus* Blyth, 1854 (Mammalia: Carnivora: Ursidae) with a review of its distribution and status in Nepal. *Journal of Threatened Taxa* 14(9): 21797–21804. <https://doi.org/10.11609/jott.7797.14.9.21797-21804>

Copyright: © Chetri 2022. Creative Commons Attribution 4.0 International License. JoTT allows unrestricted use, reproduction, and distribution of this article in any medium by providing adequate credit to the author(s) and the source of publication.

Funding: A series of biodiversity surveys in the upper Mustang region is funded by UNDP/GEF project. My Ph.D. project was funded by the Norwegian State Education Loan Fund (Lånekassen), Inland Norway University of Applied Sciences. The fieldwork was supported by the Panthera-the Kaplan Graduate Award, and the National Trust for Nature Conservation.

Competing interests: The author declares no competing interests.

Author details: MADHU CHETRI: Project Chief, National Trust for Nature Conservation-Gaurishankar Conservation Area Project.

Acknowledgements: I would like to thank sincerely Dr. Xue Yadong and his team at the Institute of Forest Ecology, Environment and Protection, Chinese Academy of Forestry for the identification of the species. Similarly, I am grateful to Dr. Dave Garshelis, Instructor, Center for Wildlife Studies, and Co-Chair, IUCN SSC Bear Specialist Group for further confirmation of the sub-species. The field staff of ACA and MCA, and the local communities for their support during various field surveys. I am also grateful to Prof. Morten Odden for covering the Article Processing Contribution from the project "Capacity building for joint education and research in applied ecology"—a collaborative project coordinated by the Inland Norway University of Applied Sciences, Kathmandu University, and the National Trust for Nature Conservation, Nepal.



INTRODUCTION

Bears are distributed in a wide variety of habitats. Of eight global species, three are found in Nepal: the Sloth Bear *Melursus ursinus*, the Asiatic Black Bear *Ursus tibetanus*, and the Brown Bear *Ursus arctos* (Chetri 2008). The habitats of these species in Nepal are separated by altitude; Sloth Bears are mainly distributed in the lowland protected areas and Terai plains (<1,000 m), the Asiatic Black Bear in the middle mountains up to the treeline (>1,000 m up to 4,000 m), and the Brown Bear above the treeline (4,000–6,000 m; Madhu Chetri pers. obs.). The Brown Bear is a protected species under the National Park and Wildlife Conservation Act of 1973 of the government of Nepal (GoN). The taxonomic classification of this species at the subspecies level is contradictory (<https://dnpwc.gov.np/en/mammals/>). In the protected list of GoN it is listed as Himalayan Brown Bear. Similarly, a recent taxonomic study revealed that the Asiatic Black Bear found in the Nepal Himalaya belongs to a subspecies Himalayan Black Bear *Ursus tibetanus laniger* (Kadariya et al. 2018).

In the Himalaya, information concerning Brown Bears is limited (Chetri 2008; Aryal et al. 2010). In nearby China, a population of about 5,000 bears has been reported (Wu 2014). Brown Bears often come into conflict with humans by killing livestock. In Qinghai-Tibetan Plateau they are considered dangerous as they damage houses and injure people (Worthy & Foggin 2008). The population of Brown Bear in Nepal is estimated to be as few as 20 individuals (Jnawali et al. 2011), based on anecdotal reports. Bear signs (diggings, pugmarks, and feces) are mostly seen during the summer in high-altitude pastures. Their fur color ranges from sandy to reddish-brown, and varies individually and seasonally from dark to light. White tips in their hair give the coat a silvery tinge, nose color variable, patches of variable size, and often show a shoulder hump distinctive from other bears. Usually, they have a highly variable white, cream, or buffy collar across the shoulder. They feed on grasses, forbs, berries, roots, insects, and other small mammals as well (Aryal et al. 2012; Nawaz et al. 2019).

To date, very little ecological research has been done on Brown Bears in the Himalaya. The species is listed on the IUCN Red List of Threatened Animals as 'Least Concern' (McLellan et al. 2017). In Nepal, the Brown Bear is listed as Critically Endangered in the National Red Data List (Jnawali et al. 2011) and protected under schedule 1 of the National Parks and Wildlife Conservation (NPWC) Act, 1973. Brown Bears are also listed under Appendix II of the Convention of International Trade in Endangered

Species of Wild Fauna and Flora (CITES 2019).

The main objective of this study was to provide information with regards to the camera trap records of Tibetan Brown Bear in upper Mustang, and update distribution information for the Nepal Himalaya. The present manuscript resulted from the long-term systematic biodiversity surveys and monitoring (2003–2014) in the Annapurna-Manaslu landscape.

MATERIALS AND METHODS

Study area

The main study area is located (28–29°N, 83–85°E) in the northern part of Annapurna Conservation Area (ACA) and the Manaslu Conservation Area (MCA) in the central Himalaya of Nepal (Figure 1). These two conservation areas represent 27% of the protected areas (<http://www.dnpwc.gov.np>) and harbor a unique assemblage of trans- and semi-Himalayan flora and fauna diversity of global significance. The distribution of species is also governed by topography, microhabitats, and altitudinal gradients. Above the treeline, the areas represent a grassland typical of the Tibetan plateau and landscapes continue to the Tibetan Autonomous Region of the People's Republic of China. The Bharal *Pseudois nayaur*, Tibetan Argali *Ovis ammon hodgsoni*, Kiang *Equus kiang*, and Tibetan Gazelle *Procapra picticaudata* are the dominant ungulates found in Brown Bear habitats. The grassland habitats also support the Himalayan Marmot *Marmota himalayensis*, along with several species of pikas and voles. The high-altitude habitats are also home to several predator species such as Snow Leopard *Panthera uncia*, Himalayan Wolf *Canis lupus chanco*, Golden Jackal *Canis aureus*, Red Fox *Vulpes vulpes*, Tibetan Sand Fox *Vulpes ferrilata*, Eurasian Lynx *Lynx lynx*, weasels *Mustela* spp., and marten *Martes* spp.

The local economy is mainly based on animal husbandry. The main livestock consists of yaks, cattle-yak hybrids (dzo, jhopas), dwarf lulu cows, horses, goats, and sheep. Local people residing within the conservation area use all accessible areas for livestock grazing. In the study area, the density of livestock is five times higher than that of wild ungulates (Chetri et al. 2017).

Field surveys, data collection and compilation

Information about Brown Bears was compiled from various biodiversity and monitoring surveys, village reports, and interviews. In 2003–2006, four biodiversity monitoring efforts were conducted in the upper Mustang of ACA as part of the requirement of the

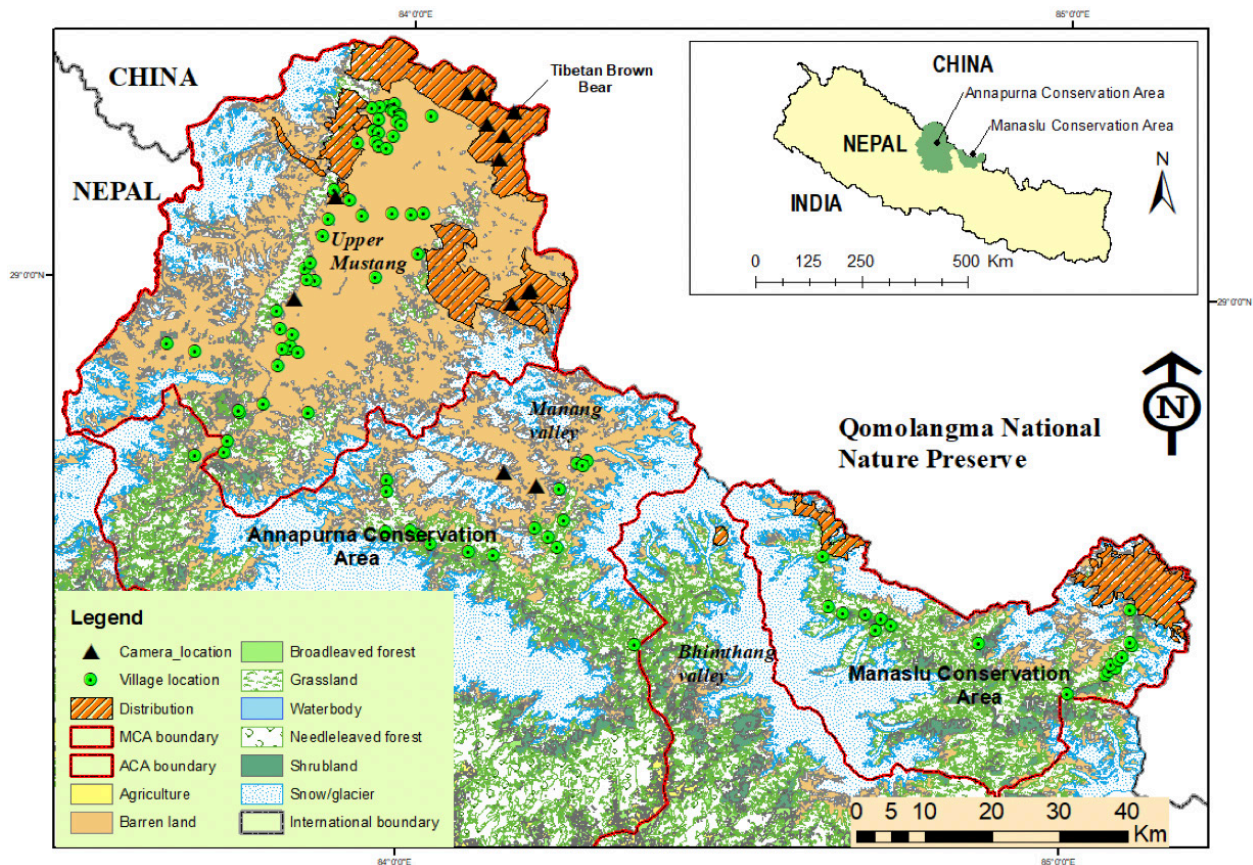


Figure 1. Map showing the location of Tibetan Brown Bear record sites and distribution of signs in Annapurna-Manaslu landscape, central Himalaya.

biodiversity conservation project funded by the UNDP-Global Environment Facility. The surveys in 2007–2008 and 2011–2012 in ACA and MCA were conducted as part of the biodiversity monitoring program of the National Trust for Nature Conservation through its Annapurna and Manaslu Conservation Area Project. The survey in 2013–2014 was a part of the author's Ph.D. fieldwork. Altogether, 10 years of survey data were compiled to show the distribution pattern of the Brown Bear in the Annapurna-Manaslu landscape. Data were collected from a random walk along the livestock trails (2003–2012), and well-defined transects (2013–2014). The occurrence of the Tibetan Brown Bear was confirmed through camera trap images. Observation of signs such as digging, feces, and footprints were also recorded from the same landscape. The Brown Bear digging signs are easy to identify as it excavates the pasture area in search of Himalayan Marmot, which is also an important prey (Chetri 2008; Aryal et al. 2010). Additionally, digging areas contain claw marks, pugmarks and sometimes hairs. Feces is easy to identify as it is usually deposited in the form of a dung pile (Image 1). Feces in the form of

single scat are very large compared to Snow Leopards, Wolves, and Red Foxes, whose habitats are closely associated with Brown Bear in the study area. Only fresh signs were recorded as bear presence. In addition, during 2013–2014, six Reconyx HC550 HyperFire camera traps were used to obtain photographs of the species. The cameras were set in a strategic location where the probability of getting pictures was higher. Camera traps were deployed in 12 locations and the number of camera traps days varied (1–42 days) depending on survey time, availability of suitable habitats, human disturbances, and duration of field works (Figure 1). Besides, possible areas were scanned from the vantage point in the early morning and the afternoon using binoculars (10 x 50 and 12 x 50) and spotting scopes (Nikon ED III spotting scope). In addition, villagers and herders, whenever encountered in the pastures, were also asked about the bear sighting and fresh diggings signs.

RESULTS

Direct sightings of the Tibetan Brown Bear and local villager's reports

Direct sightings of the Tibetan Brown Bear, digging signs, and footprints recorded in various pastures of the Annapurna-Manaslu landscape are given in Table 1. The presence of the species was also confirmed from MCA. During May 2008, a yak herder reported sightings of four bears (two adults and two cubs) near the Tibet border at 5,100 m in Samdo pasture (Dorje Lama, pers. comm. November 2014). In September 2013, one yak herder spotted two bears digging a marmot den in Bhajo kharka (Sherap Lama pers. comm. October 2013).

Camera traps and signs

Of the 12 camera locations, Tibetan Brown Bear were only photographed in Kopchum Jhalam (29.24 °N, 84.15 °E, 5,000 m) in Dhalung-Chhujung rangeland of upper Mustang of ACA (Image 2A–C). The camera was deployed in a cliff area having single livestock trail leading to a narrow gorge and a small stream. Other

interesting species photographed by the camera traps are: Himalayan Wolf, Snow Leopard, Red Fox, Steppe Polecat *Mustela eversmannii*, and Tibetan Dwarf Hamster *Cricetulus alticola*. Among all these species, the most frequently photographed species were the livestock and the Himalayan Wolf. The Tibetan Brown Bear signs - footprints, diggings, and feces were encountered in an area where Himalayan Marmots are present.

Distribution update of Brown Bear in Nepal

Various survey records show five important areas of Tibetan Brown Bear distribution in the Annapurna-Manaslu landscape. These include the upper Mustang region—the Damodar Kunda valley, Dhalung-Chhujung valley, Ghemi lekh in upper Mustang of ACA—and the upper reaches of Tsum and Nubri valley in MCA (Table 1, Figure 1). Recent information reveals that the Brown Bear is also present in Limi valley in Humla district (Naresh Kusi pers. comm. November 2021). Local villagers have also photographed this species from Yangma in Kanchenjunga Conservation Area (Hem Raj Acharya pers. comm. August 2021). In 2020, Brown Bears were

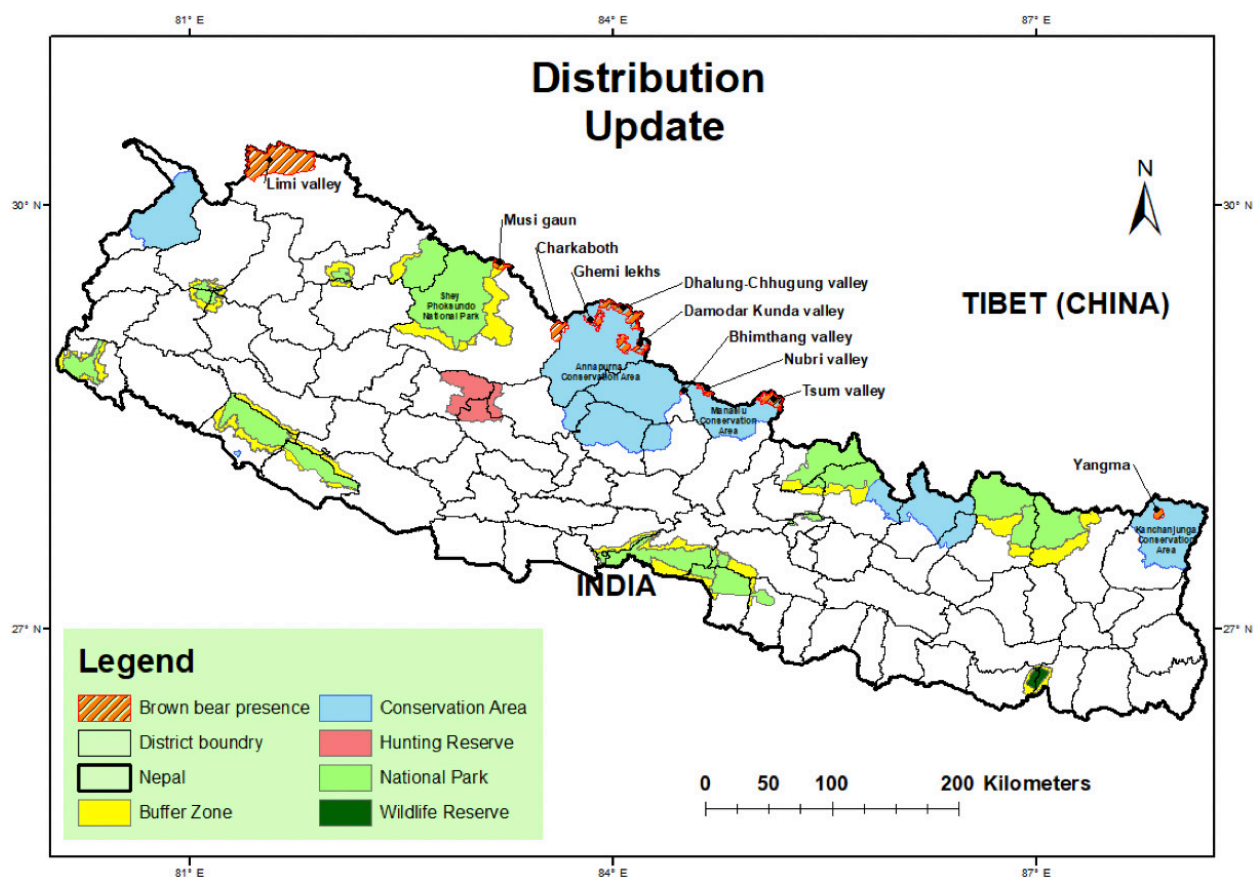


Figure 2. Distribution update of Brown Bear in Nepal Himalaya.

Table 1. Records of Tibetan Brown Bears in Annapurna-Manaslu landscape, central Himalaya – direct sightings, camera traps, and herder reports.

	Date (month.year)	Area	Record type	Altitude (m)	Remarks
1	07.2014	Kopchung Jhalem (Dhalung-Chhujung)	Camera trap	5000	Camera trap photo
2	05.2014	Dhalung-Chhujung	Direct sighting-1 adult	4800	Ridgeline
3	09.2013	Bhajo kharka	Direct sighting-2 adults, Yak herder report	4800	Digging marmot den
4	05.2008	Samdo pasture	Direct sighting-2 adults & 2 cubs, yak herder report	5100	Along Nepal-Tibet border
5	09.2007	Lower Damodar Kunda	Direct sighting-1 adult	5200	Digging marmot den
6	08.2005	Kekyap pasture (Ghemi lekh)	Direct sighting-2 adults, yak herder report	5300	Digging marmot den
7	07.2003	Shya Pasture	Direct sightings-villagers report	4800	Digging marmot den

captured in a camera trap from ‘musi gaun’ in Shey Phoksundo National Park (Gopal Khanal pers. comm. September 2021). All these areas abut with the Tibetan border in the north. Based on direct observation, signs, and field reports obtained from confirmed sources, a distribution map of Brown Bears was updated (Figure 2).

DISCUSSION

In the Himalaya, two subspecies of Brown Bear are recognized: *Ursus arctos isabellinus* and *Ursus arctos pruinosus*. The population in the central Himalaya of Nepal is thought to be connected to the large Tibetan Brown Bear population (McLellan et al. 2016). Nepal's location is such that there is possibility of *isabellinus* in the west and *pruinosus* in the east. The ssp. *isabellinus* occurs in Uttarakhand, and hence it is plausible both subspecies may occur in the Nepal Himalaya. According to Pocock (1941), these two subspecies have a distinct skull feature. Also, the Himalayan Brown Bear is characterized by its paler and reddish-brown fur, while the Tibetan Brown Bear has generally darker fur with a developed, white or light yellowish ‘collar’ around the neck. Image 2 shows a distinct collar around the neck and a darker grizzly fur, small ears with black fur on legs and feet and well distinct shoulder hump are a common physical characteristic of the Tibetan Brown Bear (Lydekker 1897; Sowerby 1920; Pocock 1941). In 2014, a nomadic herdsman (Sonam Norbu) collected a hair sample from Chunjung upper Mustang, Nepal which is close to camera trap location and genetic analysis revealed that the sample belonged to Tibetan Brown Bear (Lan et al. 2017).

The photographs obtained from a camera trap in upper Mustang were sent for confirmation to experts, and based on morphology and pelage pattern, sighting

of Tibetan Brown Bear was confirmed (Dave Garshelis pers.comm. December 2020; Xue Yadong pers.comm. December 2020). A small and isolated population of Himalayan Brown Bear was found at higher elevations in the western Himalaya, ranging from mid-Uttarakhand to Jammu & Kashmir in India up to Pakistan. It is unknown whether this subpopulation is connected to Tibet or not (McLellan et al. 2016). Recent genetic study shows that *Ursus arctos isabellinus* is one of the first branching clades within the Brown Bear lineage, and *Ursus arctos pruinosus* diverged much later (Lan et al. 2017). It was also shown that extant bears in the region are likely descendants of populations that survived in local refugia during the Pleistocene glaciations (Lan et al. 2017). This is the first camera trap confirmation of the extant of Tibetan Brown Bear in the central Himalaya of Nepal. Earlier in September 2007, the author captured a video of a Brown Bear from the eastern part of upper Mustang-the Damodar Kunda Valley (Chetri 2008). However, the subspecies could not be confirmed as the picture was blurry and taken from a long distance using a camera mount on the spotting scope.

In the Annapurna-Manaslu landscape, signs of Brown Bears are found at an altitude ranging from 4,000–6,000 m. The distribution of Brown Bears correlates with the presence of Himalayan Marmot and other small rodents. Flat alpine grassland with <10° slope, and the valley floor is the most suitable habitat for diggings. Livestock trails are also used by Brown Bears. The present distribution ranges show that the habitat of Tibetan Brown Bears is contiguous with the Tibetan border. In the Manang and Naar-Phu valley of ACA, no signs of Brown Bears have been detected (Figure 2). Evidence of marmot presence in these two valleys is not known until date, which is one of the key prey species of Brown Bears (Aryal et al. 2012). Brown Bear signs were also recorded farther west of upper Mustang, i.e., the area between Shey Phoksundo



Image 1. Signs of Brown Bear in Annapurna-Manaslu landscape: A—Diggings for Himalayan Marmot | B—Feces (in the form of dung pile) | C—Single Feces | D—Resting site | E—Resting site. © Madhu Chetri.

National Park and ACA. Aryal et al. (2012) also reported the presence of bears in the area. Recent reports and evidence suggest that they are also distributed in the eastern and far-western regions of Nepal Himalaya (Figure 2). This suggests that research on Brown Bears has not been prioritized in Nepal, probably due to their rarity and logistical difficulties, as they inhabit harsh habitats. Long-term biodiversity monitoring surveys reveal that the Himalayan marmot population is highly fluctuating year-to-year, and in some areas they are locally extinct. Only traces of old dens can be seen

in some pastures in upper Mustang. Monitoring of marmots and other small rodents is essential as they are also an important prey species of sympatric carnivores associated with the Brown Bear.

Several important areas and habitats are identified in the upper Mustang of ACA. These include the Damodar Kunda valley, Dhalung-Chhujung valley, and Ghemi lekh. In the MCA, several signs were recorded in the eastern part (Nubri valley) as well as the western part (Tsum valley) in the flat plains and the areas close to the Tibetan border. Signs of Brown Bears can be seen in

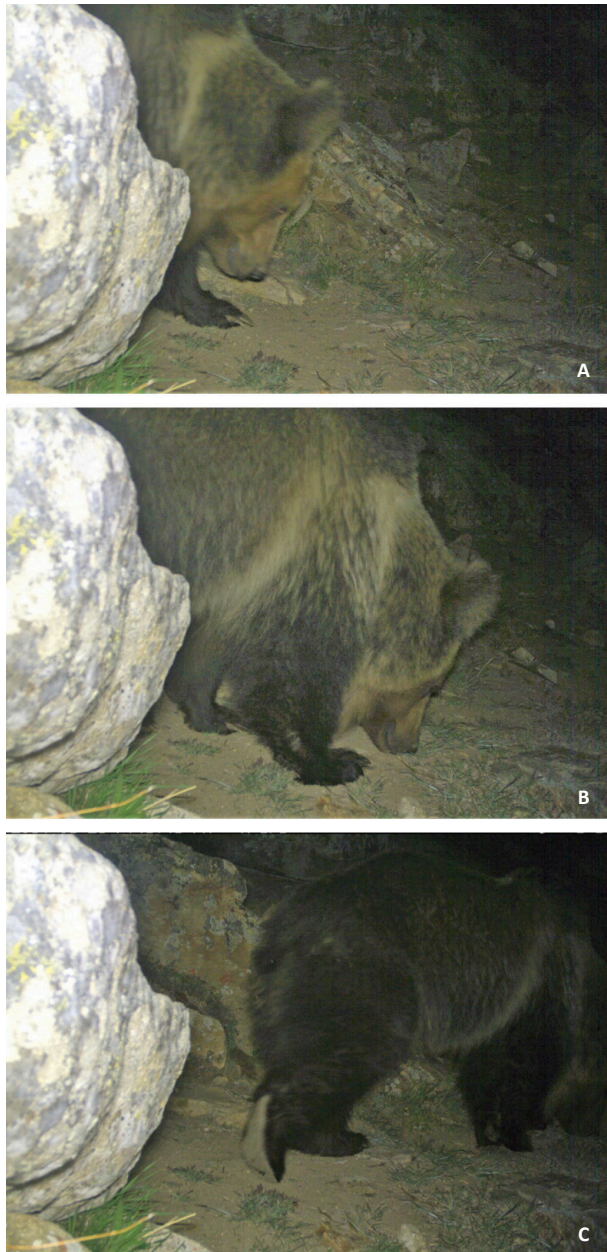


Image 2. Tibetan Brown Bear in the upper Mustang of ACA: A—Frontal view – large claws with distinct light yellowish collars around the neck | B—Lateral view with grizzly fur, black fur on the legs and feet (see also C) | C—Lateral view with a well distinct hump at shoulder producing a sloping backline. Note: Brownface, grizzled fur, long claws, black fur in legs, and whitish stripe around the back is a common characteristic of this subspecies (Dave Garshelis pers. comm. December 2020; Xue Yadong pers. comm. December 2020). © Madhu Chetri.

the flat alpine grassland in Bhajo kharka, Nula-dhojang, Yamdo kharka, Daldhang kharka, and Hinde kharka in the eastern part of MCA. Similarly, in the western part of MCA, Chettang kharka, Yajothang, and the Gala pass area are the important areas of bear distribution.

The Brown Bear is known as ‘Mithe’ by the local

villagers. They are once said to be found even in the close vicinity of the villages in the upper Mustang of ACA. These days they are found only in a few high altitudes pastures that abut the Nepal-Tibet border and are occasionally observed by the herders while grazing their livestock in highland pastures during the summer season. The tale of legendary yeti still exists in the region and locals avoid the areas due to fear as Mithe are said to have no heels and extraordinary power.

CONCLUSION

This study provides the first photographic evidence of Tibetan Brown Bear in upper Mustang of Annapurna Conservation Area. Brown Bear sightings and signs (pugmark, hair, scat, and diggings) reveal a close association with Himalayan Marmot and pikas. Recently several sighting and camera-traps records reveals the presence of Brown Bear in eastern and western part of Nepal’s Himalaya. Therefore, further research in Brown Bear ecology particularly focusing on taxonomy, population genetics, movement, habitat use, and human-bear interactions is warranted. Additionally, understanding rangeland ecology, human-induced land-use changes, and the impact of climate change in this important changing pastoral landscape will aid in conservation planning and biodiversity conservation in the region.

REFERENCES

- Aryal, A., J.B. Hopkins, D. Raubenheimer, W. Ji & D. Brunton (2012). Distribution and diet of Brown Bears in the upper Mustang Region, Nepal. *Ursus* 23(2): 231–236. <https://doi.org/10.2192/URSUS-D-11-00015.1>
- Aryal, A., S. Sathyakumar & C.C. Schwartz (2010). Current status of Brown Bears in the Manasalu Conservation Area, Nepal. *Ursus* 21(1): 109–114. <https://doi.org/10.2192/09GR029.1>
- Bojarska, K. & N. Selva (2012). Spatial patterns in Brown Bear *Ursus arctos* diet: the role of geographical and environmental factors. *Mammal Review* 42(2): 120–143. <https://doi.org/10.1111/j.1365-2907.2011.00192.x>
- Chetri, M. (2008). Brown Bear (*Ursus arctos*) from Upper Mustang. *Prakriti* 15: 19–22. Newsletter of the National Trust for Nature Conservation, Kathmandu, Nepal.
- Chetri, M., M. Odden & P. Wegge (2017). Snow leopard and Himalayan wolf: food habits and prey selection in the Central Himalayas, Nepal. *PLoS One* 12(2): e0170549. <https://doi.org/10.1371/journal.pone.0170549>
- CITES. (2019). The CITES appendices. Appendices I, II & III (04/04/2017), 16. 26 July 2019. <https://cites.org/sites/default/files/eng/app/2017/E-Appendices-2017-10-04.pdf>
- Evans, A.L., N.J. Singh, A. Friebe, J.M. Arnemo, T. Laske, O. Fröbert, J.E. Swenson & S. Blanc (2016). Drivers of hibernation in the Brown Bear. *Frontiers in zoology* 13(1): 1–14. <https://doi.org/10.1186/s12983-016-0140-6>

- Fowler, N.L., J.L. Belant, G. Wang & B.D. Leopold (2019). Ecological plasticity of denning chronology by American black bears and Brown Bears. *Global Ecology and Conservation* 20: e00750. <https://doi.org/10.1016/j.gecco.2019.e00750>
- González-Bernardo, E., L.F. Russo, E. Valderrábano, A. Fernández & V. Penteriani (2020). Denning in Brown Bears. *Ecology and Evolution* 10(13): 6844–6862. <https://doi.org/10.1002/ece3.6372>
- Hissa, R. (1997). Physiology of the European Brown Bear (*Ursus arctos arctos*). *Annales Zoologici Fennici* 34(4): 267–287.
- Jnawali, S., H. Baral, S. Lee, K. Acharya, G. Upadhyay, M. Pandey, R. Shrestha, D. Joshi, B.R. Lamichhane, J. Griffiths, A.P. Khatiwada, N. Subedi & R. Amin (2011). The Status of Nepal's Mammals: The National Red List Series-IUCN. Department of National Parks and Wildlife Conservation, Kathmandu, Nepal, 276 pp.
- Kadariya, R., M. Shimozuru, J.E. Maldonado, M.A.M. Moustafa, M. Sashika & T. Tsubota (2018). High genetic diversity and distinct ancient lineage of Asiatic black bears revealed by non-invasive surveys in the Annapurna Conservation Area, Nepal. *PLoS One* 13(12): e0207662. <https://doi.org/10.1371/journal.pone.0207662>
- Lan, T., S. Gill, E. Bellemain, R. Bischof, M.A. Nawaz & C. Lindqvist (2017). Evolutionary history of enigmatic bears in the Tibetan Plateau–Himalaya region and the identity of the yeti. *Proceedings of the Royal Society B* 284: 20171804. <https://doi.org/10.1098/rspb.2017.1804>
- Lydekker, R. (1897). The Blue Bear of Tibet, with Notes on the Members of the *Ursus arctos* Group. In *Proceedings of the Zoological Society of London* 65(2): 412–426. <https://doi.org/10.1111/j.1469-7998.1897.tb00025.x>
- McLellan, B.N., M.F. Proctor, D. Huber & S. Michel (2017). *Ursus arctos*. The IUCN Red List of Threatened Species 2017: e.T41688A121229971. Accessed 06 February 2022. <https://doi.org/10.2305/IUCN.UK.2017-3.RLTS.T41688A121229971.en>
- McLellan, B.N., M.F. Proctor, D. Huber & S. Michel (2016). Brown Bear (*Ursus arctos*) Isolated Populations (Supplementary Material to *Ursus arctos* Redlisting account). The IUCN Red List of Threatened Species 2016. Electronic version accessed 06 February 2022.
- Nawaz, M.A., A. Valentini, N.K. Khan, C. Miquel, P. Taberlet & J.E. Swenson (2019). Diet of the Brown Bear in Himalaya: Combining classical and molecular genetic techniques. *PLoS One* 14(12): e0225698. <https://doi.org/10.1371/journal.pone.0225698>
- Pocock R.I. (1941). The fauna of British India, including Ceylon and Burma. Volume II. Mammalia. Taylor and Francis, London.
- Sowerby, A.D.C. (1920). Notes on Heude's Bears in the Sikawei Museum, and on the Bears of Palæarctic Eastern Asia. *Journal of Mammalogy* 1(5): 213–233. <https://doi.org/10.2307/1373245>
- Worthy, F. R. & J.M. Foggini (2008). From the field Conflicts between local villagers and Tibetan Brown Bears threaten conservation of bears in a remote region of the Tibetan Plateau. *Human-Wildlife Conflicts* 2(2): 200–205.
- Wu, L. (2014). Ecological study on human-Brown Bear conflicts in Sanjiangyuan area, Tibetan Plateau, China. PhD Thesis, Peking University, Beijing.

Dr. George Mathew, Kerala Forest Research Institute, Peechi, India
Dr. John Noyes, Natural History Museum, London, UK
Dr. Albert G. Orr, Griffith University, Nathan, Australia
Dr. Sameer Padhye, Katholieke Universiteit Leuven, Belgium
Dr. Nancy van der Poorten, Toronto, Canada
Dr. Kareen Schnabel, NIWA, Wellington, New Zealand
Dr. R.M. Sharma, (Retd.) Scientist, Zoological Survey of India, Pune, India
Dr. Manju Siliwal, WILD, Coimbatore, Tamil Nadu, India
Dr. G.P. Sinha, Botanical Survey of India, Allahabad, India
Dr. K.A. Subramanian, Zoological Survey of India, New Alipore, Kolkata, India
Dr. P.M. Sureshan, Zoological Survey of India, Kozhikode, Kerala, India
Dr. R. Varatharajan, Manipur University, Imphal, Manipur, India
Dr. Eduard Vives, Museu de Ciències Naturals de Barcelona, Terrassa, Spain
Dr. James Young, Hong Kong Lepidopterists' Society, Hong Kong
Dr. R. Sundararaj, Institute of Wood Science & Technology, Bengaluru, India
Dr. M. Nithyanandan, Environmental Department, La Ala Al Kuwait Real Estate. Co. K.S.C., Kuwait
Dr. Himender Bharti, Punjabi University, Punjab, India
Mr. Purnendu Roy, London, UK
Dr. Saito Motoki, The Butterfly Society of Japan, Tokyo, Japan
Dr. Sanjay Sondhi, TITLI TRUST, Kalpavriksh, Dehradun, India
Dr. Nguyen Thi Phuong Lien, Vietnam Academy of Science and Technology, Hanoi, Vietnam
Dr. Nitin Kulkarni, Tropical Research Institute, Jabalpur, India
Dr. Robin Wen Jiang Ngiam, National Parks Board, Singapore
Dr. Lionel Monod, Natural History Museum of Geneva, Genève, Switzerland.
Dr. Asheesh Shivam, Nehru Gram Bharti University, Allahabad, India
Dr. Rosana Moreira da Rocha, Universidade Federal do Paraná, Curitiba, Brasil
Dr. Kurt R. Arnold, North Dakota State University, Saxony, Germany
Dr. James M. Carpenter, American Museum of Natural History, New York, USA
Dr. David M. Claborn, Missouri State University, Springfield, USA
Dr. Kareen Schnabel, Marine Biologist, Wellington, New Zealand
Dr. Amazonas Chagas Júnior, Universidade Federal de Mato Grosso, Cuiabá, Brasil
Mr. Monsoon Jyoti Gogoi, Assam University, Silchar, Assam, India
Dr. Heo Chong Chin, Universiti Teknologi MARA (UiTM), Selangor, Malaysia
Dr. R.J. Shiel, University of Adelaide, SA 5005, Australia
Dr. Siddharth Kulkarni, The George Washington University, Washington, USA
Dr. Priyadarsanan Dharma Rajan, ATREE, Bengaluru, India
Dr. Phil Alderslade, CSIRO Marine And Atmospheric Research, Hobart, Australia
Dr. John E.N. Veron, Coral Reef Research, Townsville, Australia
Dr. Daniel Whitmore, State Museum of Natural History Stuttgart, Rosenstein, Germany.
Dr. Yu-Feng Hsu, National Taiwan Normal University, Taipei City, Taiwan
Dr. Keith V. Wolfe, Antioch, California, USA
Dr. Siddharth Kulkarni, The Hormiga Lab, The George Washington University, Washington, D.C., USA
Dr. Tomas Ditrich, Faculty of Education, University of South Bohemia in Ceske Budejovice, Czech Republic
Dr. Mihaly Foldvari, Natural History Museum, University of Oslo, Norway
Dr. V.P. Niyal, Wildlife Institute of India, Dehradun, Uttarakhand 248001, India
Dr. John T.D. Caleb, Zoological Survey of India, Kolkata, West Bengal, India
Dr. Priyadarsanan Dharma Rajan, Ashoka Trust for Research in Ecology and the Environment (ATREE), Royal Enclave, Bangalore, Karnataka, India

Fishes

Dr. Neelesh Dahanukar, IISER, Pune, Maharashtra, India
Dr. Topiltzin Contreras MacBeath, Universidad Autónoma del estado de Morelos, México
Dr. Heok Hee Ng, National University of Singapore, Science Drive, Singapore
Dr. Rajeev Raghavan, St. Albert's College, Kochi, Kerala, India
Dr. Robert D. Sluka, Chiltern Gateway Project, A Rocha UK, Southall, Middlesex, UK
Dr. E. Vivekanandan, Central Marine Fisheries Research Institute, Chennai, India
Dr. Davor Zanella, University of Zagreb, Zagreb, Croatia
Dr. A. Biju Kumar, University of Kerala, Thiruvananthapuram, Kerala, India
Dr. Akhilesh K.V., ICAR-Central Marine Fisheries Research Institute, Mumbai Research Centre, Mumbai, Maharashtra, India
Dr. J.A. Johnson, Wildlife Institute of India, Dehradun, Uttarakhand, India
Dr. R. Ravinesh, Gujarat Institute of Desert Ecology, Gujarat, India

Amphibians

Dr. Sushil K. Dutta, Indian Institute of Science, Bengaluru, Karnataka, India
Dr. Annemarie Ohler, Muséum national d'Histoire naturelle, Paris, France

Reptiles

Dr. Gernot Vogel, Heidelberg, Germany
Dr. Raju Vyas, Vadodara, Gujarat, India
Dr. Pritpal S. Soorae, Environment Agency, Abu Dhabi, UAE.
Prof. Dr. Wayne J. Fuller, Near East University, Mersin, Turkey
Prof. Chandrashekher U. Rivonker, Goa University, Taleigao Plateau, Goa, India
Dr. S.R. Ganesh, Chennai Snake Park, Chennai, Tamil Nadu, India
Dr. Himansu Sekhar Das, Terrestrial & Marine Biodiversity, Abu Dhabi, UAE

Birds

Dr. Hem Sagar Baral, Charles Sturt University, NSW Australia
Mr. H. Byju, Coimbatore, Tamil Nadu, India
Dr. Chris Bowden, Royal Society for the Protection of Birds, Sandy, UK
Dr. Priya Davidar, Pondicherry University, Kalapet, Puducherry, India
Dr. J.W. Duckworth, IUCN SSC, Bath, UK
Dr. Rajah Jayapal, SACON, Coimbatore, Tamil Nadu, India
Dr. Rajiv S. Kalsi, M.L.N. College, Yamuna Nagar, Haryana, India
Dr. V. Santharam, Rishi Valley Education Centre, Chittoor Dt., Andhra Pradesh, India
Dr. S. Balachandran, Bombay Natural History Society, Mumbai, India
Mr. J. Praveen, Bengaluru, India
Dr. C. Srinivasulu, Osmania University, Hyderabad, India
Dr. K.S. Gopi Sundar, International Crane Foundation, Baraboo, USA
Dr. Gombobaatar Sundev, Professor of Ornithology, Ulaanbaatar, Mongolia
Prof. Reuven Yosef, International Birding & Research Centre, Eilat, Israel
Dr. Taej Mundkur, Wetlands International, Wageningen, The Netherlands
Dr. Carol Inskipp, Bishop Auckland Co., Durham, UK
Dr. Tim Inskipp, Bishop Auckland Co., Durham, UK
Dr. V. Gokula, National College, Tiruchirappalli, Tamil Nadu, India
Dr. Arkady Lelej, Russian Academy of Sciences, Vladivostok, Russia
Dr. Simon Dowell, Science Director, Chester Zoo, UK
Dr. Mário Gabriel Santiago dos Santos, Universidade de Trás-os-Montes e Alto Douro, Quinta de Prados, Vila Real, Portugal
Dr. Grant Connette, Smithsonian Institution, Royal, VA, USA
Dr. M. Zafar-ul Islam, Prince Saud Al Faisal Wildlife Research Center, Taif, Saudi Arabia

Mammals

Dr. Giovanni Amori, CNR - Institute of Ecosystem Studies, Rome, Italy
Dr. Anwaruddin Chowdhury, Guwahati, India
Dr. David Mallon, Zoological Society of London, UK
Dr. Shomita Mukherjee, SACON, Coimbatore, Tamil Nadu, India
Dr. Angie Appel, Wild Cat Network, Germany
Dr. P.O. Nameer, Kerala Agricultural University, Thrissur, Kerala, India
Dr. Ian Redmond, UNEP Convention on Migratory Species, Lansdown, UK
Dr. Heidi S. Riddle, Riddle's Elephant and Wildlife Sanctuary, Arkansas, USA
Dr. Karin Schwartz, George Mason University, Fairfax, Virginia.
Dr. Lala A.K. Singh, Bhubaneswar, Orissa, India
Dr. Mewa Singh, Mysore University, Mysore, India
Dr. Paul Racey, University of Exeter, Devon, UK
Dr. Honnavalli N. Kumara, SACON, Anaikatti P.O., Coimbatore, Tamil Nadu, India
Dr. Nishith Dharaiya, HNG University, Patan, Gujarat, India
Dr. Spartaco Gippoliti, Socio Onorario Società Italiana per la Storia della Fauna "Giuseppe Altobello", Rome, Italy
Dr. Justus Joshua, Green Future Foundation, Tiruchirappalli, Tamil Nadu, India
Dr. H. Raghuram, The American College, Madurai, Tamil Nadu, India
Dr. Paul Bates, Harison Institute, Kent, UK
Dr. Jim Sanderson, Small Wild Cat Conservation Foundation, Hartford, USA
Dr. Dan Challenger, University of Kent, Canterbury, UK
Dr. David Mallon, Manchester Metropolitan University, Derbyshire, UK
Dr. Brian L. Cypher, California State University-Stanislaus, Bakersfield, CA
Dr. S.S. Talmale, Zoological Survey of India, Pune, Maharashtra, India
Prof. Karan Bahadur Shah, Budhanilakantha Municipality, Kathmandu, Nepal
Dr. Susan Cheyne, Borneo Nature Foundation International, Palangkaraja, Indonesia
Dr. Hemanta Kafley, Wildlife Sciences, Tarleton State University, Texas, USA

Other Disciplines

Dr. Aniruddha Belsare, Columbia MO 65203, USA (Veterinary)
Dr. Mandar S. Paingankar, University of Pune, Pune, Maharashtra, India (Molecular)
Dr. Jack Tordoff, Critical Ecosystem Partnership Fund, Arlington, USA (Communities)
Dr. Ulrike Streicher, University of Oregon, Eugene, USA (Veterinary)
Dr. Hari Balasubramanian, EcoAdvisors, Nova Scotia, Canada (Communities)
Dr. Rayanna Hellem Santos Bezerra, Universidade Federal de Sergipe, São Cristóvão, Brazil
Dr. Jamie R. Wood, Landcare Research, Canterbury, New Zealand
Dr. Wendy Collinson-Jonker, Endangered Wildlife Trust, Gauteng, South Africa
Dr. Rajeshkumar G. Jani, Anand Agricultural University, Anand, Gujarat, India
Dr. O.N. Tiwari, Senior Scientist, ICAR-Indian Agricultural Research Institute (IARI), New Delhi, India
Dr. L.D. Singla, Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana, India
Dr. Rupika S. Rajakaruna, University of Peradeniya, Peradeniya, Sri Lanka
Dr. Bahar Baviskar, Wild-CER, Nagpur, Maharashtra 440013, India

Reviewers 2019–2021

Due to paucity of space, the list of reviewers for 2018–2020 is available online.

The opinions expressed by the authors do not reflect the views of the Journal of Threatened Taxa, Wildlife Information Liaison Development Society, Zoo Outreach Organization, or any of the partners. The journal, the publisher, the host, and the partners are not responsible for the accuracy of the political boundaries shown in the maps by the authors.

Journal of Threatened Taxa is indexed/abstracted in Bibliography of Systematic Mycology, Biological Abstracts, BIOSIS Previews, CAB Abstracts, EBSCO, Google Scholar, Index Copernicus, Index Fungorum, JournalSeek, National Academy of Agricultural Sciences, NewJour, OCLC WorldCat, SCOPUS, Stanford University Libraries, Virtual Library of Biology, Zoological Records.

NAAS rating (India) 5.64

Print copies of the Journal are available at cost. Write to:
The Managing Editor, JoTT,
c/o Wildlife Information Liaison Development Society,
No. 12, Thiruvannamalai Nagar, Saravanampatti - Kalapatti Road,
Saravanampatti, Coimbatore, Tamil Nadu 641035, India
ravi@threatenedtaxa.org



www.threatenedtaxa.org

OPEN ACCESS



The Journal of Threatened Taxa (JoTT) is dedicated to building evidence for conservation globally by publishing peer-reviewed articles online every month at a reasonably rapid rate at www.threatenedtaxa.org. All articles published in JoTT are registered under [Creative Commons Attribution 4.0 International License](https://creativecommons.org/licenses/by/4.0/) unless otherwise mentioned. JoTT allows unrestricted use, reproduction, and distribution of articles in any medium by providing adequate credit to the author(s) and the source of publication.

ISSN 0974-7907 (Online) | ISSN 0974-7893 (Print)

September 2022 | Vol. 14 | No. 9 | Pages: 21751–21902

Date of Publication: 26 September 2022 (Online & Print)

DOI: 10.11609/jott.2022.14.9.21751-21902

Article

Diversity, distribution, and abundance status of small mammalian fauna (Chiroptera: Rodentia: Eulipotyphla) of Manipur, India

– Uttam Saikia & A.B. Meetei, Pp. 21751–21768

Review

Conservation of Tiger *Panthera tigris* in Nepal: a review of current efforts and challenges

– Pramod Ghimire, Pp. 21769–21775

Communications

Effects of visitor disturbance on tetrapod vertebrates in the Horton Plains National Park, Sri Lanka

– D.M.T. Dhananjani & W.A.D. Mahaulpatha, Pp. 21776–21785

Population density and nesting behaviour of Indian Giant Squirrel *Ratufa indica* (Erxleben, 1777) in Bhimashankar Wildlife Sanctuary, Western Ghats of Maharashtra, India

– Ganesh Rathod, Erach Bharucha & Kranti Yardi, Pp. 21786–21796

First camera-trap confirmation of Tibetan Brown Bear *Ursus arctos pruinosus* Blyth, 1854 (Mammalia: Carnivora: Ursidae) with a review of its distribution and status in Nepal

– Madhu Chetri, Pp. 21797–21804

Age estimation of Tiger *Panthera tigris* (Linnaeus, 1758) and Lion *Panthera leo* (Linnaeus, 1758) (Mammalia: Carnivora: Felidae): applicability of cementum annuli analysis method

– Vipin, Chandra Prakash Sharma, Vinita Sharma, Surendra Prakash Goyal, Heather Stevens & Sandeep Kumar Gupta, Pp. 21805–21810

Hematological value of captive Asian Elephants *Elephas maximus* around Chitwan National Park, Sauraha, Nepal

– Roshan Ghimire, Sagar Regmi, Rakshya Shrestha, Amir Sadaula & Janardan Dev Joshi, Pp. 21811–21817

Foraging strata and dietary preferences of fifteen species of babblers in Sarawak, Malaysia

– Jayasilan Mohd-Azlan, Attiqqah Fadzilah Sopian, Andrew Alek Tuen & Chong Leong Puan, Pp. 21818–21825

Effects of wind farm on land bird composition at Kachchh District, Gujarat, India

– Selvaraj Ramesh Kumar, P.R. Arun & A. Mohamed Samsoor Ali, Pp. 21826–21835

New records of odonates from Trongsa and Zhemgang, central Bhutan with a checklist of Jigme Singye Wangchuck National Park

– Mer Man Gurung, Cheten Dorji, Abir Man Sinchuri, Sanjit K. Rai, Karma C. Dendup & Vincent J. Kalkman, Pp. 21836–21844

Land snails of Guwahati, Assam, India

– Girindra Kalita, Pp. 21845–21852

Morphology characterization and phytochemical overview of the Moluccan Ironwood *Intsia bijuga* (Colebr.) Kuntze, a living collection of Purwodadi Botanic Garden, Indonesia

– Melisnawati H. Angio, Elga Renjana & Elok Rifqi Firdiana, Pp. 21853–21861

Woody plant wealth of Therikadu Reserve Forest, Tuticorin, India: a checklist

– V. Muneeswaran & M. Udayakumar, Pp. 21862–21869

Invasive alien plant species of Hassan District, Karnataka, India

– G.M. Prashanth Kumar & Shiddamallayya Nagayya, Pp. 21870–21890

Notes

First photographic evidence of the Binturong *Arctictis binturong* (Raffles, 1821) from Nepal

– Madhu Chetri, Purna Bahadur Ale, Tulasi Prasad Dahal & Karan Bahadur Shah, Pp. 21891–21894

First record of *Chlorophorus jucundus* (Perroud, 1855) (Coleoptera: Cerambycidae: Cerambycinae) from Maharashtra, India

– Yogesh K. Mane & Sunil M. Gaikwad, Pp. 21895–21897

First record of the swallowtail moth *Epiplema adamantina* Inoue, 1998 (Lepidoptera: Uraniidae: Epipleminae) from western Himalaya, India

– Lekhendra & Arun Pratap Singh, Pp. 21898–21899

Visceral tetrathyridiosis *Mesocestoides* sp. (Cestoda: Cyclophyllidae) in a wild Barn Owl *Tyto alba* - a first report and new host record

– P.G. Vimalraj & A. Latchumikanthan, Pp. 21900–21902

Publisher & Host

