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Bears on the edge: the occurrence of the Himalayan Brown bear, *Ursus arctos isabellinus* (Horsfield, 1826) (Mammalia: Carnivora: Ursidae) in the high altitude protected areas of the lesser Himalayas, Jammu and Kashmir, India

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Abstract

This communication reports the presence of the Himalayan brown bear in the twin mountainous protected areas of Bani Wildlife Sanctuary and Sudhmahadev Conservation Reserve in the Jammu division of Jammu and Kashmir, India. With the established presence of Himalayan brown bear in the region, systematic surveys are needed to gain a better understanding of its behavior and population dynamics, as well as to make management decisions linked to its conservation in the region.

Key words: Carnivores, camera traps, questionnaire surveys, western Himalayas

The Himalayan brown bear, *Ursus arctos isabellinus*, is an elusive, large carnivore occurring along the Asian high-altitude open valleys and pastures of Afghanistan, Pakistan, India, Nepal, Tibetan autonomous region of China and Bhutan (Nawaz et al., 2014; Aryal et al., 2012a, 2014; Su et al., 2018; Sharief et al., 2019). In the Indian Himalayan region, the species occurs in alpine meadows, scrub, and sub-alpine forests of the Union Territories of Jammu and Kashmir, and Ladakh and the Himalayan States of Himachal Pradesh and Uttarakhand (Sathyakumar, 2003, 2006; Sathyakumar et al., 2012; Rathore and Chahuhan, 2014; Pal et al., 2016; Sharief et al., 2019, Bhattacharya et al., 2020) in the north-west, and Sikkim (Choudhury, 2011) in the north-east. This sub-species has been listed as 'Endangered' by IUCN (McLellan et al., 2017) and included in Appendix I (CITES, 2023) and Schedule I under the Wildlife Protection Act 1972 (amended in 2022). Much of the Himalayan brown bear distribution is threatened by habitat loss, anthropogenic disturbance, and climate change, and it may shrink in the near future (Shrestha et al., 2012; Su et al., 2018). While exhibiting a declining population trend, it is one of the least studied carnivores in India and other Asian highlands, because of its elusive behavior and the difficult and inaccessible habitats it occupies (Nawaz et al., 2014; Lan et al., 2017; Sharief et al., 2019).

Despite being well-established in Ladakh (Karimov et al., 2018; Maheshwari, 2018; Dai et al., 2020), and with more concentrations around Drass, Kargil and Zanskar Valleys (Maheshwari, 2016; Maheshwari and Sathyakumar, 2020; Maheshwari et al., 2021), the Himalayan brown bear has not received much scientific attention in the adjoining regions (Maheshwari et al., 2021). According to media reports, the animal has started migrating further south towards Kashmir, and the more populous townships near Sonamarg and the Baltal base. Further south-east, Zaheer et al. (2023) reported, as part of a snow leopard assessment in Jammu and Kashmir, the occurrence of the Himalayan brown bear in Kishtwar high altitude National Park. Now, with its presence

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established in the Great Himalayan landscape of Kishtwar bordering Zanskar Himalayas, the current surveys were undertaken to ascertain its presence in the parts of the Lesser Himalayas farther south across the Chenab River.

This communication reports the presence of the Himalayan brown bear in the twin mountainous protected areas of the Bani Wildlife Sanctuary and Sudhmahadev Conservation Reserve (now termed Bani WLS and Sudhmahadev CR) in the Jammu division of Jammu and Kashmir. The adjacent mountainous protected areas, Bani WLS (32°47'16.654 N" to 32°53'33.524 N" and 74°41'1.92 E" to 75°52’ 4.455 E"; Elevation: 1900 m asl to 4276 m asl; area: 99.76 km^2) and Sudhmahadev CR (33°04.27 N" to 32°51'54 N" and 75°20.271 E" to 75°40.'485 E"; Elevation: 1,300 m asl to 4,500 m asl; area: 142.25 km^2) rise from the Padri ridge in the east and sprawl westwards through a series of summits, meadows and montane forests with a cumulative area of approximately 240 km^2 (Fig. 1). As an extended offshoot of the Lesser Himalayas, these protected areas border the Gamgul Siyabehi Wildlife Sanctuary (Chamba, Himachal Pradesh) in the east, Chenani (Udhampur) in the west, Bhaderwah (Doda) in the north and Bani (Kathua) in the south. The mountain summits of Ashapati and Kailash that rise over 4000 meters asl stand like sky islands, often shrouded in clouds during the rainy season and wrapped in snow during the winter. The climate of the study region is cold with short summers and extreme cold winters that experience snowfall from December to March.

The protected areas form a complex physiographic unit comprised of a series of snow-covered mountains studded with alpine lakes, pure conifer and broad-leaved forests and vast alpine meadows. It is a rich biodiversity repository in the Biogeographic Province 2A of northwest Himalaya. The forests are marked by the presence of *Abies pindrow* (Himalayan silver fir), *Betula utilis* (birch), and *Quercus semecarpifolia* (*Kharsu* oak), with extensive coverage of *Juniperus squamata* (juniper) and *Rhododendron campanulatum* (bell rhododendron) constituting the sub-alpine and alpine scrub that transforms into vast alpine meadows and rocky outcrops, forming the wide nival zone. The exclusive broad-leaved species in the region is *Kharsu* Oak (Singh and Sharma, 2022). The protected areas are home to diverse mammalian species, most having high conservation significance, which besides the two bear species, Himalayan brown bear *Ursus arctos isabellinus* and Asiatic black bear *Ursus thibetanus laniger*, include the common leopard *Panthera pardus*, leopard cat *Prionailurus bengalensis*, golden jackal *Canis aureus*, red fox *Vulpes vulpes*, rhesus macaque *Macaca mulatta*, Kashmir gray langur *Semnopithecus ajax*, yellow-throated marten *Martes flavigula*, Himalayan tahr *Hemitragus jemlahicus*, Kashmir musk deer *Moschus cupreus*, Himalayan Goral *Naemorhedus goral*, and Himalayan serow *Capricornis sumatraensis thar* (Bhatnagar, 2007, Quyoom et al., 2024).

Scientific surveys for biodiversity assessment and documentation of wild flora and fauna were undertaken in and around the Bani WLS and Sudhmahadev CR during 2023. A hybrid strategy combined structured questionnaire surveys, transect walks, and camera trapping, following Joshi et al. (2020). While the transect walks and questionnaire surveys were undertaken during April, 2022, the camera trapping commenced during June 2023. A total of 29 camera traps (12 in Sudhmahadev CR and 17 in Bani WLS) were deployed for 45–50 days in an elevational range of 2400 m asl to 3800 m asl in a phased manner from June-August and then October-November. The people interviewed included nomad and local pastoralist communities, forest and wildlife officials, villagers living along the forest edges, pilgrims and tourists.

Of the total 181 interviews held, 164 (107 in SCR and 57 in Bani WLS) were considered for analysis. Twenty-three respondents confirmed the presence of Himalayan brown bear in 15 grids, two in Sudhmahadev CR and 13 in Bani WLS in an elevational range of 2700 m asl to 3800 m asl. Most of the animals were reported near treelines and forest edges during the summer, the respondents’ period of activity at the higher altitudes. While the species is fairly well represented in Bani WLS (Fig. 1), its presence in Sudhmahadev CR is scanty, as observed during the current sampling. There was no direct sighting, however, during this first phase of investigations.

Of the 29 camera traps deployed, we were able to extract 15 from Bani WLS (two were stolen), and six (out of 12) from Sudhmahadev CR. The other six camera traps were badly damaged or lost in the field. The camera trap data revealed that the Himalayan brown bear was photo captured in and around Bani WLS (four occasions in four grids, Fig. 2A-D) and Sudhmahadev CR (a sole capture, Fig. 2E). An adult female with two cubs (Fig. 2A) were the first to be photo-captured near Heiu nallah on July 07, 2023 at 8:58 pm (grid-27, 2567 m asl) followed by another adult between Thalli nallah forest and Somphu forest (Fig. 2B) on August 15, 2023 at 8:44 pm (grid- 27, elevation 2754 m asl), and an adult on October 19, 2023 at 7:37 am (Fig. 2C) in Dhanbiyal (grid-22, elevation 2765 m asl). An adult female with two cubs (Fig. 2D) were photo-captured on November 12, 2023 at 9:07 am in Chattri (grid-7, elevation 3465 m asl). Farther west, a sub-adult (Fig. 2E) was photo-captured near Seoj Dhar (Sudhmahadev CR, grid-62, elevation 3230 m asl) on October, 05, 2023 at 4:34 am.

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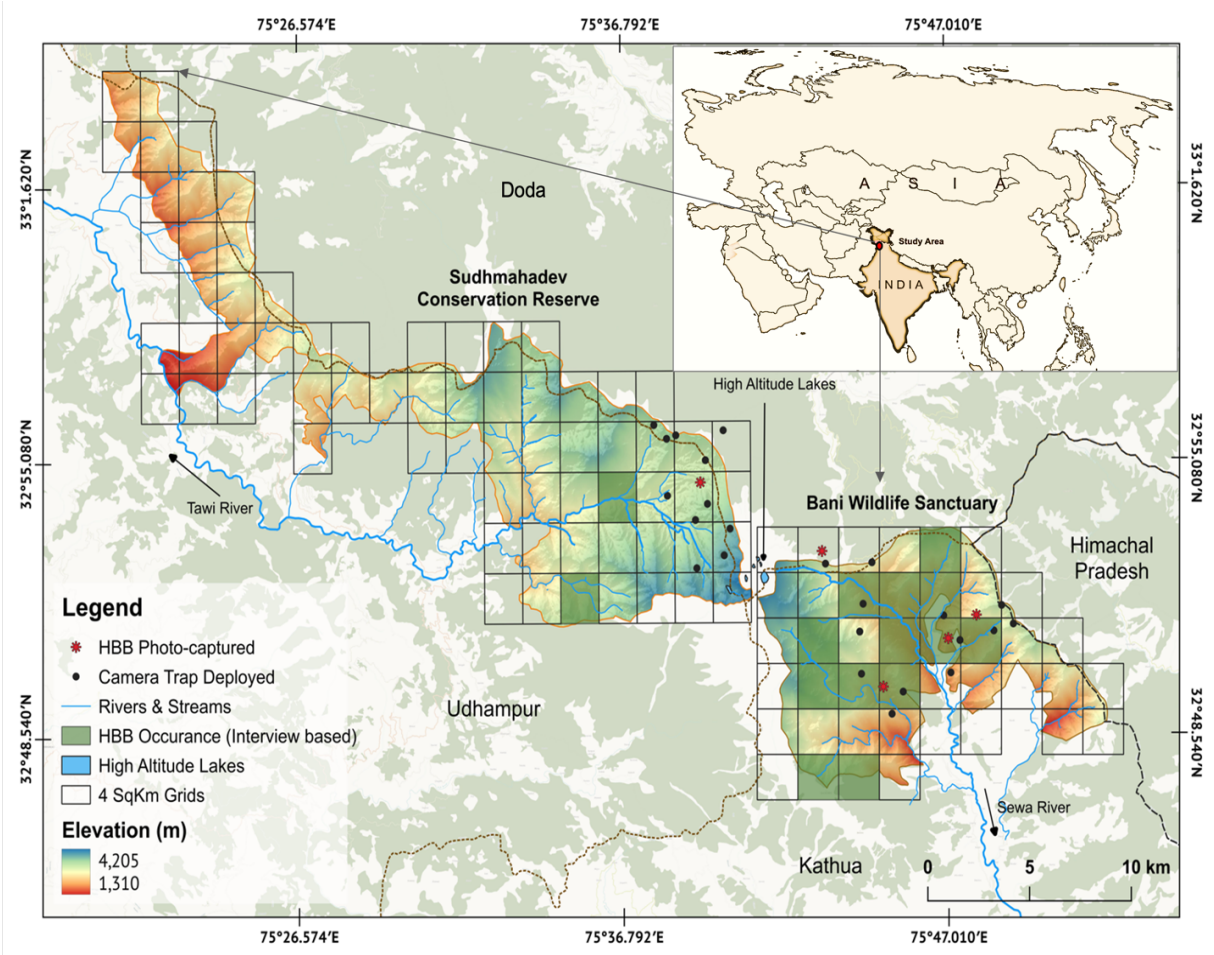

Figure 1: Map of the study area showing the twin protected areas of Sudhmahadev CR and Bani WLS overlaid with 4 km^2 grids indicating total camera trap installed (black dots) and those positive (red dots) for Himalayan brown bear. All the spatial attributes were collected and prepared by first author for visualization using open source QGIS; no copyrighted material was used.

The animals were identified on the basis of their light brownish coat, a distinctive shoulder hump, nose color, and ear shape and size. The cubs and sub-adults possessed a highly variable white, cream, or buffy collar across the shoulder that differentiates them from the Asiatic black bear. The same cameras also recorded the presence of Asiatic black bear, leopard cat, common leopard, red fox, yellow throated marten, rhesus macaque, Kashmir gray langur, Kashmir musk deer and a few pheasants. Most of the animal signs, such as diggings, pugmarks, and faeces, were mostly seen during the summer in high-altitude pastures and near water bodies. Some pug marks and slide signs were prominent on snow during the winter.

While the interviews revealed the existence of Himalayan brown bears, camera traps confirmed their presence in and around the protected areas. Along with the images, signs such as diggings, pugmarks, and faeces further revealed the presence of Asiatic black bear, *Ursus thibetanus laniger* sharing the habitats with Himalayan brown bear. Since both species have adapted to the harsh climatic conditions, their coexistence makes them a vital component of the region's biodiversity. While black bears are mostly restricted to montane and sub-alpine oak-rhododendron and conifer forests, the brown bear mostly prefers the alpine scrub or treeline vegetation, alpine meadows, glacial moraines, and barren slopes (Pal et al., 2016) as revealed in the present investigation. Both species have been reported to feed on grasses, forbs, berries, roots, insects, and other small mammals (Aryal et al., 2012b; Nawaz et al., 2019; Chetri, 2022). Now that the presence of Himalayan brown bear has been established in the region, systematic surveys are required to improve our understanding of its behavior and population dynamics, as well as to make management decisions linked to its conservation in the region.

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Figure 2: Camera trap images of Himalayan brown bear captured in different grids in Bani Wildlife Sanctuary, (A) an adult female with two cubs near Heiu Nallah (grid-27, 2567 m asl), (B) another adult between Thalli Nallah Forest and Somphu Forest (grid- 27, elevation 2754 m asl), (C) an adult in Dhanbiyal (grid-22, elevation 2765 m asl), (D) an adult female with two cubs in Chattri (grid-7, elevation 3465 m asl), Sudhmahadev Conservation Reserve, and (E), a sub-adult near Seoj Dhar (Sudhmahadev CR, grid-62, elevation 3230 m asl) Jammu and Kashmir, India. All images are the photo captures triggered by IR cameras.

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Author contributions

NS conceived the idea and designed the study; AA and NK conducted the field surveys, deployed camera traps, analysed the data and wrote the draft. NS reviewed and approved the manuscript and communicated with the journal.

Conflict of interest

All authors declare that there are no conflicting issues related to this short communication.

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