

Distribution Update

First photographic evidence of the Tibetan fox in Bhutan

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Abstract

The Tibetan fox *Vulpes ferrilata* is listed as Least Concern on the IUCN Red List, yet its ecology and distribution remain poorly documented. Here, we report the first photographic evidence of the Tibetan fox in Bhutan, recorded during the nationwide snow leopard *Panthera uncia* camera-trap survey (2022–2023) at a single station at 4,582m a.s.l. near the Bhutan–China border, under the Divisional Forest Office Paro. The survey also photographed the woolly hare *Lepus oiostolus*, providing the first confirmed national record. These findings emphasise the conservation significance of Bhutan’s northern alpine landscapes as biodiversity-rich ecosystems. Retrospective screening of existing camera-trap images and targeted alpine surveys are recommended to clarify the species’ distribution and ecology. This record extends the species confirmed range southward into the eastern Himalaya.

Bhutan lies in the eastern Himalayas and forms part of the Himalaya biodiversity hotspot, supporting a high faunal diversity, including nearly 200 mammal species (Myers et al. 2000, Wangchuk et al. 2004). However, baseline information for many taxa remains limited, particularly for small to medium-sized carnivores. Four canids are currently known from Bhutan: Himalayan wolf *Canis lupus chanco*, Asiatic wild dog *Cuon alpinus*, golden jackal *Canis aureus*, and red fox *Vulpes vulpes*. While information on these species remains limited, wolves and Asiatic wild dogs receive increasing public attention due to their involvement in human–wildlife conflict (Thinley et al. 2021, Dhendup et al. 2025).

Given Bhutan’s proximity to the Tibetan Plateau and the presence of extensive alpine habitats in the country’s north, another candidate canid is the Tibetan fox *Vulpes ferrilata*. This species is widespread across the steppes and semi-steppes of the Tibetan Plateau, ranging from Ladakh (India) east through western and central China (Xinjiang, Gansu, Qinghai, Sichuan, and the Tibet Autonomous Region) into Yunnan (Harris et al. 2014). In Nepal, it has been documented in Mustang (Annapurna Conservation Area), Dolpo (Shey Phoksundo National Park), and Humla (Schaller and Ginsberg 2004, Jnawali et al. 2011, Werhahn et al. 2016). It typically occupies high-elevation plains and hills (2,500–5,200m a.s.l.), favouring sparse grasslands with little woody vegetation, and is closely associated with pikas *Ochotona* spp., its primary prey (Wang et al. 2007, Harris et al. 2014).

Although the Tibetan fox is listed as Least Concern on the IUCN Red List and appears globally stable, its population status is poorly understood. There is no evidence of decline, but monitoring is also scarce, and widespread poisoning campaigns targeting pikas across parts of the Tibetan Plateau may pose a localised concern (Harris 2014). Importantly, the Tibetan fox had not previously been confirmed in Bhutan, although the terms “red fox” and “Tibetan fox” have often been used interchangeably. While the IUCN range map includes approximately the northern half of the country within the species’ potential distribution, its presence in Bhutan is classified as uncertain. To date, there have been no verifiable published records confirming the species’ occurrence in the country.

Methods

The nationwide snow leopard camera-trap survey was conducted across suitable high-elevation habitats in Bhutan, including areas within the Jigme Khesar Strict Nature Reserve, the Divisional Forest Office (DFO) Paro, the DFO Thimphu, Jigme Dorji National Park, Wangchuck Centennial National Park, Jigme Singye Wangchuck National Park, and Bumdeling Wildlife Sanctuary. We overlaid a 2x2km grid across habitats between 3,500 and 5,000m a.s.l., and deployed camera stations in 310 grid cells (NCD 2023).

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Cameras were operated from August to December 2022, with a small number of stations remaining active into the following year, where retrieval was delayed by winter snowfall.

At each camera station, two Reconyx HC500 HyperFire (RECONYX, Inc., USA) camera traps were installed on opposite sides of a likely snow leopard travel route. Cameras were programmed to medium-high passive infrared sensitivity and set to record a burst of five photographs per trigger. Units were mounted 30–50 cm above ground and oriented at 45–90° to maximise capture of identifying features (flanks, hindquarters/tail, and/or face and forelimbs) for individual recognition. Within each selected grid cell, station placement was determined by the field team based on local signs and terrain, prioritising features expected to be frequented by snow leopards and other animals (e.g., ridgelines, valley bottoms, caves, and overhung rock faces). To reduce spatial clustering, the minimum distance between neighbouring camera stations was set to 1 km.

Each camera was assigned a unique identifier, and station-level metadata (geographic coordinates, habitat type, and evidence of prey) were recorded using EpiCollect5. EpiCollect5 (five.epicollect.net) is a free mobile and web-based platform for customizable field data collection, including GPS-linked records, photographs, and other media, with data managed through a central web interface. Cameras were checked once, where feasible, at approximately 45 days after installation to replace memory cards and batteries, reposition misaligned units, replace non-functional cameras, clean lenses, and remove vegetation or other obstructions; some remote stations could not be checked due to access constraints.

Results and Discussion

The nationwide snow leopard camera-trap survey operated for 148 days, yielding 22,636 trap-nights. Under DFO Paro (northwestern Bhutan), where 29 camera stations were deployed, one of the stations near the Bhutan–China border (27.683449, 89.204441; 4,582 m a.s.l.) recorded the Tibetan fox (Figure 1). The cameras captured 11 photographs of a solitary individual on 25 September 2022 at 11:43 (Figure 2). The fox was photographed walking along a trail in an alpine meadow with gentle slopes.

At the same station, additional mammals recorded included snow leopard, red fox, Asiatic wild dog, Himalayan wolf, and blue sheep *Pseudois nayaur*. We also obtained photographic records of the woolly hare, which is a first for Bhutan (Figure 3). Domestic yaks *Bos grunniens* and dogs *Canis familiaris* were frequently observed at the site.

The finding confirms the first record of the Tibetan fox in Bhutan, increasing the country's fox fauna to two species, an addition to the national mammal inventory. The detection of only one individual is consistent with the species' typically low encounter rates across much of its range, although local densities can increase where key prey, notably pika, is abundant (Harris et al. 2014). The rarity of alpine specialist in Bhutan may also reflect a combination of limited sampling in remote alpine habitats, naturally low densities, and/or patchy prey availability. For example, another pika-associated carnivore, Pallas's cat *Ootocobus manul*, is also rarely recorded in Bhutan (Dhendup et al. 2019, Dhendup 2021). While this could suggest that pika-rich grasslands may be spatially limited or localised in Bhutan's northern alpine zone, targeted prey and habitat surveys are needed before drawing firm conclusions.

The northern portion of DFO Paro, bordering the Tibet Autonomous Region, appears increasingly important for transboundary wildlife movements, with new detections of alpine species emerging as survey effort increases. Historic trade routes through the Paro–Chumbi Valley in Tibet and connected alpine valleys may provide functional movement corridors for wide-ranging alpine fauna. Consistent with this, the same survey documented additional species recorded for the first time in Bhutan with strong affinities to the Tibetan Plateau, notably the white-lipped deer *Cervus albirostris* (IUCN Red List classified as Vulnerable). In addition, the nearby Jigme Khesar Strict Nature Reserve recorded the Asian badger *Meles leucurus* (IUCN Red List classified as Least Concern) during the same survey (NCD 2023).

The current record supports the plausibility of the predicted occurrence of the Tibetan fox in Bhutan and extends its confirmed range southward into the eastern Himalaya (Figure 4). The current IUCN range map depicts extant areas covering much of the country, from the central region to the northern

border, but classifies the species' presence in Bhutan as uncertain due to the absence of verified or published records. Our finding provides the first confirmed evidence of occurrence in Bhutan and is expected to inform future updates to the species' distribution. However, caution is warranted in interpreting large portions of Bhutan as extant range, as no additional records are currently available.

From a management perspective, the new records of the Tibetan fox and the woolly hare underscore the biodiversity value of Bhutan's northern alpine landscapes, which are already critical for threatened species such as the snow leopard and the Himalayan wolf. Because the site was frequently used by domestic yaks, herders, and dogs, it appears to be subject to ongoing disturbance. Therefore, conservation threats to this alpine ecosystem should be explicitly considered in future surveys and in conservation planning for the Tibetan fox and other alpine wildlife in the area. We also highlight the need for careful data screening. Because the Tibetan fox was not previously reported in Bhutan, it may have been misclassified as a red fox in past camera-trap datasets, particularly when images are partial or low-resolution. We recommend: (1) a retrospective review of archived camera-trap images from northern alpine areas; (2) targeted, habitat-stratified camera trapping and sign surveys focussed on Plateau pika *Ochotona curzoniae* habitats, as the Tibetan fox is a known specialist predator of this species; and (3) general monitoring of the mammal community in alpine areas together with monitoring of human pressure.

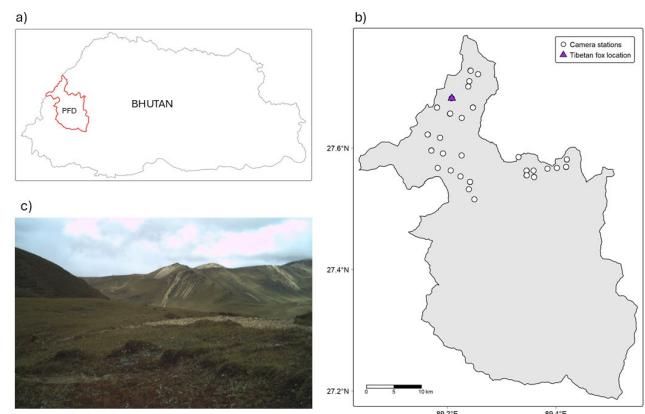


Figure 1. (a) Map of Bhutan showing the location of Paro Forest Division; (b) Map of Paro Forest Division showing camera-trap stations from the nationwide snow leopard survey (2022–2023) and the Tibetan fox record; (c) Landscape at the camera-trap station where the Tibetan fox was photographed.



Figure 2. Tibetan fox camera-trapped under the Divisional Forest Office, Paro.



Figure 3. A camera trap captures photographs of the woolly hare at the same location as the Tibetan fox.

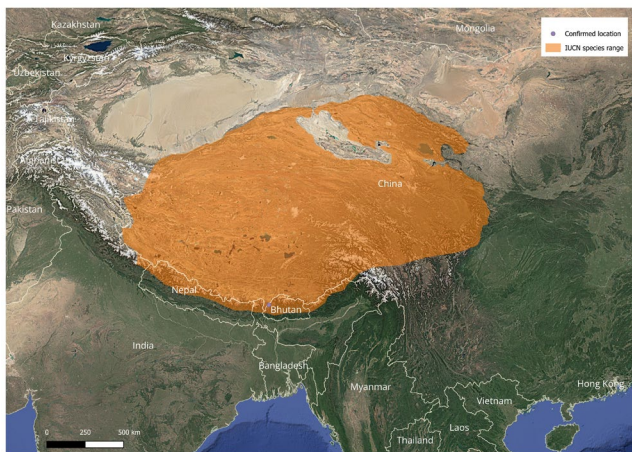


Figure 4. Location of the Tibetan fox record in Bhutan in relation to the IUCN-mapped distribution, highlighting its occurrence within a previously unverified range in Bhutan.

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Biographical sketch

Tashi Dhendup is a conservation biologist with Bhutan's Department of Forests and Park Services and has over 13 years of experience in species research and conservation.

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Letro is a scientist working at the interface of wildlife ecology and the human dimensions of conservation. He is currently pursuing a PhD at Charles Sturt University.

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