

Distribution update

Distribution update for Tibetan fox in western Nepal

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Abstract

We report a western distribution extension for the Tibetan fox *Vulpes ferrilata* in Nepal to the district of Humla in the northwest of the country. We observed a Tibetan fox on 8 August 2015 at 18:00hrs at an elevation of 4,949m above sea level. This finding was genetically verified through sequencing of the mitochondrial D-loop and cytochrome *b* regions extracted from scat samples collected in the same area. The site is locally known as *Chyakpalung* and is situated on the Tibetan Plateau dominated by alpine steppe grassland. Plateau pika *Ochotona curzoniae*, an important prey species for the fox, was frequently observed in the same area. Previously the Tibetan fox has been reported in Nepal from Shey Phoksundo National Park in Dolpo district and from northern part of the Annapurna Conservation Area in Mustang district, which are situated 180km and 250km southeast of Humla. Sympatric canids documented in the study area are red fox *Vulpes vulpes* and Himalayan wolf *Canis* sp., (taxon unsolved). Our findings confirm a western distribution of Tibetan fox up to the Karnali zone in western Nepal, and support the association between the occurrence of plateau pika and Tibetan fox.

Introduction

The Tibetan fox inhabits the steppes and semi-deserts of the Tibetan Plateau (Harris 2014) at elevations from 2,500m to 5,200m (Clark et al. 2008). The species range is reported from Ladakh in India, across China including parts of Xinjiang, Gansu, Qinghai, and Sichuan provinces and all of the Tibetan Autonomous Region into Yunnan (Harris 2014). In Nepal the species is reported north of the Himalayan range, specifically from two locations including the northern part of the Annapurna Conservation Area in Mustang district (Schaller and Ginsberg 2004) and from Shey Phoksundo National Park in Dolpo district (Jnawali et al. 2011, Figure 1). The Tibetan fox inhabits grasslands where pikas are found (Wang et al. 2007).

The IUCN Red List of Threatened Species classifies the Tibetan fox as Least Concern with an unknown population trend (Harris 2014).

Despite this classification there is a knowledge gap about all aspects of the species' natural history, including its reproductive behaviour (Harris 2014). In Nepal, the Tibetan fox is classified as Data Deficient with not enough information available to assess extinction risk (Jnawali et al. 2011). CITES does not list the species in its appendices. Conservation actions are restricted to legal protection within some Chinese reserves (Harris 2014).

In general Tibetan foxes occur at low density, but a recent study implies that they can occur at higher densities of 2-4/km² when their preferred prey is abundant and human hunting pressure is low (Harris 2014). Tibetan foxes feed on various species of pika *Ochotona* spp., other small rodents, hares, birds, vegetation and insects (Clark et al. 2008). Their occurrence appears closely tied to the presence of plateau pika (Harris et al. 2014). The foxes are also reported to scavenge on wolf kills (Schaller 1998), and to follow brown bears *Ursus arctos* digging up pikas (Harris et al. 2008). Tibetan foxes are monogamous

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(Schaller 1998) and mating takes place in winter followed by a 50-60 day gestation period. Thereafter two to five pups are born in a den site, usually found in grasslands with moderate slopes (Schaller and Ginsberg 2004).

Conservation threats for the Tibetan fox include the poisoning of pikas in large parts of the Tibetan Plateau leading to prey depletion and to possible secondary poisoning of foxes. Killings by domestic dogs can contribute locally to fox mortality (Harris 2014). Hunting and snaring of Tibetan foxes seems to occur at very low frequency as the coarse pelts are of little monetary value to humans.

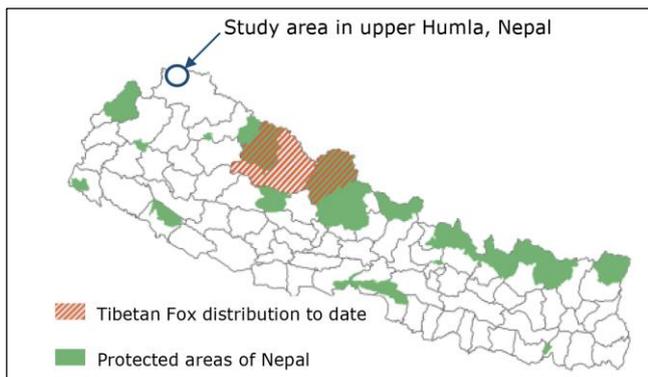


Figure 1. Current knowledge of the Tibetan fox distribution in Nepal. Map modified from Jnawali et al. (2011).

Methods

The study area comprised two sites, Chyakpalung and Nign khola, that span elevations from 4,500 to 5,400m above sea level (Figure 2). Both sites are within the jurisdictional boundaries of Limi Village Development Committee (VDC) in Humla district in the mid-western region of Nepal. The closest permanent settlement to the study area is Jang village in Limi Valley which can be reached within one day of walking. At present a dirt road from Jang to the Chinese border to the north exists, but traffic of one to two vehicles per week is limited to the snow free summer months. During the summer, nomadic pastoralists herd their yaks and goats for one to two months in the area. The rolling flatlands of the study area are dominated by alpine steppe vegetation. The herbivore community includes kiang *Equus kiang*, Tibetan gazelle *Procapra picticaudata* and argali *Ovis ammon*. Predators present are wolf, snow leopards *Panthera uncia*, red fox, and Tibetan fox. Smaller mammals found are Himalayan marmot *Marmota himalayana*, plateau pika, woolly hare *Lepus oiostolus*, Tibetan dwarf hamster *Cricetulus tibetanus* and several other small rodent species.

The study was conducted from July to August 2015. Observations were made from vantage points overlooking the rolling, open landscape allowing to observe animals up to two kilometres away. Observations were made daily during dawn and dusk hours with occasional full days of observations. All canid scats in the area were collected as part of a wolf study that was the primary purpose of the expedition. The genetic analysis was conducted by the Centre for Molecular Dynamics Nepal in Kathmandu, with a genetics protocol developed by The Royal Zoological Society of Scotland WildGenes Laboratory. For species identification, samples were amplified and sequenced at the D-loop and the cytochrome *b* control region of the mitochondrial DNA (primer pairs D-loop: F- GCACCCAAAGCTGAAATTCT, R- ATGGGCCCGAGCGA GAAGAG; primer pairs cytochrome *b*: F- TTGTATTTCAAC TATAAGACAT, R- GCAAAGAATCGTGTAGGGTTG). The fragment length of the D-loop sequence was 216bp and 513bp for the cytochrome *b* sequence. Further details and conditions on the genetic analysis can be found in Waters et al. (2015) and Senn et al. (2014). The sequencing results were examined and edited with Geneious version 9.0.5 and then compared with available sequences in the GenBank

database of the National Centre for Biotechnology Information (NCBI) using the Basic Local Alignment Search Tool (BLAST) to identify the species.

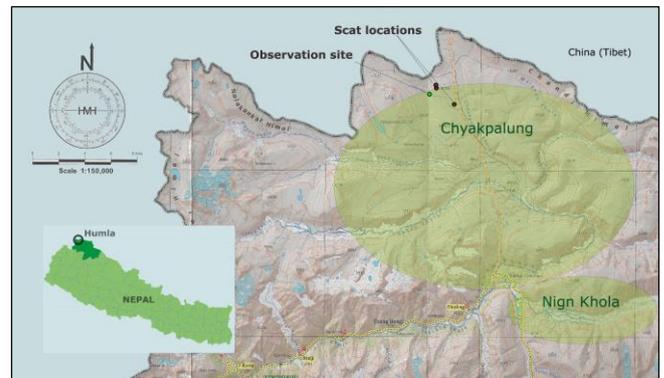


Figure 2. Study sites Chyakpalung and Nign Khola in upper Humla with the Tibetan fox observation site and scat locations indicated. Map modified from Himalayan Map house (2011).

Results

A Tibetan fox was sighted on 8 August 2015 at 18:00hrs in the location 30.40159°N/ 81.61281°E at an elevation of 4,949m above sea level. The observation site is characterized by alpine grassland covering rolling hills with a narrow wildlife trail following the side of a small stream (Figure 3). Three scat samples, collected in the same general area (Figure 2), matched with mitochondrial DNA sequences of *V. ferrilata* deposited in GenBank (KT033906.1, JF520838, JF520839, JF520840) with >97% identity overlap for all three samples. Matches to the red fox *Vulpes vulpes* were much lower at <93%. The two unique D-loop haplotypes of Tibetan fox found in the study area have been deposited in GenBank with accession numbers KU646947 and KU646948. The one unique cytochrome *b* haplotype found in the area matched a 100% with the sequence KT033906 already deposited on GenBank. Sympatric canids documented both by observation and genetics in the study area are red fox and wolf. We observed plateau pika and its burrows frequently in the entire *Chyakpalung* site.



Figure 3. Tibetan fox walking along a wildlife trail at 30.40159°N/ 81.61281°E and an elevation of 4,949m above sea level (Photograph taken 8 August 2015 by Geraldine Werhahn).

Discussion

This Tibetan fox documentation in the district of Humla in Nepal represents an expansion of the known distribution range of the species in Nepal by 180km to the northwest. Our observations support previous findings of a close tie between the occurrence of Tibetan fox and plateau pika (Harris 2014, Harris et al. 2014), as plateau pikas and their burrows were observed frequently in the area. Although the Tibetan fox is classified as Least Concern by the IUCN, very little is known about its general biology, its population trends, or specific distribution (Harris 2014). Tibetan foxes are elusive animals and generally occur in low densities (Schaller and Ginsberg 2004), while currently receiving little attention by field researchers and locals. The local people in our study area did not recognize the species when they were shown photographs of Tibetan foxes. However, they were familiar with red foxes and wolves in their locality. According to local people, the species is neither hunted in Humla, nor is it used for religious or medicinal purposes. In contrast, both red fox and wolves are used in local medicines and particular body parts serve specific religious purposes. Based on its elusiveness and generally low density, it is possible that the Tibetan fox is found in other regions north of the Himalayas in Nepal that are not currently known to be inhabited by it. The rather broad and coarsely scaled distribution ranges reported for this elusive and specialized species should be considered with care. The current global trend of habitat destruction and increasing human-wildlife conflict implies that research into a species as little studied as the Tibetan fox yet classified as Least Concern by IUCN is important to maintain this favourable status into the future.

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Biographical sketches

Geraldine Werhahn is a graduate student at WildCRU, University of Oxford. She is studying the phylogeny and ecology of wolves in the Himalayas. Her research is driven by the appreciation that maintaining robust carnivore populations is based on conserving healthy ecosystems that benefit many other species.

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