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Short Communications

First photographic evidence of Snow Leopard *Panthera uncia* (Mammalia: Carnivora: Felidae) outside current protected areas network in Nepal Himalaya

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First photographic evidence of Snow Leopard *Panthera uncia* (Mammalia: Carnivora: Felidae) outside current protected areas network in Nepal Himalaya

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Abstract: The Snow Leopard *Panthera uncia* is a rare top predator of high-altitude ecosystems and insufficiently surveyed outside of protected areas in Nepal. We conducted a rapid camera-trapping survey to assess the presence of Snow Leopard in the Limi valley of Humla District. Three individuals were recorded in two camera locations offering the first photographic evidence of this elusive cat outside the protected area network of Nepal. In addition to Snow Leopard, the Blue Sheep *Pseudois nayaur*, Beech Marten *Martes foina*, Pika *Ochotona* spp. and different species of birds were also detected by camera-traps. More extensive surveys and monitoring are needed for reliably estimating the population size of Snow Leopard in the area. The most urgent needs are community-based conservation activities aimed at mitigating immediate threats of poaching, retaliatory killing, and rapid prey depletion to ensure the survival of this top predator in the Himalaya.

Keywords: Camera-trapping, conservation, Humla, livestock depredation, monasteries, non-timber forest products, retaliatory killing, Tibetan Buddhism.

The Snow Leopard *Panthera uncia* is distributed throughout northern Nepal along the boundary with China over an area of 22,625.34km^2 (Aryal et al. 2016). Snow Leopards research and conservation activities have been focused mostly on protected areas (PA) of Nepal (Jackson & Alhborn 1989; Oli 1991; Kyes & Chalise 2005; Khatiwada et al. 2007; Ale 2007; Ale et al. 2007; Devkota 2010; Karmacharya et al. 2011; Wegge et al. 2012; Aryal et al. 2014, 2016). To date, research institutions, conservationists and students have given very low priority to surveys and monitoring of Snow Leopard outside Nepal's PAs, in spite of the existence of suitable habitat. A few Snow Leopard studies based on sign surveys were conducted outside PAs in Humla District (R. Jackson

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Competing interests: The authors declare no competing interests.

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in litt. 2003; Khatiwada & Ghimirey 2009; FoN 2014) and Bhajang District (FoN 2014). Of the total potential habitats preferred by Snow Leopards in Nepal, 65% were located outside PAs (Jackson & Ahlborn 1990). More recent species distribution modeling, however, shows that only 34% of the total Snow Leopard habitat in Nepal lies outside the PA network, comprising a significant portion of potential unprotected habitats located in western Nepal, including Humla, Bajhang, and Bajura (Aryal et al. 2016).

The paucity of surveys and the resulting lack of reliable data for unprotected lands presumably increases leopard vulnerability to local extinction from poaching and retaliatory killing (R. Jackson pers. comm. 2017), and lack of effective government actions against poaching and wildlife trade aggravates the situation. Therefore, urgent collection of baseline data on Snow Leopard presence, distribution and status outside of PAs is warranted. To date, information on distribution and status of Snow Leopard is mostly based on anecdotal evidence and few sign surveys (Jackson & Hunter 1995). Due to challenging habitat structure, site accessibility and the cryptic nature of this felid species, direct sighting such as detection is virtually impossible (Jackson et al. 2006; Ale & Brown 2009). Camera trapping is a preferred method for detecting such rare and elusive species. In addition, sign surveys and local residents' interviews generally lack scientific rigor for reliable status assessment (Jackson et al. 2006). Considering these facts, we conducted the first ever camera-trapping survey of Snow Leopards in the Limi valley of Humla District of Nepal. The findings of this study will make an important baseline for future monitoring and help government and conservation partners in conservation planning.

Materials and Methods

Study Area

Limi Valley is located in the trans-Himalayan steppe environment in Humla District of Nepal (Fig. 1), covering an area of ca. 1200km^2 and including three villages (Halji, Jang, and Til) with 181 households and a total population of 904 humans. Historically, Limi residents depended on traditional barter economies and semi-nomadic animal husbandry. Now, trans-boundary grazing restrictions imposed by China compel community members to reduce livestock holdings and search for new economic options. Carving of Phuru, a wooden bowl made from maple knots, is an old and highly demanded economic activity for the people living in the upper part of Humla including the Limi Valley (R.P. Lama pers. obs. 2007–2015). Trade and

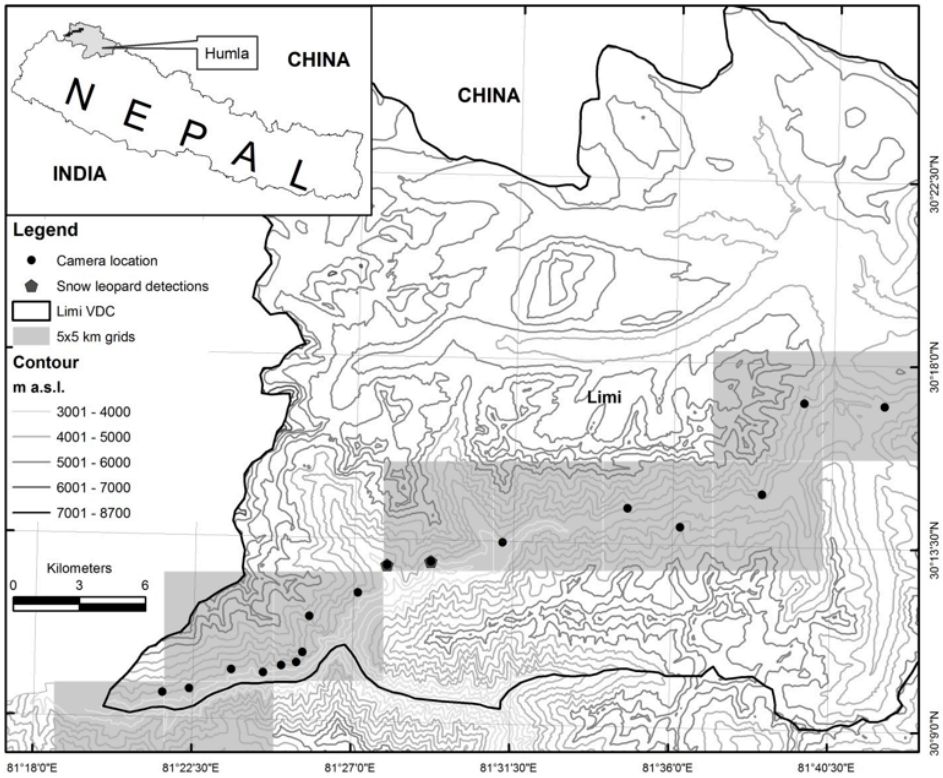

Figure 1. The study area showing the grid cells and camera-trap locations. Village Development Committee (VDC) is the smallest administrative unit of Nepal.

seasonal migrant labor work in the neighboring Chinese town also significantly contribute to the local economy.

The Mt. Gurla Mandata range divides Limi Valley into the southern and northern parts. The southern part has river valleys, settlements, agricultural lands, patches of open forest, rocky outcrops and broken terrain making favorable habitats for species like Blue Sheep *Pseudois nayaur*, Snow Leopard, Beech Marten *Martes foina*, and Tallus-dwelling Pikas *Ochotona roylei*, while the northern side of the range consists of plain steppe grasslands supporting the plateau species such as Tibetan Wild Ass *Equus kiang*, Plateau Pika *Ochotona curzoniae*, Tibetan Gazelle *Procapra picticaudata*, Tibetan Argali Sheep *Ovis ammon hodgsoni*, Wild Yak *Bos grunniens* and Himalayan Wolf *Canis Lupus himalayensis* (Werhahn et al. 2017).

Site selection and camera trapping

We conducted a camera-trapping survey in the Limi Valley during July and August, 2015 to conduct a rapid assessment of Snow Leopard status. We divided the total study area into 5x5 km^2 grid cells considering 24km^2 (11–37 km^2) as the minimum home range of the Snow Leopard in western Nepal (Jackson 1996) and placed one or two cameras in each grid. Due to time limitations we could not cover an entire study area and placed camera-traps only in the least disturbed locations where we frequently observed Snow Leopard signs. We set up 17 Bushnell Trophy HD cameras in 17 locations (Fig. 1) within 10 grids following preferred habitat features like ridgelines, travel corridors and marking sites (Jackson et al. 2006). A minimum distance between camera-traps was kept at 2.5km, and they were placed at elevations from 3,092–4,608 m. Since the purpose of this preliminary survey was to assess the presence of Snow Leopard, we did not account for spatial autocorrelation of camera-trap sites. One camera-trap was lost thus only data from the remaining 16 camera-traps were used in the analysis.

Data management and analysis

We managed camera-trap images using the program described by Sanderson & Harris (2013). We defined capture events as independent images of a species at a location captured at least 60 minutes apart. We computed the relative abundance index (RAI) for all the mammals, birds and human recorded during the surveys. RAI was expressed as the number of independent images per 100 trap-nights (Sanderson & Harris 2013; Jenks et al. 2011).

Results

Relative Abundance Index (RAI)

A total survey effort of 195 trap-nights recorded 39,839 images from 16 camera traps. We sorted out and analyzed images of mammals, birds and human (n = 1,110) and discarded the ghosts, i.e., false images and also the unknown images (n = 38,729). The survey recorded 95 independent images of four species of mammals: Snow Leopard (n = 6 images), Blue Sheep (n = 6 images), Beech Marten (n = 14 images), and Pikas (n = 69 images). In addition to mammals, images of different species birds (n = 711 images) and human (n = 99 images) were also recorded. The birds had the highest RAI of 45.00 captures/100 trap-nights followed by Pika (30.45), human (13.64), Beech Marten (5.45), Snow Leopard (2.73), and Blue Sheep (2.73) (Table 1).

Photographic evidence of Snow Leopard

Snow Leopard was captured in two different locations (Til Gomba and Chhongerche) and the time to first detection was 16 days. We used pelage patterns (Jackson et al. 2006; Ale et al. 2014) to identify different individuals from camera-trap pictures. The dorsal side of the tail, forelegs, right hind legs and right flanks were particularly informative. We recorded total of three individuals, including two adults and one sub-adult (Image 1). In Til Gomba, individual 1 was recorded on 28 July 2015 from 00:06:05 h to 00:36:04 h (1a in Image 1) and individual 2 was captured on 30 July 2015 from 23:16:40–23:22:42 hr (2a in Image 1). The adjoining location Chhongerche also produced two events. Individual 3 was captured on 28 July 2015 from 17:14:36–17:14:37 hr (3b in Image 1) and individual 2 was captured on 31 July 2015 from 03:37:45–03:38:45 hr (2b in Image 1). In Til Gomba, individuals 1 and 2 were captured while scraping on the surface. In Chhongerche, individual 3 was captured while scent-marking a rock (3b in Image 1). Both these locations are dominated by broken terrain and cliffs providing good habitats for Snow Leopard and the middle elevations contain open areas with good grazing grounds for Blue Sheep.

Discussion

This is the first camera-trapping survey in the Limi Valley that successfully recorded Snow Leopards during a short survey period in two locations. An opportunistic survey carried out in early 2000 suggested the presence of Snow Leopards in the Limi Valley (R. Jackson pers. comm. 2017). A study conducted in 2007 in the adjoining area which included some parts of the Limi Valley also showed a good abundance of Snow Leopard signs (Khatiwada & Ghimirey 2009). In May 2007, the first author observed two adult Snow Leopards in Til Gomba where we obtained camera-trap pictures during this study. Additionally, four independent sightings of Snow Leopards were reported

Table 1. The relative abundance index (RAI) and elevations of mammal, birds and human camera-trap record locations in the Limi Valley.

Taxa	RAI (number of independent camera-trap captures/100 trap-nights)	Minimum elevation (m)	Maximum elevation (m)
Birds	45.00	3928	4608
Blue sheep	2.73	3928	4054
Human	13.64	3902	4608
Pika	30.45	3920	4367
Snow Leopard	2.73	3902	3928
Beech Marten	5.45	3928	4608

Image 1. Photos 1a and 2a depict the individuals 1 and 2, respectively, in Til Gomba. Similarly, the photos 2b and 3b show the individuals 2 and 3 photographed in Chhongerche. Thus, the photos 2a and 2b belong to the same individual photographed in two different locations.

around Halij Village in the winter of 2011 (A. Hovden pers. comm. 2012). High encounter rates of Snow Leopards are reported in the inner part of Limi Valley, including Ningkhola, Rakaru and Hel, mostly during winter and spring (P. Tamang pers. comm. 2015). A female with three cubs was sighted in Rakaru in the winter of 2014 (P. Tamang pers. comm. 2015) and another female with two cubs was sighted at a goat kill site in Takchi in July 2015 (N. Tamang pers. comm. 2015). Apart from photographic evidence of Snow Leopard presence, this study also provides the relative abundance of four mammal species, including the Snow Leopard and its main prey Blue Sheep.

Limi Valley is inhabited by people of Tibetan origin and the local culture is strongly influenced by Buddhist beliefs.

Tibetan Buddhist monasteries serve as cultural centers for non-violence and conservation actions (T. Lama pers. comm. 2017); for example in the Sanjiangyuan region of Tibet, monasteries have played an important role in conserving Snow Leopards and their habitats (Li et al. 2013). The Limi Valley is locally protected by the 1000-year-old Buddhist Monastery Rinchhen Ling, and no hunting and harvesting of medicinal herbs is allowed here. People violating these rules are strictly fined; however, at present this area is vulnerable to encroachment by poachers and harvesters from outside, as the valley is rich in wildlife and medicinal and aromatic plants (R.P. Lama pers. obs. 2015). Depredation of livestock by Snow Leopards and Wolves *Canis lupus* is frequent in the valley (R.P. Lama pers. obs. 2015), and leopards can also enter houses. Fear of attack and economic losses have negative impacts on local livelihoods, and motivate retaliatory killings. A female Snow Leopard was killed after a mass killing of goats (25 in a single night) in Halji Village in 2007 (FoN 2014). Similarly, a female Snow Leopard with two cubs was trapped in Til Village in 2011 (FoN 2014) after being perceived as a threat to livestock. A male Snow Leopard that entered Jang Village was killed in the winter of 2012 after attacking several goats inside a house (Local people pers. comm. 2015).

This survey confirms the presence of Snow Leopard in Limi Valley in Humla by successfully bringing the first photographic evidence to supplement previous local sightings and indirect signs. Implementation of predator-friendly human-leopard interaction measures such as predator-proofed corrals, improved husbandry practices, conservation education and livelihood improvement programs are recommended to ensure the survival of Snow Leopards in the Limi Valley.

References

Ale, S.B. (2007). Ecology of the Snow Leopard and the Himalayan Tahr in Sagarmatha (Mt. Everest) Nationl Park, Nepal. PhD Thesis. University of Illinois, Chicago, 179pp.

Ale, S.B. & J.S. Brown (2009). Prey behavior leads to predator: a case study of the Himalayan Tahr and the Snow Leopard in Sagarmatha (Mt. Everest) National Park, Nepal. *Israel Journal of Ecology and Evolution* 55: 315–327.

Ale, S.B., B. Shrestha & R. Jackson (2014). On the status of Snow Leopard *Panthera uncia* (Schreber, 1775) in Annapurna, Nepal. Journal of Threatened Taxa 6(3): 5534–5543; http://doi.org/10.11609/JoTT.o3635.5534-43

Ale, S.B., P. Yonzon & K. Thapa (2007). Recovery of Snow Leopard *Uncia uncia* in Sagarmatha (Mt. Everest) National Park, Nepal. *Oryx* 41(1): 89–92; http://doi.org/10.1017/S0030605307001585

Aryal, A., D. Brunton, W. Ji, D. Karmacharya, T. McCarthy, R. Bencini & D. Raubenheimer (2014). Multipronged strategy including genetic analysis for assessing conservation options for the Snow Leopard in the central Himalaya. *Journal of Mammalogy* 95(4): 871–881; http://doi.org/10.1644/13-MAMM-A-243

Aryal, A., U.B. Shrestha, W. Ji, S.B. Ale, S. Shrestha, T. Ingty & D. Raubenheimer (2016). Predicting the distributions of predator (Snow Leopard) and prey (Blue Sheep) under climate change in the Himalaya. *Ecology and Evolution* 6(12): 1–11; http://doi.org/10.1002/ece3.2196

Devkota, B.P. (2010). Prey Density and Diet relationship of Snow Leopard (*Uncia uncia*). Msc Thesis. Institute of Forestry, Tribhuvan University, Pokhara, 50pp.

FoN (2014). Assessment of Snow Leopard Status and Distribution in Humla and Bajhang districts in Western Complex of Nepal. Report submitted to WWF Nepal Program, Baluwatar, Kathmandu, 60pp.

Jackson, R.M. (1996). Home range, movements and habitat use of Snow Leopard (*Uncia Uncia*) in Nepal. PhD Thesis, University of London, London, United Kingdom, 233pp.

Jackson, R. & G. Ahlborn (1989). Snow Leopards (*Panthera uncia*) in Nepal - home range and movements. *National Geographic Research and Exploration* 5: 161–75.

Jackson, R. & G. Ahlborn (1990). The role of protected areas in Nepal in maintaining viable population of Snow Leopards. *International Pedigree Book of Snow Leopard* 6: 51–69.

Jackson, R. & D.O. Hunter (1995). Snow Leopard Survey and conservation handbook (First edition). Report, International Snow Leopard Trust, 120pp.

Jackson, R., J.D. Roe, R. Wangchuk & D.O. Hunter (2006). Estimating Snow Leopard population abundance using photography and capture-recapture techniques. *Wildlife Society Bulletin* 34(3): 772–781; http://doi.org/10.2193/0091-7648(2006)34[772:ESLPAU]2.0.CO;2

Jenks, K.E., P. Chanteap, D. Kanda, C. Peter, P. Cutter, T. Redford, L. Antony & P. Leimgruber (2011). Using relative abundance indices from camera-trapping to test wildlife conservation hypotheses–an example from Khao Yai National Park, Thailand. *Tropical Conservation Science* 4(2): 113–131.

Karmacharya, D.B., K. Thapa, R. Shrestha, M. Dhakal & J.E. Janecka (2011). Non-invasive genetic population survey of Snow Leopards (*Panthera uncia*) in Kangchenjunga conservation area. *BMC Research Notes* 4: 1–8; http://doi.org/10.1186/1756-0500-4-516

Khatiwada J.R., M.K. Chalise & R.C. Kyes (2007). Survey of Snow Leopard (*Uncia uncia*) and Blue Sheep (*Pseudois nayaur*) populations in the Kanchenjungha Conservation Area (KCA), Nepal. Final Project Report Submitted to International Snow Leopard Trust, Seattle, USA, 13pp.

Khatiwada, J.R. & Y.P. Ghimirey (2009). Status of Snow Leopard (*Uncia uncia*) in Humla District, Western Nepal. *Scientific World* 7: 49–52.

Kyes, R.C. & M.K. Chalise (2005). Assessing the Status of the Snow Leopard Population in Langtang National Park, Nepal. Final Project Report submitted to International Snow Leopard Trust, Seattle, USA, 11pp.

Li, J., D. Wang, H. Yin, D. Zhaxi, Z. Jiagone, G.B. Schaller, C. Mishra, T.M. McCarthy, H. Wang, L. Wu, L. Xiao, L. Basange, Y. Zhang, Y. Zhou & Z. Lu (2014). Role of Tibetan Buddhist Monasteries in Snow Leopard Conservation. *Conservation Biology* 28(1): 87–94; http://doi.org/10.1111/cobi.12135

Oli, M.K. (1991). Ecology and conservation of the Snow Leopard (*Panthera uncia*) in the Annapurna Conservation Area, Nepal. MPhil Thesis. University of Edinburgh, Edinburgh, 197pp

Sanderson, J. & G. Harris (2013). Automatic data organization, storage, and analysis of camera trap pictures. *Journal of Indonesian Natural History* 1: 6–14.

Wegge, P., R. Shrestha & Ø. Flagstad (2012). Snow Leopard *Panthera uncia* predation on livestock and wild prey in a mountain valley in northern Nepal: implications for conservation management. *Wildlife Biology* 18(2): 131–141; http://doi.org/10.2981/11-049

Werhahn, G., N. Kusi, C. Sillero-Zubiri & D. Macdonald (2017). Conservation implications for the Himalayan Wolf *Canis (lupus) himalayensis* based on observations of packs and home sites in Nepal. *Oryx* 1–7; http://doi.org/10.1017/S0030605317001077

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