Snow Leopard REPORTS

Research Note

Snow Leopard Reports, 3 (2024): 79-87
http://dx.doi.org/10.56510/slr.v3.28939

First Photographic Evidence of Pallas's Cat (*Otocolobus manul*) from Himachal Pradesh, India

Charu Sharma[1,*] · Tanzin Thuktan[1] · Rinchen Tobge[1] · Dorje Angrup[1] · Dorje Chhering[1] · Tanzin Sherab[1] · Tanzin Chhering[1] · Deepti Bajaj[1] · Munib Khanyari[1] · Kulbhushansingh Suryawanshi[1,2,3]

1 Nature Conservation Foundation, Mysore, India
2 Snow Leopard Trust, Seattle, WA, USA
3 Future Flourishing Program, Canadian Institute for Advanced Research, Toronto, Ontario, Canada
* Corresponding author: charusharma@ncf-india.org

Key words
camera trap surveys, Himachal Pradesh, Pallas's cat, small cat, small carnivores

ARTICLE HISTORY:
First Submission: September 10, 2024
Second submission: November 12, 2024
Accepted: November 15, 2024
First published online: November 25, 2024

CORRESPONDING EDITOR: Justine Shanti Alexander <Justine.s.alexander@gmail.com>

Abstract

While the study of carnivore ecology has made significant progress, our knowledge of small cats remains limited. For some species, their distribution remains largely unknown. We report the first photographic evidence of the Pallas's cat in Himachal Pradesh, India. Of the 56 camera traps placed for snow leopard population estimation across Kinnaur region between March-May 2024, we recorded Pallas's cat at three camera trap sites with 19 images from three instances during morning hours. These captures were at an elevation of 3900–4100 meters in rocky habitats largely dominated by boulders and cliffs. Sympatric carnivores captured were snow leopard (*Panthera uncia*), red fox (*Vulpes vulpes*), stone marten (*Martes foina*) and free-ranging dogs. This discovery not only extends the known

distribution of Pallas's cat but also underscores the urgent need for focused conservation research and action in this region, especially given the presence of free-ranging dogs. This can be achieved through coordinated, landscape level and trans-boundary efforts.

Main Text

Small carnivores (mammals of order Carnivora weighing <16 kg) play significant roles in determining the structure and function of an ecosystem through top-down effects on herbivores, long-distance seed dispersal, pest control and nutrient cycling (Do Linh San et al., 2022; Marneweck et al., 2021). Even though there is increasing evidence of them being excellent sentinel species (Marneweck et al., 2022), we have a paucity of information about them (Bandyopadhyay et al., 2024; Marneweck et al., 2021). India is home to 15 species of wild cats (60% of the global felid diversity), of which 11 are small carnivores (Jackson, 1997). Alarmingly though, a majority of them show a declining trend (Bandyopadhyay et al., 2024).

The Pallas's cat (*Otocolobus manul*), like many small carnivores, faces significant threats from habitat fragmentation and increasing feral species, making focused research on its distribution and status critical for conservation planning. Also known as manul, the Pallas's cat is a small cat species documented from 13 countries and is listed as Least Concern on the IUCN Red List (Ross et al., 2020). However, its distribution is fragmented, spanning from the Middle East Asian region to montane grasslands and shrublands of Northern and Central Asia and some parts of South Asia (Aghili et al., 2008; Anile et al., 2021; Barashkova et al., 2007; Belousova, 1993; Jutzeler et al., 2010). Despite its wide range of occurrence, it is a habitat and prey specialist (Ross et al., 2010, 2020) with its prey populations also prone to land-use change and climate change (Lanz et al., 2019; Ma et al., 2021). In India, this elusive and rare small cat has been reported from several locations in Ladakh (Mahar et al., 2017; Maheshwari et al., 2023; Mallon, 1991), and occasional sightings from Sikkim (Chanchani, 2008; Menon, 2014; Prater & Society, 1990) and a camera trap record from Uttarakhand (Pal et al., 2019) (Figure 1 (a)). Owing to its limited observations resulting from rough terrain and cryptic nature, knowledge about this species is sparse, especially in South Asia (Dhendup et al., 2019; Mahar et al., 2017). This lack of comparable and accurate data across its range acts as an impediment in formulating and implementing effective conservation plans for the species (Lanz et al., 2019; Ross et al., 2019).

Here we report the first photographic evidence of Pallas's cat in the trans-Himalayan region of Hangrang valley, Kinnaur from the state of Himachal Pradesh, India (Figure 1). We obtained this record during a camera trapping survey for snow leopard (*Panthera uncia*) population estimation across the state of Himachal Pradesh, India conducted in partnership with the Himachal Pradesh Forest Department. We had placed 56 cameras for a duration of 60 days, from March 2024 to May 2024, with the aim to estimate snow leopard populations in the Kinnaur region. We deployed cameras in 4 x 4 km grids based on snow leopard signs such as scat, scratch or spray marks in their suitable habitat like ridgelines, cliff bases and overhanging boulders. We recorded the Pallas's cat at three independent camera trap sites in the valley, at elevations ranging from

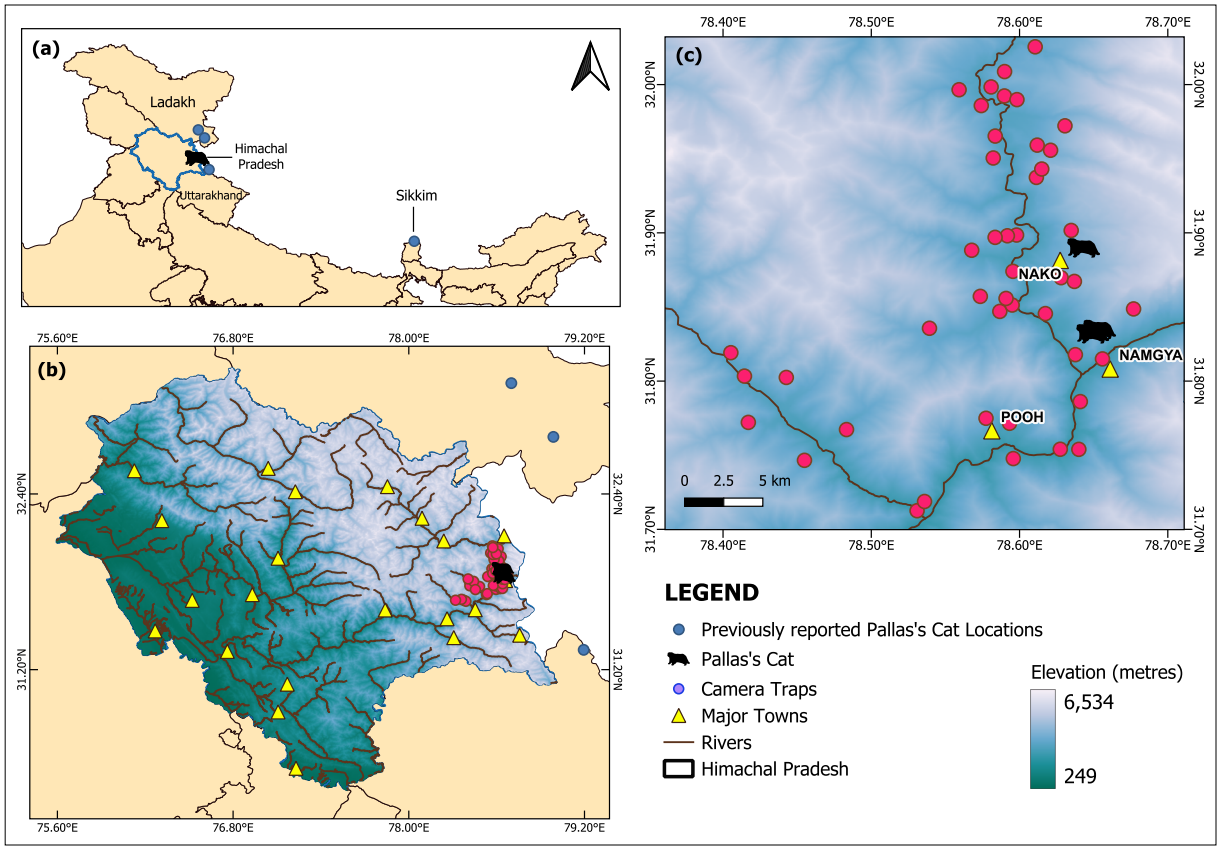

Figure 1. **(a)** *Previously reported Pallas's cat locations in Ladakh, Uttarakhand and Sikkim,* **(b)** *the state of Himachal Pradesh with camera trap locations, and* **(c)** *Hangrang Valley where the Pallas's cat was recorded.*

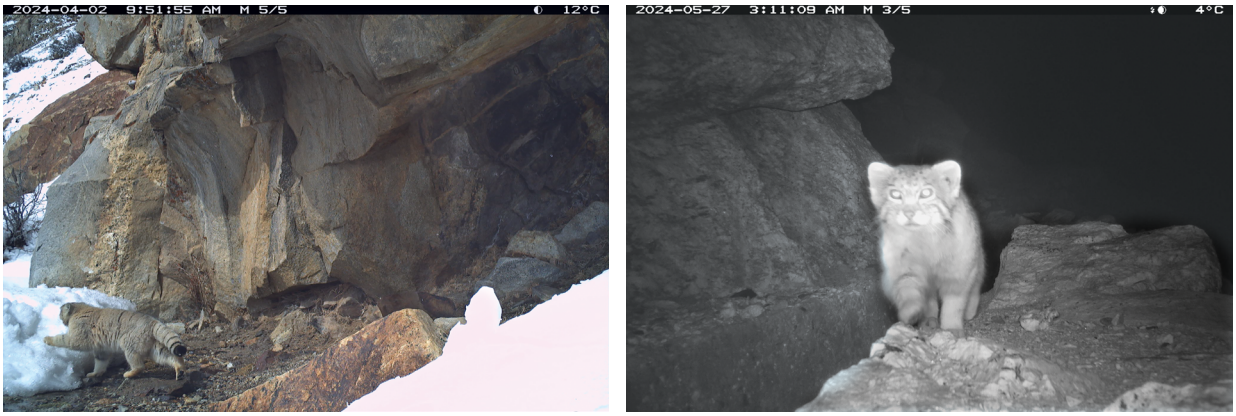

Figure 2. *Pallas's cat captured in Hangrang valley, Upper Kinnaur.*
(Photo credit: Wildlife Wing-Himachal Pradesh Forest Department and Nature Conservation Foundation).

3900–4100 meters above mean sea level. The Pallas's cat was photographed once at each of the three sites, with a total of 19 images, during the early morning hours, specifically between 3 AM and 4 AM and one at 10 AM (Figure 2). They were observed solitary, walking past the camera. Individual identification was not possible given these low number of captures.

Hangrang valley is located in the Kinnaur region adjacent to Spiti. This region of Upper Kinnaur is characterized by a cold and arid environment with annual rainfall of < 50 mm and harsh snow-bound winters (Chawla et al., 2012; Rahimzadeh, 2016) (Figure 3), and rugged mountains with precipitous watersheds flowing into the Sutlej (Rahimzadeh, 2016). The habitat in the surrounding area where we recorded the Pallas's cat was covered with medium-large sized rocky boulders and cliffs, interspersed with patches of meadows (Figure 4). One of the

Figure 3. *The trans-Himalayan landscape from Hangrang valley in Kinnaur.*

Figure 4. *Trans-Himalayan region of Upper Kinnaur where camera traps were placed.*

sites had an Irrigation and Public Health water pipeline source. The vegetation in the area was sparse, dry alpine scrub *Artemisia* spp., *Astragalus* spp., *Eurasia* spp., *Carex* spp.

Other wildlife that we recorded along with the Pallas's cat include snow leopard, red fox (*Vulpes vulpes*), stone marten (*Martes foina*), Himalayan snowcock (*Tetraogallus himalayensis*), chukar (*Alectoris chukar*), and pika (*Ochotona* spp.) (Figure 5). Pikas were captured

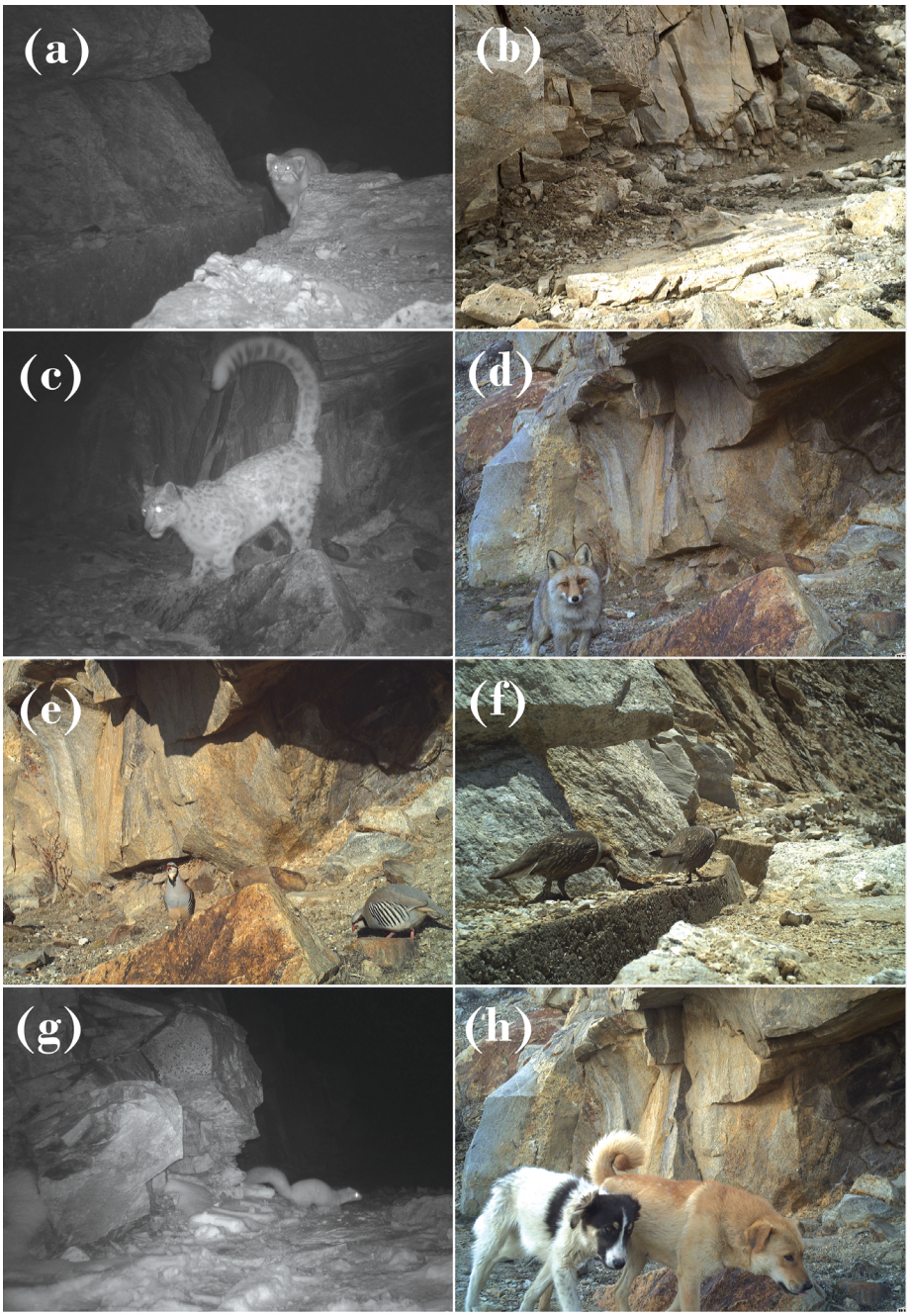

Figure 5. *Pallas's cat and other wildlife that were captured in Hangrang valley* **(a)** *Pallas's cat,* **(b)** *pika,* **(c)** *snow leopard,* **(d)** *red fox,* **(e)** *chukar,* **(f)** *Himalayan snowcock,* **(g)** *stone marten,* **(h)** *free-ranging dogs. (Photo credit: Wildlife Wing-Himachal Pradesh Forest Department and Nature Conservation Foundation).*

on multiple occasions, and the occurrence of Pallas's cat is strongly linked with the presence of its prey (Greenspan & Giordano, 2021). Their probable prey species in this part of their distribution also include chukar, voles (*Alticola* spp.) and Tibetan snowcock (*Tetraogallus tibetanus*) (Dhendup et al., 2019).

The Hangrang valley is situated very close to the international border with Tibet. Research suggests there are many regions possibly inhabited by/suitable for the Pallas's cat, however, they suffer from a lack of survey effort (Greenspan & Giordano, 2021). Models do predict the western Himalayas and the Tibetan plateau as plausible habitats for this species (Greenspan & Giordano, 2021). Earlier, in 2020-21, there have been locally reported sightings shared across social media and older records from the state as well (Negi, 1998). This finding reiterates the need to have Pallas's cat-focused camera trap surveys to better understand its presence.

Pallas's cat has been recorded in trade in India in the past five decades (Bandyopadhyay et al., 2024; *CITES Trade Database*, 2022). It is listed in Appendix II of the CITES (CITES, 2022) and Schedule 1 of the Wildlife Protection Amendment Act, 2022 (The Indian Wildlife Protection (Amendment) Act, 2022). Despite this, there are numerous threats that the animal faces. From our camera trap data, we observed free-ranging dogs present at the majority of locations (see Figure 5). They are highly invasive, threatening wildlife through predation, competition, disease transmission, hybridization, inducing chronic stress and fear-induced behavioural changes (Dar et al., 2023; Home et al., 2018). There has been a rise in their number in the trans-Himalayas, and pose significant threat of harming wildlife, especially small cats, and competing for prey (Home et al., 2018; Mahar et al., 2024; Shrivastava, 2023). Moreover, their widespread distribution in the landscape and high exposure rates to pathogens result in serious disease risks to carnivores (Home et al., 2022). In addition to this, the habitat of Pallas's cat is fragmented by heavy military presence and disturbance due to proximity to an international border, and large-scale infrastructure development causing irreversible damage to the ecosystem (Dey & Basu, 2023; Hussain, 2023). Unregulated tourism, military camps and poor waste management attract free-ranging dogs, exacerbating the issue (Dey & Basu, 2023; Geneletti & Dawa, 2009; Mahar et al., 2024). This region is also highly vulnerable to climate change with many irreparable impacts on mountain ecosystems (IPCC, 2023; Krishnan et al., 2019). Increasing human pressures, rapidly changing land-use patterns, dependence on small mammal prey, and erratic seasons can likely endanger the future of the Pallas's cat (Banerjee et al., 2019; Ross et al., 2019).

The Pallas's cat is an indicator species for the mountain steppe ecosystems (Lanz et al., 2019). Hence, holistic conservation measures at a landscape-level are needed for effectively conserving it, its habitat and sympatric species. Reducing and controlling dog populations through better waste management practices, sterilization programs, and responsible dog ownership should be encouraged. Along with these, continuous monitoring and robust population assessments across its vast range are essential to derive efficient conservation measures. Raising awareness about the presence of these species also holds the potential to

increase local stewardship for its conservation. More focused studies to understand the distribution and ecology of Pallas's cat are needed to aid in long-term conservation and management. Particular emphasis on its ranging behaviour, habitat use and reproductive success in such landscapes is needed.

This record is a crucial finding, not least because it is one of the first reported sightings from the state, but this could also be a population that is connected to the adjoining Tibetan plateau, further adding to its known global distribution. Potential cross-border connectedness can render the Pallas's cat a species that will need implementation of collaborative transboundary conservation. This will need raising awareness and capacities of key stakeholders which can assist in establishing connectivity across the trans-Himalayan region. Joint monitoring, patrolling and research programs to study the species will help in developing better strategies and action plans based on shared findings. These efforts can be leveraged to support viable populations of the species and safeguarding of its habitat.

Acknowledgements

We are grateful to the Himachal Pradesh Forest Department and the Kinnaur Forest Division for the research permits, assistance and support. We would like to thank Takpa Tanzin, Tanba Chhering and Prabhu Dhaya for their help during fieldwork. Furthermore, we are also thankful to the people of Kinnaur for their cooperation. We thank the Snow Leopard Trust for funding the project.

Conflict of Interest

No known conflict of interests.

Literature Cited

Aghili, A., Masoud, R., Murdoch, J. D., & Mallon, D. P. (2008). First record of Pallas's cat in northwest Iran. *Cat News, 49*, 8–9.

Anile, S., Augugliaro, C., Munkhtsog, B., Dartora, F., Vendramin, A., Bombieri, G., & Nielsen, C. K. (2021). Density and activity patterns of Pallas's cats, Otocolobus manul, in central Mongolia. *Wildlife Research*, *48*(3), 264–272. https://doi.org/10.1071/WR20061

Bandyopadhyay, K., Banerjee, K., Vittoria Mazzamuto, M., Koley, S., Koprowski, J. L., Qureshi, Q., & Jhala, Y. (2024). Review of small cat ecology and status within India. *Mammal Review*, mam.12348. https://doi.org/10.1111/mam.12348

Banerjee, A., Chakraborty, P., & Bandopadhyay, R. (2019). Urgent conservation needs in the Sikkim Himalaya biodiversity hotspot. *Biodiversity*, *20*(2–3), 88–97. https://doi.org/10.1080/14888386.2019.1656547

Barashkova, A., Smelansky, I., Goryunova, S., & Naidenko, S. (2007). Pallas's cat: Investigation for saving (clarifying conservation status in Russia). *Siberian Environmental Center, Novosibirsk, Russia*.

Belousova, A. V. (1993). Small Felidae of Eastern Europe. *Central Asia, and the Far East: Survey of the State of Populations. Lutreola*, *2*, 16–21.

Chanchani, P. (2008). Sighting of a manul or Pallas cat in north Sikkim, India. *Cat News, 48*, 18–19.

Chawla, A., Kumar, A., Lal, B., Singh, R. D., & Thukral, A. K. (2012). Ecological Characterization of High Altitude Himalayan Landscapes in the Upper Satluj River Watershed, Kinnaur, Himachal Pradesh, India. *Journal of the Indian Society of Remote Sensing*, *40*(3), 519–539. https://doi.org/10.1007/s12524-011-0169-0

CITES Trade Database. (2022). Convention on International Trade in Endangered Species of Wild Fauna and Flora. https://trade.cites.org/

CITES, U. (2022). *Appendices I, II and III*. Convention on International Trade in Endangered Species of Wild Fauna and Flora.

Dar, S. A., Sharief, A., Kumar, V., Singh, H., Joshi, B. D., Bhattacharjee, S., Dutta, R., Dolker, S., Singh, A. P., Singh, V. K., Sidhu, A. K., Thakur, M., & Sharma, L. K. (2023). Free-ranging dogs are seriously threatening Himalayan environment: Delineating the high-risk areas for curbing free-ranging dog infestation in the Trans-Himalayan region. *Environmental Monitoring and Assessment*, *195*(11), 1386. https://doi.org/10.1007/s10661-023-11972-6

Dey, R., & Basu, A. (2023). Military-Induced Threat to The Himalayan Ecosystem: From Defilement to PossibleAmelioration. *Journal of Mountain Research, 18*(1). https://doi.org/10.51220/jmr.v18i1.10

Dhendup, T., Shrestha, B., Mahar, N., Kolipaka, S., Regmi, G. R., & Jackson, R. (2019). Distribution and status of the manul in the Himalayas and China. *Cat News, 13*, 31–36.

Do Linh San, E., Sato, J. J., Belant, J. L., & Somers, M. J. (2022). The World's Small Carnivores. In *Small Carnivores* (pp. 1–38). John Wiley & Sons, Ltd. https://doi.org/10.1002/9781118943274.ch1

Geneletti, D., & Dawa, D. (2009). Environmental impact assessment of mountain tourism in developing regions: A study in Ladakh, Indian Himalaya. *Environmental Impact Assessment Review, 29*(4), 229–242. https://doi.org/10.1016/j.eiar.2009.01.003

Greenspan, E., & Giordano, A. J. (2021). A rangewide distribution model for the Pallas's cat (Otocolobus manul): Identifying potential new survey regions for an understudied small cat. *Mammalia, 85*(6), 574–587. https://doi.org/10.1515/mammalia-2020-0094

Home, C., Bhatnagar, Y. V., & Vanak, A. T. (2018). Canine Conundrum: Domestic dogs as an invasive species and their impacts on wildlife in India. *Animal Conservation, 21*(4), 275–282. https://doi.org/10.1111/acv.12389

Home, C., Bijoor, A., Bhatnagar, Y. V., & Vanak, A. T. (2022). Serosurvey of viral pathogens in free-ranging dog populations in the high altitude Trans-Himalayan region. *Journal of Threatened Taxa, 14*(5), Article 5. https://doi.org/10.11609/jott.7203.14.5.21025-21031

Hussain, B. (2023, July 21). India-China Military Buildup Threatens Fragile Himalayan Ecosystems. *Voice of America*. https://www.voanews.com/a/india-china-military-buildup-threatens-fragile-himalayan-ecosystems-/7190915.html

IPCC. (2023). *Summary for Policymakers* (Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change, pp. 1–34). IPCC. https://www.ipcc.ch/report/ar6/syr/downloads/report/IPCC_AR6_SYR_SPM.pdf

Jackson, P. (1997). The status of cats in the wild. *International Zoo Yearbook, 35*(1), 17–27. https://doi.org/10.1111/j.1748-1090.1997.tb01185.x

Jutzeler, E., Xie, Y., & Vogt, K. (2010). The smaller felids of China: Pallas's cat Otocolobus manul. *Cat News Special Issue, 5*, 37–39.

Krishnan, R., Shrestha, A. B., Ren, G., Rajbhandari, R., Saeed, S., Sanjay, J., Syed, Md. A., Vellore, R., Xu, Y., You, Q., & Ren, Y. (2019). Unravelling Climate Change in the Hindu Kush Himalaya: Rapid Warming in the Mountains and Increasing Extremes. In P. Wester, A. Mishra, A. Mukherji, & A. B. Shrestha (Eds.), *The Hindu Kush Himalaya Assessment* (pp. 57–97). Springer International Publishing. https://doi.org/10.1007/978-3-319-92288-1_3

Lanz, T., Breitenmoser-Wursten, C., Barclay, D., Nygren, E., Samelius, G., & Breitenmoser, U. (2019). Prologue: Why care about Otocolobus manul? *Cat News Special Issue, 13*, 5–8.

Ma, L., Mi, C., Qu, J., Ge, D., Yang, Q., & Wilcove, D. S. (2021). Predicting range shifts of pikas (Mammalia, Ochotonidae) in China under scenarios incorporating land use change, climate change and dispersal limitations. *Diversity and Distributions, 27*(12), 2384–2396. https://doi.org/10.1111/ddi.13408

Mahar, N., Habib, B., & Hussain, S. A. (2024). Do we need to unfriend a few friends? Free-ranging dogs affect wildlife and pastoralists in the Indian Trans-Himalaya. *Animal Conservation, 27*(1), 53–64. https://doi.org/10.1111/acv.12876

Mahar, N., Shrotriya, S., Habib, B., Singh, S., Takpa, J., & Hussain, S. A. (2017). Recent records of Pallas's cat in Changthang Wildlife Sanctuary, Ladakh, India. *Cat News, 65*, 36–37.

Maheshwari, A., Chapman, S., & Bhadula, A. (2023). *Pallas's cat and Tibetan fox standoff in Ladakh, India*. https://www.researchgate.net/profile/Aishwarya_Maheshwari/publication/371638760_Pallas's_cat_and_Tibetan_fox_standoff_in_Ladakh_India/links/648d2def8de7ed28ba30d1c2/Pallass-cat-and-Tibetan-fox-standoff-in-Ladakh-India.pdf

Mallon, D. P. (1991). Status and conservation of large mammals in Ladakh. *Biological Conservation, 56*(1), 101–119. https://doi.org/10.1016/0006-3207(91)90092-N

Marneweck, C. J., Allen, B. L., Butler, A. R., Do Linh San, E., Harris, S. N., Jensen, A. J., Saldo, E. A., Somers, M. J., Titus, K., Muthersbaugh, M., Vanak, A., & Jachowski, D. S. (2022). Middle-out ecology: Small carnivores as sentinels of global change. *Mammal Review, 52*(4), 471–479. https://doi.org/10.1111/mam.12300

Marneweck, C. J., Butler, A. R., Gigliotti, L. C., Harris, S. N., Jensen, A. J., Muthersbaugh, M., Newman, B. A., Saldo, E. A., Shute, K., Titus, K. L., Yu, S. W., & Jachowski, D. S. (2021). Shining the spotlight on small mammalian carnivores: Global status and threats. *Biological Conservation, 255*, 109005. https://doi.org/10.1016/j.biocon.2021.109005

Menon, V. (2014). *Indian Mammals: A Field Guide*. Hachette UK.

Negi, S. S. (1998). *Discovering the Himalaya* (Vol. 1). Indus Publishing. https://books.google.com/books?hl=en&lr=&id=kusLzP8H6TQC&oi=fnd&pg=PA5&dq=Negi+S.+S.+1998.+Discovering+the+Himalaya+(Vol.+1).+Indus+Publishing.&ots=sAfw5Cw-QT&sig=lOedEFO1xz-eEtBfjciupgt8VPc

Pal, R., Bhattacharya, T., & Sathyakumar, S. (2019). First record of Pallas's cat in Uttarakhand, Nelang Valley, Gangotri National Park, India. *Cat News*, *69*, 25.

Prater, S. H., & Society, B. N. H. (1990). *The Book of Indian Animals*. Bombay Natural History Society. https://books.google.co.in/books?id=ic26bwAACAAJ

Rahimzadeh, A. (2016). *Mountain Livelihoods in Transition: Constraints and Opportunities in Kinnaur, Western Himalaya* [PhD Thesis, UC Berkeley]. https://escholarship.org/uc/item/5t29j6n5

Ross, S., Barashkova, A., Dhendup, T., Munkhtsog, B., Smelansky, I., Barklay, D., & Moqanaki, E. (2020). *Otocolobus manul. The IUCN Red List of Threatened Species 2020: E.T15640A180145377*. IUCN. https://www.iucnredlist.org/species/15640/180145377

Ross, S., Moqanaki, E. M., Barashkova, A., Dhendup, T., Smelansky, I., Naidenko, S., Antonevich, A., & Samelius, G. (2019). Past, present and future threats and conservation needs of Pallas's cats. *Cat News Special Issue*, *13*, 46–51.

Ross, S., Munkhtsog, B., & Harris, S. (2010). Dietary composition, plasticity, and prey selection of Pallas's cats. *Journal of Mammalogy*, *91*(4), 811–817. https://doi.org/10.1644/09-MAMM-A-342.1

Shrivastava, S. (2023, November 13). Ladakh's small cats face resource competition, intimidation by free-ranging dogs. *Mongabay-India*. https://india.mongabay.com/2023/11/ladakhs-small-cats-face-resource-competition-intimidation-by-free-ranging-dogs/

The Indian Wildlife Protection (Amendment) Act, Ministry of Environment, Forests and Climate Change, Government of India (2022). http://www.indiaenvironmentportal.org.in/files/file/wildlife%20protection%20amendment%20act%202022.pdf