

New records of the Endangered Helan Shan pika *Ochotona argentata*, with notes on its natural history and conservation

JOSEPH P. LAMBERT, JINGYAO LI, YIBIN LI, XUEHAN HOU and KUN SHI

Abstract The Helan Shan pika *Ochotona argentata* is an Endangered pika endemic to Ningxia Helan Shan National Nature Reserve in China. Little is known about the species, including regarding its population status, distribution, habitat requirements and even basic natural history. We conducted camera trapping in the Reserve during 13 January 2020–25 January 2022 and obtained two new records for this species. These, combined with five other new records obtained during the monitoring programme in the Reserve, represent a significant increase in the known range of the species and more than double the species' known extent of occurrence from 107 to 223 km². These records also provide the first evidence that this species is active both nocturnally and diurnally. However, this range increase does not alter the Endangered status of the pika, and the pika was not observed within its previously known range; future research should involve intensive camera trapping in the Reserve to ascertain whether this is a result of local extirpation, habitat loss or fragmentation or under-sampling on our part. Studies should also incorporate techniques used for other alpine pika species to collect baseline data on habitat use, population size and behaviour to determine the potential response of the Helan Shan pika to present and future threats.

Keywords Camera trap, China, lagomorph, Ningxia, *Ochotona argentata*, pika, small mammal conservation

The Helan Shan pika *Ochotona argentata*, also known as the silver pika, is a talus-dwelling pika restricted to a small area of forest and rocky mountain ridge habitat in Ningxia Helan Shan National Nature Reserve in China (Li & Smith, 2018). The species is categorized as Endangered on the IUCN Red List based on criteria B1ab(iii) (i.e. the

extent of occurrence of the species is < 5,000 km², the population is severely fragmented or occurs in fewer than five locations and a decline in area, extent or quality of habitat has been inferred; Smith & Li, 2016). The current extent of occurrence of *O. argentata* is 107 km², just above the 100 km² threshold for categorization as Critically Endangered (Smith & Li, 2016). It was previously known from three small (< 3 km²) and isolated locations within this area, and deforestation throughout the Reserve has led to an inferred decline in habitat quality (Formozov et al., 2004; Smith & Li, 2016). As a cold-adapted species, *O. argentata* is likely to face range contraction and further habitat loss as a result of climate change (Lorenzo et al., 2015). In 2020 China added *O. argentata* to its National List of Key Protected Species as a Category II species, indicating the political will to protect it. Despite its Endangered status and the potential threats, there is little published research on *O. argentata* and no dedicated conservation programme (Lambert et al., 2023). Its ecology, population status and basic natural history remain unknown, impeding its conservation (Li & Smith, 2018).

The Helan Shan mountain range lies along the border of Ningxia Hui Autonomous Region to the east and the Inner Mongolia Autonomous Region to the west. Two nature reserves are present in the range: Ningxia Helan Shan National Nature Reserve and the smaller Inner Mongolia Helan Shan National Nature Reserve (Fig. 1). The region is characterized by a typical continental climate, with a mean annual temperature of −0.9°C and mean annual rainfall of 420 mm (Zhang et al., 2013). The area includes deciduous forests dominated by *Ulmus glaucescens* and *Prunus mongolica* and coniferous forests of *Pinus tabulaeformis* and *Picea crassifolia*. At lower elevations there are open meadows and steppes characterized by *Stipa breviflora*, *Ajania fruticulosa*, *Ptilagrostis pelliottii*, *Oxytropis aciphylla*, *Convolvulus gortschakovii* and *Salsola laricifolia* (Zhang et al., 2013). *Ochotona argentata* has been observed amongst rocks and talus in both the open steppe and forested regions (Li & Smith, 2018).

From 13 January 2020 we conducted a camera-trapping survey in the Helan Shan mountain range to monitor the snow leopard *Panthera uncia* and its main prey species, the bharal *Pseudois nayaur*. During the pilot stage we set a total of nine camera-trap stations, each comprising one Boskon Guard BG-526 camera (Boskoncam, Dongguang, China), separated by 2 km. This was increased to 24 cameras

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Received 12 December 2022. Revision requested 1 February 2023.

Accepted 28 April 2023. First published online 8 August 2023.

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Oryx, 2023, 57(5), 581–584 © The Author(s), 2023. Published by Cambridge University Press on behalf of Fauna & Flora International doi:10.1017/S003060532300056X

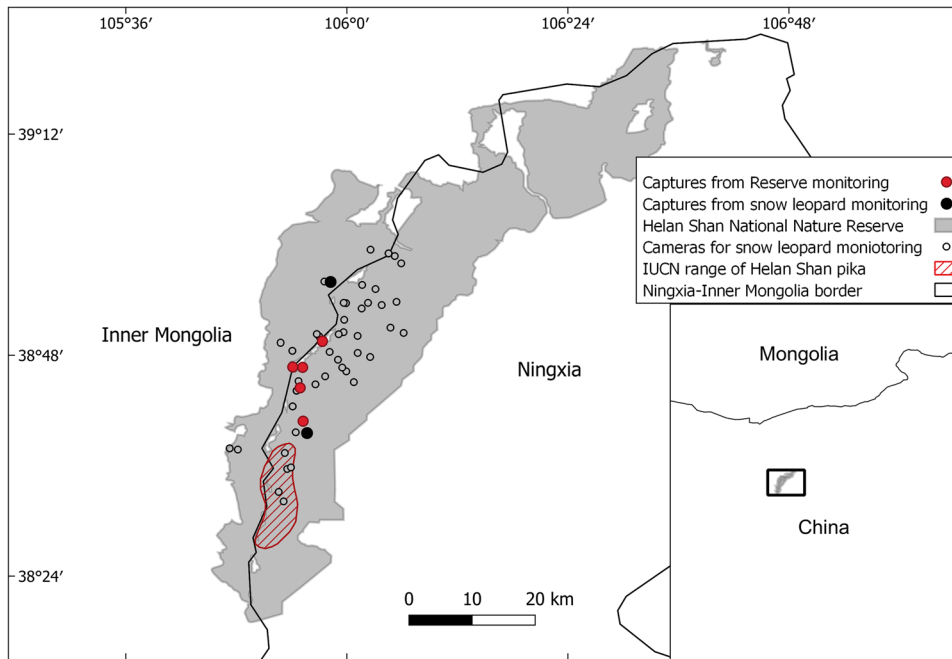


FIG. 1 Location of camera-trap captures of *Ochotona argentata* from 13 January 2020 to 25 January 2022 during monitoring for the snow leopard *Panthera uncia* and during routine monitoring of the Reserve, relative to its previously known range in the Ningxia Helan Shan National Nature Reserve, China.

on 30 June 2020 and to 51 cameras on 16 January 2021. These were left operating until 25 January 2022, yielding a total of 10,965 camera-trap days (Fig. 1). Additionally, Reserve staff have been carrying out routine camera trapping and monitoring of wildlife. The monitoring programme consists of a 5×5 km grid covering the whole Reserve, with a single camera-trap station in each grid square, totalling 66 camera traps. Captures are recorded from the monitoring programme every 3 months. Here we present details on captures of *O. argentata* obtained during these two surveys. We mapped these records using QGIS 3.1.8 (QGIS Development Team, 2023) and compared this map to the current distribution map of the species. We calculated a new extent of occurrence using a minimum convex polygon incorporating the old range and the new observations.

During 10 July 2020–12 February 2021 there were 124 individual captures of *O. argentata*, including 80 videos, at two trapping stations (Plate 1a). Rock-dwelling pikas are solitary and strongly territorial (Smith, 2008), and so these are likely to be captures of two individuals. Both camera-trap stations were outside the current known distribution of the species. The closest active pika site was 13.5 km to the north-east of the nearest previous observation, and the farthest was 43.8 km to the north (Fig. 1). Of these 124 captures, 50 were obtained at night (Plate 1b).

Examination of the captures obtained during routine monitoring in the Reserve revealed an additional five sites at which *O. argentata* had been photographed. All of these sites were also outside the previously known range of the species (Fig. 1). None of the five cameras we placed within the previously known range secured captures of *O. argentata* (Fig. 1).

These new records significantly extend the known distribution of *O. argentata*. The newly calculated extent of occurrence is 233 km². This is more than double the size of the previous extent of occurrence but still within the threshold for Endangered status. However, the extent of occurrence does not account for unsuitable habitat or fragmentation within the range. Previous observations indicate that the population is severely fragmented and subjected to habitat loss (Formozov et al., 2004; Smith & Li, 2016). Fragmented and isolated populations are at greater risk of extinction (Crooks et al., 2017), and pikas are notoriously poor dispersers, which could impede their ability to adapt to fragmentation (Smith, 2020). Further research is needed to establish the extent of fragmentation and the habitat requirements of this species.

The captures of *O. argentata* at night constitute the first evidence that this species is nocturnally active. Pikas are alpine specialists and are often considered to be significantly threatened by climate change. American pikas *Ochotona princeps* in particular are often considered to be at risk from warming climates, which would cause them to move up mountains as temperatures at lower elevations increase (Beever et al., 2003). However, populations of *O. princeps* living at lower altitudes have been observed responding to warmer temperatures by modifying their behaviour, including by spending more time within the cooler interior of talus piles (Smith et al., 2016), reducing daytime activity and increasing crepuscular and nocturnal foraging (Millar & Hickman, 2021). Captures of *O. argentata* at night could indicate this species is capable of adapting to warming climates in the same way. Further research is needed to determine the



PLATE 1 (a) A photograph of *Ochotona argentata* taken on 24 July 2020 at 16.16, 43.8 km from the previously known range of the species. The pika was observed entering the interior of the rock formation in the bottom-left corner of the image. (b) A photograph from the same location as (a) on 13 August 2020 at 03.34. This constitutes the first evidence of nocturnal activity by this species.

behavioural ecology of this species and how it might respond to climate change, especially given its fragmented population and likely poor dispersal ability.

These new records contribute to the knowledge of this elusive and understudied species. Further surveys are required to ascertain habitat requirements, distribution and population size. Surveys could incorporate methods such as those used to survey the better-known American pika and collared pika *Ochotona collaris*. These could include sign surveys for haypiles (piles of vegetation collected by pikas to feed on over the winter) and scat within suitable talus habitat patches to determine occupancy (Millar & Smith, 2022), and they could be combined with live trapping and mark–recapture methods to facilitate more detailed inferences regarding population size (Morrison & Hik, 2007). The lack of observations in this study from within the previously known range of this species is of concern, and more detailed surveys need to be undertaken within this range to establish whether this constitutes evidence of local extirpation and retreat into more suitable

habitat or is simply a result of insufficient surveying and monitoring.

Acknowledgements This research was funded by the Science and Technology Department of Ningxia Autonomous Region (2020BEG02001) and the Ningxia Forestry and Grassland Administration (NLF2020-93-2). We thank all of the staff at Ningxia Helan Shan National Nature Reserve, whose fieldwork contributed to this paper; and Hu Tianhua, who provided information about the locations of the Helan Shan pika.

Author contributions Conception: JPL, KS; writing, analysis: JPL; study design: JL, YL, XH, KS; fieldwork: JL, YL, XH; support: JL, KS; revision: all authors.

Conflicts of interest None.

Ethical standards This research abided by the Oryx guidelines on ethical standards.

Data availability statement The data that support the findings of this study are available from Ningxia Helan Shan National Nature Reserve. Restrictions apply to the availability of these data, which were used with permission for this study.

References

- BEEVER, E.A., BRUSSARD, P.F. & BERGER, J. (2003) Patterns of apparent extirpation among isolated populations of pikas (*Ochotona princeps*) in the Great Basin. *Journal of Mammalogy*, 84, 37–54.
- CROOKS, K.R., BURDETT, C.L., THEOBALD, D.M., KING, S.R.B., DI MARCO, M., RONDININI, C. & BOITANI, L. (2017) Quantification of habitat fragmentation reveals extinction risk in terrestrial mammals. *Proceedings of the National Academy of Sciences of the United States of America*, 114, 7635–7640.
- FORMOZOV, N.A., BAKLUSHINSKAYA, I.Y. & MA, Y. (2004) Taxonomic status of the Helan-Shan pika, *Ochotona argentata*, from the Helan-Shan ridge (Ningxia, China). *Zoologicheskii Zhurnal*, 83, 995–1007.
- LAMBERT, J.P., ZHANG, X., SHI, K. & RIORDAN, P. (2023) The pikas of China: a review of current research priorities and challenges for conservation. *Integrative Zoology*, 18, 110–128.
- LI, W. & SMITH, A.T. (2018) *Ochotona argentata* Howell, 1928 – Helan Shan pika. In *Lagomorphs: Pikas, Rabbits, and Hares of the World* (eds A.T. Smith, C.H. Johnston, P.C. Alves & K. Hackländer), pp. 33–34. Johns Hopkins University Press, Baltimore, USA.
- LORENZO, C., RIOJA-PARADELA, T.M. & CARRILLO-REYES, A. (2015) State of knowledge and conservation of Endangered and Critically Endangered lagomorphs worldwide. *Therya*, 6, 11–30.
- MILLAR, C.I. & HICKMAN, K.T. (2021) Camera traps provide insights into American pika site occupancy, behavior, thermal relations, and associated wildlife diversity. *Western North American Naturalist*, 81, 141–170.
- MILLAR, C.I. & SMITH, A.T. (2022) Return of the pika: American pikas re-occupy long-extirpated, warm locations. *Ecology and Evolution*, 12, e9295.
- MORRISON, S.F. & HIK, D.S. (2007) Demographic analysis of a declining pika *Ochotona collaris* population: linking survival to broad-scale climate patterns via spring snowmelt patterns. *Journal of Animal Ecology*, 76, 899–907.

- QGIS DEVELOPMENT TEAM (2023) *QGIS Geographic Information System*. Open Source Geospatial Foundation Project. qgis.osgeo.org [accessed 5 July 2023].
- SMITH, A.T. (2008) The world of pikas. In *Lagomorph Biology: Evolution, Ecology, and Conservation* (eds P.C. Alves, N. Ferrand & K. Hackländer), pp. 89–102. Springer, Berlin, Germany.
- SMITH, A.T. (2020) Conservation status of American pikas (*Ochotona princeps*). *Journal of Mammalogy*, 101, 1466–1488.
- SMITH, A.T. & LI, W. (2016) *Ochotona argentata*. In *The IUCN Red List of Threatened Species* 2016. dx.doi.org/10.2305/IUCN.UK.2016-3.RLTS.T41986A45194521.en.
- SMITH, A.T., NAGY, J.D. & MILLAR, C.I. (2016) Behavioral ecology of American pikas (*Ochotona princeps*) at Mono Craters, California: living on the edge. *Western North American Naturalist*, 76, 459–485.
- ZHANG, M., LIU, Z. & TENG, L. (2013) Seasonal habitat selection of the red deer (*Cervus elaphus alxaicus*) in the Helan Mountains, China. *Zoologia*, 30, 24–34.