Building evidence for conservation globally

# Journal of Threatened Taxa

10.11609/jott.2022.14.12.22207-22354
www.threatenedtaxa.org

26 December 2022 (Online & Print)
14(12): 22207–22354
ISSN 0974-7907 (Online)
ISSN 0974-7893 (Print)

Open Access

ISSN 0974-7907 (Online); ISSN 0974-7893 (Print)

Publisher
**Wildlife Information Liaison Development Society**
www.wild.zooreach.org

Host
**Zoo Outreach Organization**
www.zooreach.org

43/2 Varadarajulu Nagar, 5th Street West, Ganapathy, Coimbatore, Tamil Nadu 641035, India
Ph: +91 9385339863 | www.threatenedtaxa.org
Email: sanjay@threatenedtaxa.org



For Focus, Scope, Aims, and Policies, visit https://threatenedtaxa.org/index.php/JoTT/aims_scope
For Article Submission Guidelines, visit https://threatenedtaxa.org/index.php/JoTT/about/submissions
For Policies against Scientific Misconduct, visit https://threatenedtaxa.org/index.php/JoTT/policies_various

continued on the back inside cover

**Cover: Common Silverline *Spindasis vulcanus vulcanus* in poster colours adapted from photograph by Kalpesh Tayade. © Pooja R. Patil.**

Journal of Threatened Taxa | www.threatenedtaxa.org | 26 December 2022 | 14(12): 22341–22345

ISSN 0974-7907 (Online) | ISSN 0974-7893 (Print)

https://doi.org/10.11609/jott.7987.14.12.22341-22345

#7987 | Received 25 February 2022 | Final received 06 June 2022 | Finally accepted 23 November 2022

OPEN ACCESS

SHORT COMMUNICATION

# First photographic record of Spotted Deer *Axis axis* (Erxleben, 1777) (Artiodactyla: Cervidae) in Great Indian Bustard Sanctuary, Maharashtra, India

**Shaheer Khan [1], S. Ramesh Kumar [2] & Bilal Habib [3]**

[1,3] Wildlife Institute of India, Chandrabani, Dehradun, Uttarakhand 248001, India.
[2] Maharashtra Forest Department, Maharashtra 440001, India.
[1] shaheer@wii.gov.in, [2] neenujee@gmail.com, [3] bh@wii.gov.in (corresponding author)

**Abstract:** *Axis axis* also known as Chital, Spotted Deer or Axis Deer, is native to Asia. The Chital ranges over 8–30 $^{0}$N in India and through Nepal, Bhutan, Bangladesh, and Sri Lanka. Chital is listed as Least Concern in the IUCN Red List of Threatened Species because it possesses a very wide range, however, the population is declining outside protected areas. Although widely distributed, there is no record of Chital from the Great Indian Bustard (GIB) Sanctuary, Maharashtra. Here we report the first photographic record of Chital from the sanctuary, in the Gangewadi region of Solapur District. During a field work exercise for radio collaring of Indian Grey Wolves to monitor movement in the human-dominated landscape of Maharashtra, camera traps were placed in the Gangewadi area of the GIB sanctuary. Over the survey period, the species that were photo-captured included the Indian Grey Wolves, Indian Fox, Jungle Cat, Black Buck, Wild Boar, porcupine, and Black-naped Hare on multiple occasions. The male Spotted Deer was captured at one event in a single camera trap (17.8324$^{0}$N, 76.0043$^{0}$E) on 30 December 2020 at 0517 h. This is the first record of Spotted Deer in the grassland ecosystem of Solapur region in Maharashtra.

**Keywords:** Camera trap, Chital, Gangewadi region, GIB sanctuary, grassland ecosystem, semi-arid landscape, Solapur region, ungulates.

The Chital *Axis axis* was first described by the German naturalist Johann Christian Polycarp Erxleben in 1777. The species is crepuscular, inhabiting a variety of habitats mostly on the periphery of dense forests (Nowak 1991). It is a medium-sized herbivore, with males attaining a height of 80–100 cm at the shoulder and a length of 119–185 cm; females are slightly smaller, 67–87 cm in height and 114–147 cm in length with no antlers (Long 2003). Adults have a reddish-brown coat with white spots (Schaller 1967). The antlers, three-pronged, are nearly 1 m long. The usual life span of Chital in the wild is 10–15 years (Walker et al. 1964) and in captivity up to 20 years (Crandall 1964).

The Chital ranges over 8–30°N in India and through Nepal, Bhutan, Bangladesh, and Sri Lanka (Anderson 1999; Grubb 2005). The western limit of its range is eastern Rajasthan and Gujarat whereas the northern limit is along the foothills of the Himalaya and

**Editor:** L.A.K. Singh, Bhubaneswar, Odisha, India. **Date of publication:** 26 December 2022 (online & print)

**Citation:** Khan, S., S.R. Kumar & B. Habib (2022). First photographic record of Spotted Deer *Axis axis* (Erxleben, 1777) (Artiodactyla: Cervidae) in Great Indian Bustard Sanctuary, Maharashtra, India. *Journal of Threatened Taxa* 14(12): 22341–22345. https://doi.org/10.11609/jott.7987.14.12.22341-22345



**Funding:** Department of Science and Technology (DST) Govt. of India.

**Competing interests:** The authors declare no competing interests.

**Acknowledgements:** We are thankful to the Maharashtra Forest Department for the permissions to conduct research in Maharashtra. Department of Science and Technology (DST) Govt. of India are duly acknowledged for funding provided to carry out the research. We are also grateful to the forest officials and especially our field assistants Daut Shaikh, Shiv Kumar Bapu More and Sarang Mhamane. We also thank Satish Devkar and Rahul Patil for providing help during the field work. We thank the Director, Dean, and Research Coordinator of the Wildlife Institute of India for supporting the study.

from Uttar Pradesh and Uttarakhand through to Nepal, northern West Bengal and Sikkim and then to western Assam and the forested valleys of Bhutan, which are below 1,100 m (Duckworth et al. 2015). The eastern limit of its range is through western Assam (Sankar & Acharya 2004) to the Sunderbans of West Bengal (India) and Bangladesh (Duckworth et al. 2015) and Sri Lanka is the southern limit (Schaller 1967). Chital occurs sporadically in the forested areas throughout the rest of the Indian peninsula (Sankar & Acharya 2004). Within Bangladesh, it currently exists only in the Sundarbans and some ecoparks situated around the Bay of Bengal, as it became extinct in the central and northeastern parts of the country (Duckworth et al. 2015). Introduced populations also occur within Andaman & Nicobar Islands. Chital is listed as 'Least Concern' on the IUCN RedList of Threatened Species because they possess a very wide range. The population is declining outside protected areas. Although they are widely distributed across India, there are no record of Chital from the Great Indian Bustard (GIB) Sanctuary, Maharashtra.

**Study Area**

The study area lies in the Deccan landscape which is a large plateau in western and southern India. The landscape is semi-arid region of India and receives very less rainfall which makes it suitable for GIB. The summer season, lasting from mid-February to mid-June (Habib 2007), is very dry and extremely hot, with temperatures regularly exceeding 48°C. The Great Indian Bustard Sanctuary, established in 1979, is a wildlife sanctuary for the Great Indian Bustard *Ardeotis nigriceps* at Solapur Maharashtra, India. The sanctuary is spread over seven talukas: Mohol, Mhada, northern Solapur, Karmala, Nevasa, Karjat, and Shrigonda. The original spread of the GIB Sanctuary was 8,469 km$^2$, which has been reduced to 1,222.61 km$^2$, including reserved forest, Gairan lands, and private lands (including grasslands) in 2011. This vast grassland is home for many resident wildlife species and a variety of migratory species, along with the GIB. The major floral species are *Azadirachta indica, Acacia nilotica, Ziziphus* spp., *Glericidia sepium, Hardwickia binata*, & *Albizzia lebbeck* and the prominent grasses are *Aristida funiculate, Aristida stocksii, Chrysopogon fulvus, Heteropogon contortus, Lodhopogon tridentatus,* & *Melanocenchris jacquemontii* (Habib 2007). Also, the sanctuary has a good population of Blackbuck, Indian Wolf, Indian Fox, Golden Jackal, and Jungle Cat. There has been no previous record of the Spotted Deer from any part of the sanctuary.

## Materials and Methods

During the field work exercise for radio collaring of Indian Grey Wolves to monitor movement in the human-dominated landscape of Maharashtra, camera traps have been placed in the Gangewadi area of the GIB sanctuary. The trails and junctions of the area were targeted and Cuddeback Ambush/C1 camera traps (http://cuddeback.com/cameras) were placed. Cameras were tied up on tree trunks at the height of 25–35 cm from the ground at the animal trails. The camera delay was set at multi-shot mode with a delay of 5 seconds and were active for 24 hours.

## Results

Over the survey period, species photo-captured included the Indian Grey Wolf, Indian Fox, Jungle Cat, Black Buck, Wild Boar, porcupine, and Black-Naped Hare. A male Spotted Deer was captured by a single camera trap (17.83240˚N, 76.00439˚E) on 30 December 2020 at 0517 h (Image 1). This is the first record of Spotted Deer in the grassland ecosystem of Solapur region of Maharashtra (Image 1).

## Discussion

The Spotted Deer is endemic to southern Asia (Schaller 1967) and found in dry deciduous, moist deciduous, thorn forest, and mangroves. As per the IUCN RedList, the distribution data show that Spotted Deer are present in the entire state of Maharashtra. They are found almost exclusively in dry and mixed deciduous forest habitat intermixed with grasslands. They are most commonly associated with a mixture of forest and more open grass-shrub, but they occupy a wide range of habitats throughout their native range, often avoiding rugged terrain (Anderson 1999). It is one of the most common prey species for carnivores in the forest ecosystem. Carnivores that may prey upon Chital in the GIB Sanctuary include Indian Wolf *Canis lupus pallipes*. The sanctuary is dominated by a matrix of grasslands, barren lands and agricultural land, with small patches of *Azadirachta* sp. and *Gliricidia* sp. plantation. The sanctuary has long record of research activities on various flora and fauna (Kumar 1988; Rahmani 1988; Habib 2007; Habib & Kumar 2007; Kumar & Rahmani 2008; Vanak & Gompper 2010; Janakiraman & Jalal 2015; Varghese et al. 2016; Khan et al. 2019) but there is no earlier record of the Spotted Deer. The present work is the first record of Spotted Deer from this region. In the surrounding of the sanctuary various other wildlife sanctuaries are present. The closest sanctuary which has Spotted Deer population is Nayangaon Mayur Wildlife

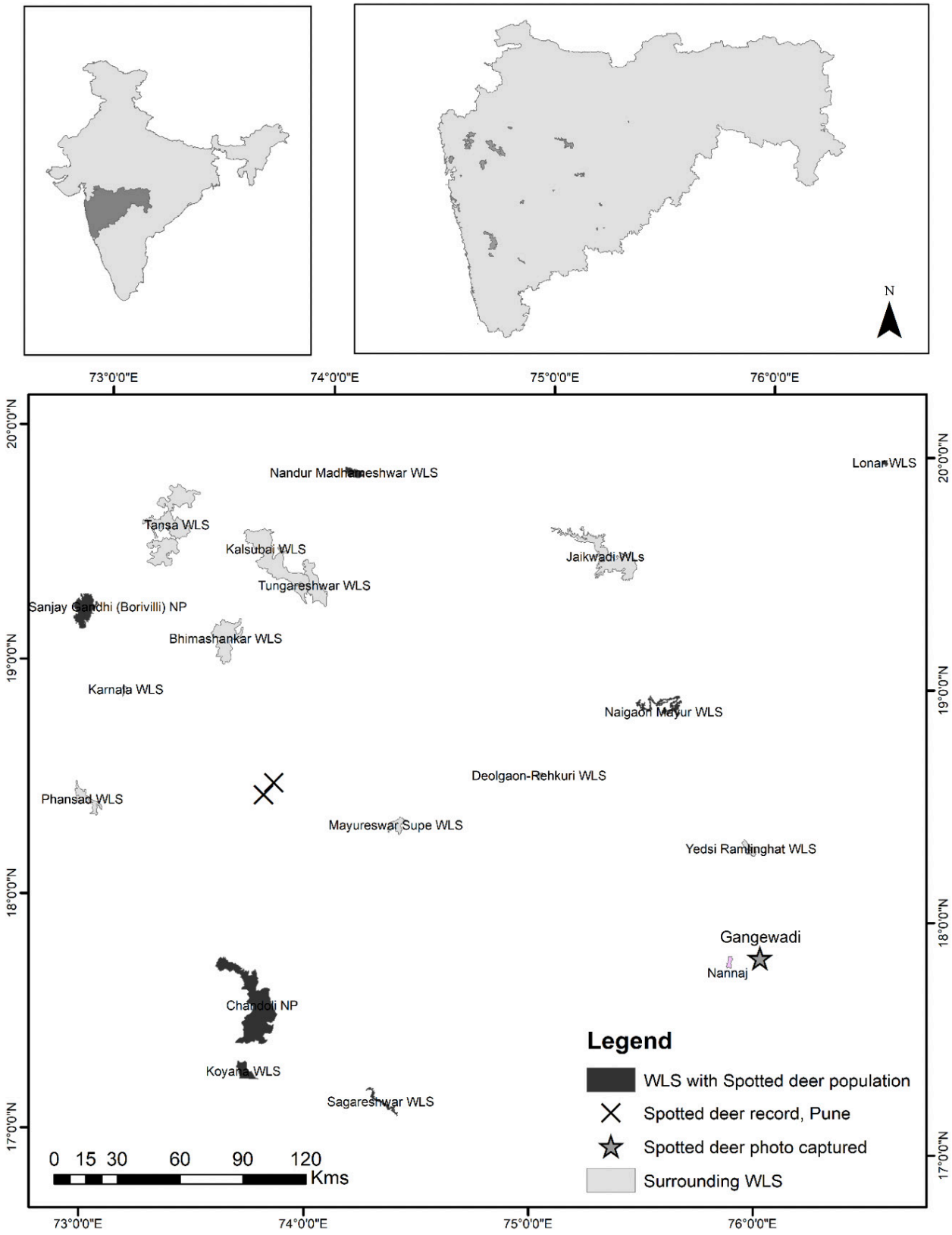


**Figure 1. The location of the first photographic evidence of Spotted Deer *Axis axis* from Great Indian Bustard Sanctuary (marked with star symbol) along with the record of dead Spotted Deer from Pune (marked with cross in 2016 and 2017). The solid black colour polygons are the PAs where Spotted Deer population is present and the light grey polygons show surrounding PAs. Topleft: map of India showing the state of Maharashtra (topright), showing the PAs of Maharashtra around Great Indian Bustard Sanctuary. Bottom figure shows protected areas and Spotted Deer presence around the sanctuary along with the photographed location of Spotted Deer in Gangewadi area of the sanctuary.**


**Image 1. First photographic record of Spotted Deer *Axis axis* from Great Indian Bustard Sanctuary, Maharashtra.**

Sanctuary (WS) (Show as symbol and name in legend in bottom map of Figure 1) which is about 124 km away from the photo-captured point. The other close by sanctuaries are Sagareshwar WS (190 km), Lonar WS (240 km), Nandur WS (305 km), and SGNP (356 km), where Spotted Deer population is present (Figure 1). There have been a few earlier records of Spotted Deer from Pune district (250 km away from Nannaj Bustard Sanctuary). In 2016, a dead male Spotted Deer was found at dumping site in Warje, Pune (The Golden Sparrow 2016) and in 2017 a male was killed by dogs in Khadakwasla area of Pune (Phadnis 2017). These two areas are close to each other and surrounded by forested area. Each year Pune division of the state forest department conducts waterhole census in four wildlife sanctuaries: Nannaj Bustard Sanctuary (10 km; part of GIB Sanctuary as Gangewadi area), Bhimashankar (292 km), Rehekhuri (145 km) and Mayureshwar (178 km). In the census during year 2021 no Spotted Deer was recorded from the above given wildlife sanctuaries, and the species was never recorded from Solapur district. This is the first wild record of Spotted Deer here. The other ungulates recorded from the Solapur region, including the GIB Sanctuary are Black Buck *Antilope cervicapra*, Chinkara *Gazella bennettii*, and Wild Boar *Sus scrofa*.

Systematic studies are necessary to assess whether populations of *A. axis* have started colonising the area or are using the area as a corridor. This data may support actions for conservation of regional biodiversity.

## References

**Anderson S.B. (1999).** Axis Deer overview and profile. http://www.hear.org/hnis/reports/ hnis-axiaxiv01.pdf. Accessed on 10 December 2021.

**Crandall, L.S. (1964).** *The management of wild mammals in captivity*. University of Chicago Press, Chicago, 769 pp.

**Duckworth, J.W., N.S. Kumar, I.M. Anwarul, B.H. Sagar & R. Timmins (2015).** *Axis axis*. IUCN Red List of Threatened Species. e.T41783A22158006. Accessed on 01 December 2021. https://doi.org/10.2305/IUCN.UK.2015-4.RLTS.T41783A22158006.en

**Grubb, P. (2005).** Artiodactyla, pp. 637–722. In: Wilson, D.E. & D.M. Reeder (eds.). *Mammal Species of the World. A Taxonomic and Geographic Reference* (3rd edition). Johns Hopkins University Press, Baltimore, USA, 2142 pp.

**Habib B. (2007).** Ecology of Indian Wolf *Canis lupus pallipes* (Sykes, 1831), and modelling its potential habitat in the Great Indian Bustard Sanctuary, Maharashtra, India. PhD Thesis. Department of Wildlife Sciences, Aligarh Muslim University, 270 pp.

**Habib, B. & S. Kumar (2007).** Den shifting by wolves in semi wild landscapes in the Deccan Plateau, Maharashtra, India. *Journal of Zoology* 272(3): 259–265.

**Janakiraman, J. & J. Jalal (2015).** Angiosperm diversity of the Great Indian Bustard Wildlife Sanctuary: a semi-arid grassland, Maharashtra, India. *Check List* 11(2): 1–20. https://doi.org/10.15560/11.2.1602

**Khan, S., N. Chatterjee & B. Habib (2019).** Testing performance of large-scale surveys in determining trends for the Critically Endangered

Great Indian Bustard *Ardeotis nigriceps*. *Scientific Reports* 9(1): 1–8. https://doi.org/10.1038/s41598-019-48193-2

**Kumar, S. (1998).** Ecology and Behaviour of Indian Grey Wolf *Canis iupus pallipes* (Sykes 1831) in the Deccan Grasslands of Solapur, Maharashtra. PhD Thesis. Department of Wildlife Sciences, Aligarh Muslim University, 215 pp.

**Kumar, S. & A.R. Rahmani (2008).** Predation by wolves *Canis lupus pallipes* on Black Buck *Antilope cervicapra* in the Great Indian Bustard Sanctuary, Nannaj, Maharashtra, India. *International Journal of Ecological Environmental Science* 34(2): 99–112.

**Long, J.L. (2003).** *Introduced Mammals of the World, Their History Distribution and Influence.* CSIRO Publishing, Melbourne, Australia, 589 pp.

**Nowak, R.M. (1991).** Walker's mammals of the world. 5th edition. John Hopkins University Press, Baltimore, 1629 pp.

**Phadnis, M. (2017).** Strays kill thirsty deer. Pune Mirror. https://punemirror.indiatimes.com/pune/civic/man-asks-two-to-lower-voice-but-gets-beaten-up/articleshow/56673239.cms Accessed on 12 February 2021.

**Rahmani, A.R. (1988)**. The conservation of the Great Indian Bustard *Ardeotis nigriceps* (Vigors) in the Karera Bustard Sanctuary. *Biological Conservation* 46(2): 135–144.

**Sankar, K. & B. Acharya (2004).** Chital *Axis axis* (Erxleben 1777). pp171–180. In: Sankar, K. & S.P. Goyal (eds.). Ungulates of India. Wildlife Institute of India, Dehradun, India. *ENVIS Bulletin* Wildlife Institute of India, Dehra Dun, 448 pp.

**Schaller, G.B. (1967).** *The Deer and the Tiger: A Study of Wildlife in India*, University of Chicago Press, Chicago and London, 370 pp.

**The Golden Sparrow (2016).** Spotted Deer found dead near garbage pit in Warje. The Golden Sparrow, Weekly newspaper, Pune. https://medium.com/the-golden-sparrow/spotted-deer-found-dead-near-garbage-pit-in-warje-62677f07f0ac. Accessed on 12 February 2021.

**Vanak, A.T. & M.E. Gompper (2010)**. Multi-scale resource selection and spatial ecology of the Indian Fox in a human-dominated dry grassland ecosystem. *Journal of Zoology* 281(2): 140–148.

**Varghese, A.O., V.B. Sawarkar, Y.L. Rao Y.L. & A.K. Joshi (2016).** Habitat suitability assessment of Ardeotis nigriceps (Vigors) in Great Indian Bustard Sanctuary, Maharashtra (India) using remote sensing and GIS. *Journal of the Indian Society of Remote Sensing* 44(1): 49–57.

**Walker, E.P. (1964).** *Mammals of the World*. Johns Hopkins Press. Baltimore, 2268 pp.

**Journal of Threatened Taxa** is indexed/abstracted in Bibliography of Systematic Mycology, Biological Abstracts, BIOSIS Previews, CAB Abstracts, EBSCO, Google Scholar, Index Copernicus, Index Fungorum, JournalSeek, National Academy of Agricultural Sciences, NewJour, OCLC WorldCat, SCOPUS, Stanford University Libraries, Virtual Library of Biology, Zoological Records.

NAAS rating (India) 5.64



Print copies of the Journal are available at cost. Write to:
The Managing Editor, JoTT,
c/o Wildlife Information Liaison Development Society,
43/2 Varadarajulu Nagar, 5th Street West, Ganapathy, Coimbatore,
Tamil Nadu 641035, India
ravi@threatenedtaxa.org

Journal of Threatened Taxa

www.threatenedtaxa.org



**ISSN 0974-7907 (Online) | ISSN 0974-7893 (Print)**

**December 2022 | Vol. 14 | No. 12 | Pages: 22207-22354**
**Date of Publication: 26 December 2022 (Online & Print)**
**DOI: 10.11609/jott.2022.14.12.22207-22354**

## Communications



## Reviews



## Short Communications



## Response & Reply



**Publisher & Host**

WILD ZOOREACH
Threatened Taxa