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NOTE

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Recovery of Musk Deer *Moschus chrysogaster* Hodgson, 1839 (Artiodactyla: Moschidae) in Sakteng Wildlife Sanctuary, Bhutan

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The Musk Deer *Moschus chrysogaster* is distributed from the highlands of central China extending to the south and west through the Himalaya, eastern Nepal, Bhutan, and northeastern India (Harris 2016). Distribution and occupancy information of *M. chrysogaster* in both Sakteng Wildlife Sanctuary (SWS) and other parts of Bhutan is very few or almost lacking. It is listed as Schedule I species of Forest and Nature Conservation Act of 1995, which provides maximum legal protection to the species.

The Himalayan Musk Deer was suggested to be locally extirpated in SWS owing to habitat degradation from intensive livestock grazing and hunting of wildlife for meat, skin and trade in animal body parts prior to establishment of the sanctuary (Sathyakumar 2005). Constituted as a sanctuary from 2003, SWS is on the eastern border of Bhutan. The present account is about three reports regarding the presence of *M. chrysogaster* in SWS from the year 2014 in locations at 27.22194444 N/91.95888889 E, 27.24666667 N/91.84388889 E and 27.28055556 N/91.83250000 E (Fig. 1).

In 2014, a camera trap exercise was carried out in remote locations of SWS as part of the National Tiger Survey initiatives. The study area comprised of 740.60km^2 of undulating topography with elevation ranging from 1,584m with broadleaved plants to 4,488m with alpine meadow. In total, 16 grids of 5m x 5m area were laid across the study area. Two sets of HCO ScoutGuard camera traps were placed at every survey point. These cameras were deployed for almost five months from November 2014 to March 2015.

Sakteng Wildlife Sanctuary is one of the protected areas located in the easternmost part of Bhutan representing the eastern Himalayan alpine ecosystem. With an assemblage of rich ecosystem diversity and distinctive culture, it was established to protect and conserve its diverse assemblage of biodiversity and unique cultural heritage. Home to some of the rarest and globally threatened wild flora and fauna, it is the only protected area with the highest diversity of *Rhododendron* species in the country (SWS 2016). In addition to the camera trapping, another extensive terrestrial biodiversity survey was conducted in 2015 for revision of the previous Sanctuary management plan (2008–2013). A total of 105 stratified random circular plots of radius 12.62m were laid across the entire study area. The ecological data including tree, shrub and herb species as well as direct and indirect signs of wildlife habitation was collected from each plot using prescribed forms. Further, rapid assessment of wildlife occupancy from sign survey was also conducted along the routes.

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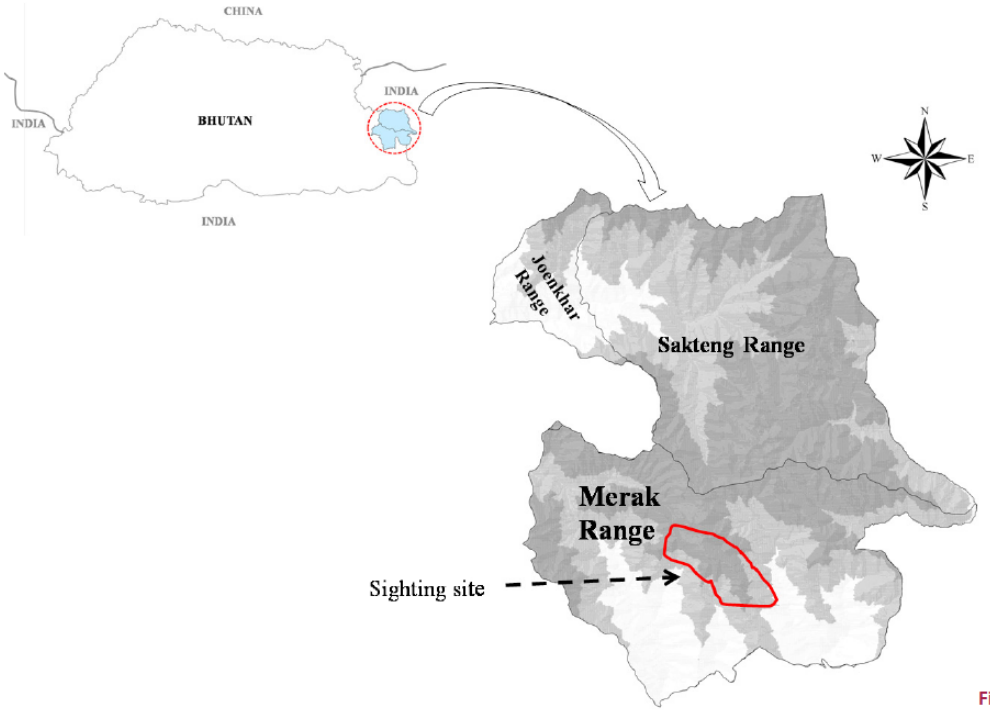

Figure 1. Sighting location map

Image 1. Photo (27.22194444 N & 91.95888889 E) of the Musk Deer at Merak Range (© Tiger Survey /DoFPS/MoAF)

Image 2. Musk Deer dropping (27.24666667 N & 91.84388889 E) (© SWS/DoFPS/MoAF)

In one of the camera traps (ID No. 6), a species of Himalayan Musk Deer *Moschus chrysogaster* was captured (27.22194444 N & 91.95888889 E) at an elevation of 3,730m (Image 1) and later during the biodiversity survey (2015), the droppings (27.24666667 N & 91.84388889 E) of the species was recorded at an altitude of 3354m in the fir forest (Image 2). Predators like Himalayan Black Bear, Royal Bengal Tiger and Common Leopard were also captured in the same camera station. In the following summer (2015), another incidence of dropping (27.28055556 N & 91.83250000 E) was also recorded at an elevation of 4,227m in a rugged terrain prone to land slide.

Walking along their trail the species was photographed in the months of November and March. All the three pieces of evidence were recorded from the southern and southeastern parts of the Merak Range under SWS. The capture of this species in the camera trap survey is the first ever recorded evidence of Musk Deer within SWS since its inception in 2003 and such a finding reveals the importance and success of species recovery programs being implemented in the Sanctuary.

Categorized as Endangered in the IUCN Red List, this species is listed as severely threatened by indiscriminate

poaching for valuable musk pod and its population is declining globally (Homes 1999; Rajchal 2006; Harris 2016). As the species prefer intact forest or scrubland for cover and feeding, habitat fragmentation by forest clearing (Green 1986; Yang et al. 2003) and grazing of livestock within protected areas are also potential threats. Musk deer conservation is thwarted due to competitions, habitat alteration and disease transmission (Sathyakumar 2005; Aryal et al. 2010; Wangchuk 2012; Shresth et al. 2014).

The main threat to the Himalayan Musk Deer in SWS appears to be the competition from large herds of free ranching livestock of 'Brokpa' (Sharchopa: pastoralist), the semi-nomadic inhabitants of the Sanctuary. Habitat fragmentation due to the presence of sporadic grazing grounds all across the sanctuary and constant habitat disturbances owing to the seasonal migration of the huge herds is another threat that may contribute to the decline of the Himalayan Musk Deer in SWS.

The probable presence of only a small population within a limited area of the Sanctuary could also cause problem of maintaining genetic variability and increased chances of loss of potentially adaptive local traits that may have resulted from evolutionary processes (Franklin 1980).

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