

Short Communication

Using camera-trap photographs and direct sightings to identify possible refugia for the Vulnerable Sumatran striped rabbit *Nesolagus netscheri*

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Abstract The endemic Sumatran striped rabbit *Nesolagus netscheri*, categorized as Vulnerable on the IUCN Red List, is one of the rarest lagomorphs and little is known about its ecology, status or distribution. After nearly a decade with no published sightings, new camera-trap photos have been taken and observations made in Bukit Barisan Seletan and Kerinci Seblat National Parks, renewing interest in this rare species. We suggest that Bukit Barisan Seletan National Park is an ideal location to initiate a much needed ecological study of the species. Documentation and protection of a population in this Park would facilitate refinement of study techniques applicable to other areas in Sumatra, including Kerinci Seblat National Park, and thus facilitate an assessment of the status and distribution of the species. We believe that in light of ongoing encroachment and deforestation in many of Sumatra's protected areas it is important to implement immediate conservation initiatives in both parks to ensure the persistence of these known populations.

Keywords Bukit Barisan Selatan National Park, camera trap, Kerinci Seblat National Park, *Nesolagus netscheri*, Sumatran striped rabbit

The Sumatran striped rabbit *Nesolagus netscheri*, categorized as Vulnerable on the IUCN Red List (Meijaard & Sugardjito, 2008), is a lagomorph thought to be endemic to the Barisan mountain range in Sumatra (Blouch, 1984; Meijaard & Sugardjito, 2008). Because of the small number of museum specimens and paucity of historical sightings it has been referred to as the rarest lagomorph (Flux, 1990). In

1990 Flux stated that 'a discovery of a population and its protection pending a widespread survey for the rabbit is extremely urgent'. Conservation actions were subsequently proposed but never funded or initiated (Meijaard & Sugardjito, 2008). To date there has been no identification of a viable study population or elucidation of the ecology of the species, and these activities remain conservation goals for the IUCN (Meijaard & Sugardjito, 2008).

There have been relatively few published records of the Sumatran striped rabbit. Historical documentation of the species consists of a small number of museum specimens collected during 1880–1916 (Flux, 1990). In 1984 a region-wide mammal survey described local accounts of the species from three areas in South Sumatra (Blouch, 1984) but a subsequent visit to these areas provided no documentation of the species (Flux, 1990). The first documented sighting was in 1972 by M. Borner in Gunung Leuser National Park (Flux, 1990). In 1978 J. Seidensticker made an unconfirmed sighting near Gunung Kerinci (Flux, 1990) but the species remained unphotographed in the wild until 1998, when Fauna & Flora International recorded an individual in a camera-trap photograph in Kerinci Seblat National Park (FFI, 1998). Since 1998 three additional sightings have been reported, all from Bukit Barisan Seletan National Park, a protected area of 3,568 km² that spans the southern Sumatran provinces of Lampung, Bengkulu and South Sumatra. In 2007 the Wildlife Conservation Society–Indonesia Program documented the species in two photographs from a camera trap in the Pulau Beringin area (BBC, 2007; H.T. Wibisono, unpubl. data), in 2008 an individual was photographed by a scientist from WWF (WWF, 2009), and in 2009 an individual was sighted along a road that bisects Bukit Barisan Seletan National Park (Dinets, 2010).

Since 2008 we have been conducting an ecological study of four sympatric felids in the Liwa region of Bukit Barisan Seletan National Park. The majority of our study site comprises primary evergreen forest located along a large ridgeline with elevations up to 1,200 m. Because of the ruggedness of the ridgeline this is one of the few areas of the Park that has experienced relatively little encroachment from surrounding settlements and thus a relatively low level of poaching. In 2011 we began a camera-trapping survey for

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small- and medium-sized felids in the area. Seven Reconyx HC500 HyperFire infrared digital cameras (Reconyx, Holmen, USA) were deployed continuously during March–September 2011 for a total of 1,293 trap days. The camera sites were randomly selected from 20 locations where camera traps had been set in a previous survey of the area (Wibisono, 2006). At each location the cameras were set within 10 m of the original location, facing a trail or other area of likely travel for wildlife, and placed 20–25 cm above the ground. They were set to take pictures 24 hours per day, with five frames per triggering event and a 1-minute delay between triggers. The cameras were placed within a locked, armoured box to prevent theft and elephant damage but were not baited with a lure or attractant. The batteries in the cameras were changed every 1–2 months and at no time did any of the cameras run out of power prior to being changed. However, one camera ceased to function in June and was subsequently removed.

We obtained a total of 10 photographs of Sumatran striped rabbits, on two separate occasions at camera sites 790 m apart. The first series of photographs was taken at 104°10'21" E 5°7'20" S (altitude 1,100 m) on 4 March 2011. Five consecutive photographs were taken from 21.21.42 to 21.21.46. A single individual emerged from the right of the camera and appeared to be slowly moving down the trail away from the camera. The second series of five photographs, from 00.01.20 to 00.01.24, was taken at 104°10'4" E 5°7'39" S (953 m) on 4 August 2011. An individual appeared to be moving away from the camera along the trail, emerging relatively quickly from the left of the camera and pausing in the middle of the trail for several frames. In both photographic events the characteristic pelage of the Sumatran striped rabbit is clearly visible (Plate 1). Both events were on particularly dark nights when the moon was either new or waning. Neither rabbit appeared to be startled or look at the camera, possibly due in part to their position facing away from the camera. Each individual was in a relatively open area and appeared to be moving along a well-established wildlife trail.

To investigate whether there have been unpublished sightings of the Sumatran rabbit we conducted an informal survey of colleagues who have conducted research in Sumatra. We asked if they had any camera-trap photos, had sighted, or had received any anecdotal reports of the species. The survey included researchers who have worked in nearly every major protected area in Sumatra (including Kerinci Seblat National Park, Bukit Barisan Selatan National Park, Way Kambas National Park, Gunung Leuser National Park and the Aceh region) as well as many forest concessions. The majority of researchers surveyed had no record of the species but Kerinci Seblat National Park emerged as the one other area where there have been multiple recent sightings.

The 13,791 km² Kerinci Seblat National Park is the largest in Sumatra, spanning the provinces of West Sumatra, Jambi,

Bengkulu and South Sumatra. In the Park D. Martyr (pers. comm., 2011) sighted an individual Sumatran rabbit at 900 m altitude in the Sipurak Ecosystem Area of Merangin District in 1999, and another at 1,350 m in the Kerinci district in 2001. J. Holden (pers. comm., 2011) recorded camera-trap photographs of the species in 1997 on Gunung Tujuh and in 1999 in Sipurak. In 2001 a Tiger Protection and Conservation Unit sighted an individual at 1,600 m in mossy forest on Gunung Raya and in 2003 another Unit sighted an individual in primary montane habitat at 1,900 m on Gunung Kerinci (D. Martyr, pers. comm., 2011). In 2010 a individual was photographed by a camera trap in submontane primary forest at 1,163 m in the Renah Kayu Embun area (W.M. Wong, pers. comm., 2011). There are several additional unconfirmed reports of the species in the Kerinci area during the late 1990s. A WWF staff member saw an individual crossing the road near Padang Aro and, in 1999, a visiting ornithologist spotted an individual on the trail to Gunung Kerinci. In addition, many local people in the area of Kerinci Seblat have reported sightings of the species (J. Holden, pers. comm., 2011).

Although the species was previously thought only to occur above 600 m, we obtained two reports of Sumatran rabbits from lowland forests. In 1997 A. Rafiastanto (pers. comm., 2011) saw a Sumatran striped rabbit in the lowland forests outside Pemerihan, and a photograph of an individual was recorded by a camera trap in 2011 in a primary/selectively logged lowland forest at 544 m in Ipuh in Bengkulu Province (W.M. Wong, pers. comm., 2011).

Although there have been several camera-trap photographs of the species, given the amount of camera trapping that has been conducted in Sumatra the number of photographs is low and could suggest the species is rare. However, the majority of camera-trap studies in Sumatra are focused on the Sumatran tiger *Panthera tigris sumatrae*, with the camera traps usually set c. 45 cm above the ground and perpendicular to trails. Rabbits may not trigger the camera if they are passing beneath its detection radius. Our study attained a relatively high number of photographs in relatively few trap days but we were targeting smaller felids, with the cameras set 25 cm above the ground. In addition, both cameras that captured the Sumatran striped rabbit were facing along a wildlife trail, from where it would be more difficult for the rabbits to miss the detection beam of the camera. There is an indication that some of the photographs of the species captured by tiger studies may also be from cameras that were oriented along game trails, or with the beam aimed slightly down (H.T. Wibisono, unpubl. data).

Although the paucity of photographic records of the Sumatran rabbit from other protected areas may be an artifact of study design, a combination of recent photographic records and sightings in Bukit Barisan Selatan and Kerinci Seblat National Parks indicate their importance as

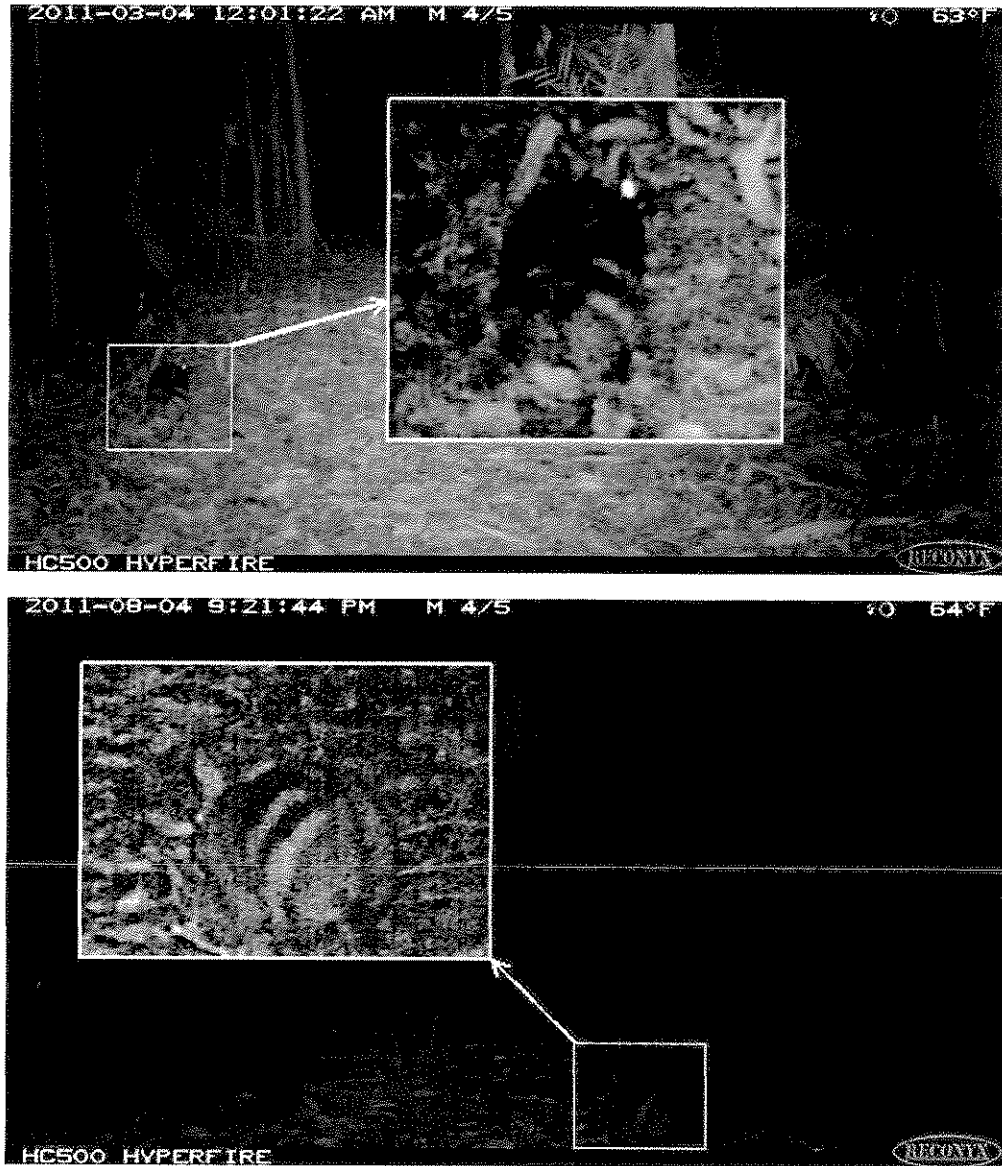


PLATE 1 Two camera-trap photographs of the Sumatran striped rabbit *Nesolagus netscheri* from Bukit Barisan Seletan National Park obtained in March (top) and August (bottom) 2011, with enlarged insets. The sharpness, brightness and contrast of the inset images have been adjusted for clarity.

current refugia for the species (although, despite a lack of recent records, it is possible that the species persists in several other protected areas). Because of the more recent and accurately described sightings and photographs from Bukit Barisan Seletan National Park we suggest that this may be the most suitable area for the first targeted research on the species. An ecological study of the Sumatran rabbit would provide valuable knowledge and facilitate the refinement of research techniques for surveys in other protected areas such as Kerinci Seblat National Park. Such surveys would be the first step in assessing the conservation status of the species and designing an action plan. The

extensive deforestation and encroachment that is currently occurring in many of Sumatra’s protected areas makes it essential to initiate conservation schemes for the Sumatran rabbit in both Bukit Barisan Seletan and Kerinci Seblat National Parks to safeguard these confirmed refugia for the species.

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Biographical sketches

JENNIFER L. MCCARTHY has conducted field research in Sumatra since 2008, focusing on camera trapping and live trapping to assess the distribution and density of four species of wild felids. She has also conducted research to characterize the conflict between humans and felids in South Sumatra. TODD K. FULLER works to identify factors that affect variation in mammal density and distribution. KYLE P. MCCARTHY studies animal behaviour and the conservation of wild felids in Central Asia, South-east Asia and the Americas. HARIYO T. WIBISONO is the Tiger Conservation Coordinator for the Wildlife Conservation Society–Indonesia Program. He is also the Director of the Harimau Kita Forum, which coordinates collaboration on tiger conservation in Sumatra. MARK C. LIVOLSI has worked for the Indonesian Wild Cat Conservation Project since 2011, assisting with camera trapping and human–wildlife conflict studies in Sumatra.