

Regionally extinct species rediscovered: the bush dog *Speothos venaticus* in Minas Gerais, south-eastern Brazil

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Abstract The bush dog *Speothos venaticus*, a rare Near Threatened South American canid that lives in packs, was thought to be extinct in Minas Gerais state, south-eastern Brazil, until recently. Here, we report four recent records of the species in Minas Gerais, the first in the state since the description of the species in 1842. All records are from the Cerrado ecosystem in the north and north-west of the state; two are from animals found dead, one from footprints and another from a camera trap. Three of the records were inside or close (< 10 km) to strict protected areas, in a region recognized as the Protected Areas Mosaic Sertão Veredas–Peruaçu, where we expect any new records of the bush dog to be found. We discuss the low probability of detecting the bush dog and the main regional threats to the species, and emphasize the need to protect large and interconnected natural areas and keep them free of domestic dogs to avoid the extinction of the bush dog in Minas Gerais.

Keywords Brazil, bush dog, Cerrado, Minas Gerais, regional extinction, *Speothos venaticus*

The bush dog *Speothos venaticus* is the most social of small canids (Eisenberg & Redford, 1999) and can hunt relatively large prey such as caviomorph rodents (Zuercher et al., 2005) and armadillos, especially *Dasypus novemcinctus* (Lima et al., 2009). Few aspects of its ecology and behaviour in the wild are known, and before the studies by Zuercher et al. (2005) and Lima et al. (2009, 2012) most of the information about the species came from occasional encounters (e.g. Silveira et al., 1998) and observations in captivity (e.g. Macdonald, 1996). The bush dog is

categorized as Near Threatened globally (DeMatteo et al., 2011) and as Vulnerable in Brazil (Machado et al., 2008). *S. venaticus* was previously considered extinct in Minas Gerais state (Costa, 1998) and, although it is currently categorized regionally as Critically Endangered (Chiarello et al., 2008), the rediscovery of the species has not been properly documented.

The state of Minas Gerais in south-eastern Brazil harbours three major ecosystems: Atlantic Forest, Caatinga and Cerrado. Caatinga is a mosaic of thorn scrub and seasonally dry forests associated with a semi-arid climate, and Cerrado is a savannah formed of several vegetation physiognomies. Here we describe four recent records of *S. venaticus* in Minas Gerais state (Table 1, Fig. 1), the first there since the species was first described (Lund, 1842).

In 2003 we found bush dog footprints in Cavernas do Peruaçu National Park, northern Minas Gerais, in the transition zone between Cerrado and Caatinga. Despite our considerable camera trap efforts (c. 7,000 trap-days at 30 sites) the species was never recorded again in this Park. In March 2011 a bush dog carcass was found in an extensive cattle ranch in northern Minas Gerais, after a local resident reported that three of his domestic dogs attacked two bush dogs and killed one of them. The site is within Cochá Gibão Environmental Protection Area (IUCN category V) and c. 8 km from the 70-km² Porto Cajueiro Private Reserve. In May 2012 a bush dog was found run over on the paved road BR-251, in the municipality of Unaí, in the north-west of the state. The site is not close to any protected area. In September 2012, at Veredas do Peruaçu State Park, we obtained the first camera-trap image of *S. venaticus* in Minas Gerais. Sightings of bush dogs had been reported by staff of this Park since 2004 but the species was recorded only 7 years after our first attempt to confirm its occurrence (in c. 6,000 camera-trap days at 70 sites).

All these records are from the north and north-west of Minas Gerais, where relatively large areas of Cerrado and dry forest remnants still occur, and from where we expect any new records of the bush dog to be found. Three of the four records were either inside or close to strict protected areas (IUCN categories I–IV), in a region officially recognized as the Protected Areas Mosaic Sertão Veredas–Peruaçu, which is one of the most important areas for long-term conservation in south-east Brazil, extending over

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TABLE 1 Details of the four recent records of the bush dog *Speothos venaticus* in Minas Gerais state, south-eastern Brazil (the record numbers correspond to the numbered locations in Fig. 1).

Record	Year	Site name	Site characteristics	Record type	Age & sex
1	2003	Cavernas do Peruaçu National Park (568 km ²)	Well preserved gallery forest & dry forest along the Peruaçu river, near large karstic caves.	Footprints	Unidentified
2	2011	Lagoa da Pedra Farm, Januária municipality	Grasslands, secondary cerrado ¹ & veredas ² with extensive cattle ranching	Carcass deposited at UFMG ³ Zoology Department (UFMG 3781)	Adult, unidentified sex
3	2012	Federal road BR-251, Unaí municipality	Paved road characterized by cerrado ⁴ & dry forests on its margins, surrounded by large agricultural lands	Carcass deposited at PUC-MG ⁵ Natural Science Museum (MCN-M 2795)	Adult male
4	2012	Veredas do Peruaçu State Park (310 km ²)	Secondary cerrado in an area used for <i>Eucalyptus</i> plantation 25 years ago	Camera-trap video	Adult, unidentified sex

¹Typical Cerrado ecosystem physiognomy, sparse trees and large shrubs 2–8 m tall with a grass ground layer

²Humid grassland vegetation dominated by the palm *Mauritia flexuosa*

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⁴Tall Cerrado vegetation with large trees

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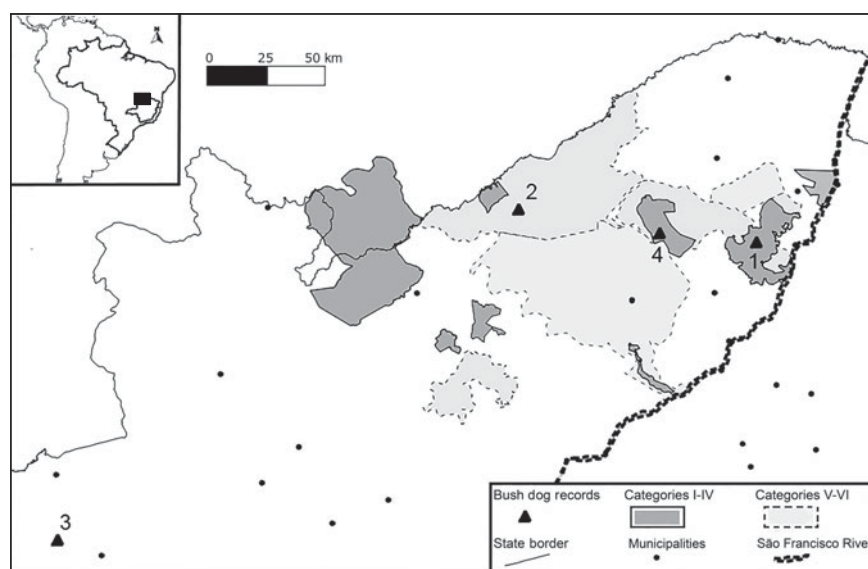


FIG. 1 Location of the four recent records of the bush dog *Speothos venaticus* (Table 1) in the state of Minas Gerais, south-east Brazil. Only protected areas within the Protected Areas Mosaic Sertão Veredas–Peruaçu are shown. Categories refer to the IUCN protected area categories (Dudley, 2008). The filled rectangle on the inset indicates the location of the main map in Brazil.

18,000 km² and largely covered with natural habitats. The Peruaçu River watershed, where two of the records were obtained and where the species is often reported by local people, appears to be an important area for conservation and studies of the bush dog in south-east Brazil.

We have been studying large mammals in the Protected Areas Mosaic Sertão Veredas–Peruaçu since 2004. These studies used techniques suitable for recording bush dogs, such as searching for tracks, track plots and camera trapping (totalling c. 27,000 trap-days). Despite this effort, *S. venaticus* was recorded only on three occasions. Similarly, Beisegel (2009) and Fusco-Costa & Ingberman (2013) reported that the bush dog was recorded in the Atlantic Forest only after 4,800 and 4,112 trap-days, respectively.

In the Brazilian Amazon, Michalski (2010) obtained an average of one camera trap record for each 3,361 days of sampling. In Emas National Park, central Brazil, bush dogs were seen only nine times in 33 years (Silveira et al., 1998). These facts indicate that the bush dog has an extremely low probability of detection (which may result in false absences), probably caused by the synergistic effect of the species' large home range and its use of armadillo burrows as rest sites (Lima et al., 2012), in conjunction with small population sizes and low density. There is a need to improve techniques to detect *S. venaticus*. Playback vocalizations (DeMatteo et al., 2004) combined with camera trapping can provide insights about pack size, and detection dogs can be useful to find scats and dens (DeMatteo et al., 2009; Lima et al., 2009).

The two carcasses were found in disturbed environments. Although *S. venaticus* can occur in such areas (Oliveira, 2009) these are not optimal habitat for the species, and mortality may be high. Lima et al. (2012) observed that bush dogs prefer natural habitats, avoiding cultivated lands even in a highly fragmented area.

As *S. venaticus* is exclusively carnivorous (Zuercher et al., 2005; Lima et al., 2009, 2012) its occurrence is conditional on the presence of prey. The species' main prey occur in the protected areas in the Protected Areas Mosaic Sertão Veredas–Peruaçu (Fundação Pró-Natureza, 2003; Ferreira et al., 2011). Some of these protected areas may support large prey populations and thus prey depletion is probably not a major threat to bush dogs in the region. The main threats in the short- and medium-term may be related to contact with domestic dogs and loss of habitat. Domestic dogs can kill bush dogs, and may transmit diseases (Jorge et al., 2010). Measures are required to eradicate domestic dogs from areas managed strictly for conservation. In protected areas where human populations are allowed, domestic dogs must be kept free of disease and close to human settlements. Loss of habitat, particularly outside protected areas, may restrict movement of individuals between packs or populations. Currently the protected areas in northern Minas Gerais are connected to some extent, but any further conversion of Cerrado into farmland could result in the isolation of these reserves. Although knowledge about bush dogs in the wild is still to be acquired, addressing the threats detailed here is crucial to safeguard the species in the state of Minas Gerais.

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Biographical sketches

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