NOTAS SOBRE

MAMÍFEROS SUDAMERICANOS

Sociedad Argentina para el Estudio de los Mamíferos

Notas sobre Mamíferos Sudamericanos 2025, vol. 7
DOI:https://doi.org/10.31687/SaremNMS25.1085
Versión on-line ISSN 2618-4788

NOTAS SOBRE
MAMÍFEROS
SUDAMERICANOS

Records of *Speothos venaticus* (Lund, 1842) (Canidae: Carnivora) in Parque Sesc Serra Azul, southwest of Mato Grosso, Brazil

Marcione Brito de Oliveira (1,2*), Martha Lima Brandão (3), José L. Passos Cordeiro (4), Henrique Sverzut Freire de Andrade (5), and Luiz Flamarion Barbosa de Oliveira (2)

(1) Laboratório de Biologia e Parasitologia de Mamíferos Silvestres Reservatórios, Instituto Oswaldo Cruz, Fiocruz, Rio de Janeiro, Brazil. (2) Setor de Mastozoologia, Departamento de Vertebrados, Museu Nacional, Universidade Federal do Rio de Janeiro (MN-UFRJ), Rio de Janeiro, Brazil. (3) Fundação Oswaldo Cruz, Vice-Presidência de Produção e Inovação em Saúde, Rio de Janeiro, Brazil. (4) Fundação Oswaldo Cruz, Ceará, Brazil. (5) Parque Sesc Serra Azul, Mato Grosso, Brazil. [*correspondência: oliveira01marcione@gmail.com]

Citación: de Oliveira, M. B., M. L. Brandão, J. L. P. Cordeiro, H. S. F de Andrade, & L. F. B. de Oliveira. 2025. Records of *Speothos venaticus* (Lund, 1842) (Canidae: Carnivora) in Parque Sesc Serra Azul, southwest of Mato Grosso, Brazil. Notas sobre Mamíferos Sudamericanos 7:e25.1085.

ABSTRACT
One of the smallest canids that occurs in Brazil is the bush dog (*Speothos venaticus*), a species with a wide distribution in the Neotropical region. Despite its broad distribution its ecology remains poorly understood. The species is listed as near-threatened internationally and was recently reclassified as vulnerable in Brazil. Here, we recorded at different times two possible groups of *S. venaticus* in a protected area in Mato Grosso state, the domain of the Cerrado Biome. The records were obtained through camera traps installed in the Parque Sesc Serra Azul, in the municipality of Rosário Oeste. This discovery highlights the importance of the new record for the species, providing valuable data on its distribution and ecology through non-invasive sampling. Furthermore, rare records like this reinforce the importance of creating and maintaining conservation areas to safeguard lesser-known species, such as bush dogs, facing an alarming threat to their survival .
Keywords: Bush dog, camera traps, conservation area, distribution, vulnerable

RESUMO – Registros de *Speothos venaticus* (Lund, 1842) (Canidae: Carnivora) no Parque Sesc Serra Azul, sudoeste do Mato Grosso, Brasil.
Um dos menores canídeos que ocorre no Brasil é o cachorro-vinagre (*Speothos venaticus*), uma espécie com ampla distribuição na região Neotropical. Apesar dessa ampla distribuição, sua ecologia permanece pouco compreendida. A espécie está listada como quase ameaçada internacionalmente e foi recentemente reclassificada como vulnerável no Brasil. No presente estudo, registramos em momentos diferentes dois possíveis grupos de *S. venaticus* em uma área protegida no estado de Mato Grosso, no domínio do Cerrado. Os registros foram obtidos através de armadilhas fotográficas instaladas no Parque Sesc Serra Azul, no município de Rosário Oeste. Esses destacam a importância da área para a espécie, fornecendo dados valiosos sobre sua distribuição e ecologia por meio de amostragem não invasiva. Adicionalmente registros raros como este reforçam a importância de criar e manter áreas de conservação para proteger espécies menos conhecidas, como o cachorro-vinagre, que enfrenta uma ameaça alarmante à sua sobrevivência .
Palavras chave: Armadilhas fotográficas, área de conservação, cachorro-vinagre, distribuição, espécie vulnerável

Recibido el 21 de abril de 2024. Aceptado el 10 de octubre de 2024. Editor asociado Mauro Schiaffini.

The Canidae family, which encompasses 35 species of dogs, wolves, coyotes, jackals, and foxes globally, includes a considerable number of subspecies whose classification is continuously being re-evaluated (Wilson & Reeder 2005; Padilla & Hilton 2015). Currently in Brazil, there are 775 species of mammals belonging to 11 orders, 37 of which belong to the order Carnivora (Abreu et al. 2022), six of which are canids: *Atelocynus microtis* (Sclater, 1883), *Cerdocyon thous* (Linnaeus, 1766), *Chrysocyon brachyurus* (Illiger, 1815), *Lycalopex gymnocercus* (Fischer, 1814), *Lycalopex vetulus* (Lund, 1842) and *Speothos venaticus* (Lund, 1842).

These species are part of Cerdocyonina, a lineage of endemic South American canids known for including some of the least studied canid species (Perini et al. 2010; Zrzavý et al. 2018). This group comprises generalist fox-like morphotypes, such as the genera *Cerdocyon*, *Atelocynus*, and *Lycalopex*, as well as highly specialized species such as *C. brachyurus* (maned wolf) and *S. venaticus* (Segura et al. 2021; Chavez et al. 2022). Two species became extinct in recent times *Dusicyon australis* (Kerr, 1792) and *Dusicyon avus* (Burmeister, 1866). According to some authors, one of them, *D. avus*, may have reached the twentieth century, having lived in the open formations of the south of the continent, including southern Brazil, whose extinction could have occurred after the arrival of Europeans in South America. It may have been kept as a pet and been considered part of the human social group (Prates 2014; Prevosti et al. 2015; Segura & Sánchez-Villagra 2021).

Unlike other canid species that are mostly mesocarnivores, *S. venaticus* (bush dog) is adapted to a hypercarnivorous diet (Zrzavý et al. 2018; Chavez et al. 2022), consisting of 70% or more of vertebrate tissues (Zuercher et al. 2005; Lima et al. 2009). Some studies have shown that the bush dog is the only surviving species, forming a clade with all hypercarnivorous fossils from South America (Perini et al. 2010; Zrzavý et al. 2018).

Speothos venaticus is the only living species in its genus, featuring a more elongated body, small and rounded ears, as well as shorter tails and limbs compared to other canids. Its length varies from 57 to 81 cm, with a tail measuring between 11 and 15 cm, and weight ranging from 4 to 8 kg (Beisiegel & Zuercher 2005; Reis et al. 2011). Records of the species, both in the literature and in the present study, suggest diurnal habits (Meyer et al. 2015; Nigro et al. 2021).

The bush dog has a wide distribution in the Neotropical region, occurring from Costa Rica, in Central America, to Argentina (DeMatteo 2008; DeMatteo et al. 2011). Despite this broad range, the species is listed as Near Threatened internationally (DeMatteo et al. 2011) and as Vulnerable (VU) in Brazil on the National List of Endangered Species (MMA 2022). This classification reflects its extreme sensitivity to the loss of available habitats over time (Bogoni et al. 2024). Therefore, this study documents the species' occurrence in a conservation area, contributing to an improved species record. Furthermore, we emphasize the importance of maintaining these protected areas, which are crucial for safeguarding species highly susceptible to degraded environments.

The study was conducted within the protected area of the Parque Sesc Serra Azul (park; Fig. 1), located on the left bank of the Cuiabazinho River, in the municipality

of Rosário Oeste, Mato Grosso, western Brazil. The study area spans approximately 5,000 hectares and is situated within the Cerrado ecoregion (Louzada et al. 2015). The vegetation is variable and has undergone partial fragmentation due to human activities. However, it is in an advanced state of recovery, with a rich array of physiographic features such as extensive pastures, cerrado, seasonal forests, and flooded forests (Louzada et al. 2015; de Oliveira et al. 2022). The climate in the region is typical of the savanna, 'Aw', according to the Köppen-Geiger system (Alvares et al. 2013). It is characterized by concentrated rainfall during the summer months, with annual precipitation ranging from 1,000 to 1,600 mm (Alvares et al. 2013). Camera traps have been installed at various sampling points within the park, positioned at a height of 45-50 cm and selecting vegetation zones for exploratory purposes. The cameras were active 24 hours a day, recording three sequential images per event. Some cameras were configured to record 10-second videos for additional observations.

The first record was on July 12, 2013, the images were taken by camera traps (Reconyx PC90HO, Holmen, WI, USA). Four bush dogs were observed foraging together in one area of the park (Latitude -14.474103; Longitude -55.738212) at 6:33 AM (Fig. 2). The individuals exhibited healthy pelage, which underscores the importance of this record. Previous research has documented the disappearance of bush dog individuals, which has been potentially associated with a type of mange—a disease known to affect this species (Jorge et al. 2008; Lima et al. 2012). These results, combined with earlier findings, provide valuable insights into the bush dogs' health status and emphasize the need for ongoing monitoring to address potential health threats affecting the population (Oliveira 2009; Jorge et al. 2013, 2018). Given that sarcoptic mange, a condition frequently observed in domestic dogs (*Canis lupus familiaris* Linnaeus, 1758) and subsequently transmitted to wild canids, poses a considerable threat to their well-being, understanding its impact and spread in wild populations is crucial (Teodoro et al. 2018; Fiori et al. 2023).

Disease and poaching of prey species are expected to have devastating effects on bush dog populations due to their high sociability (Beisiegel & Zuercher 2005; DeMatteo et al. 2006; DeMatteo 2008) and association with habitats undergoing fragmentation and loss (DeMatteo et al. 2014; Martins et al. 2024). Bush dogs persist as a threatened species due to habitat destruction and insufficient enforcement of protective laws (DeMatteo et al. 2014; Bogoni et al. 2024). Of the six wild canid species found in Brazil, four are listed as Vulnerable on the endangered species list (MMA 2022). This includes *S. venaticus*, whose status has been updated from Vulnerable under criterion A4c to C1 in the most recent assessment, underscoring the rapid decline in its population (Lemos et al. 2023).

During the study, domestic dogs were recorded at two different locations. One of these sightings was from the same camera that had previously recorded the bush dogs. These dogs does not seem to be residents of Parque Sesc Serra Azul; they were merely passing through. While it is known that dogs belonging to local cattlemen inhabit the area surrounding the park, they were not recorded by the cameras during the monitoring period. Most of the camera records have been of wild animals (Table 1). The diversity of wildlife and the low incidence of domestic dogs in the region may

contribute to the overall health of these wild animals within the protected area. By reducing the presence of domestic dogs, which can potentially introduce diseases or disrupt the natural behavior of wildlife, the ecosystem's integrity and the well-being of its species are better preserved.

A subsequent record was obtained on January 19, 2021, using another camera trap (Bushnell model 119936C). Two bush dogs were recorded at dawn on a rainy day in another area of the park (Latitude -14.462817; Longitude -55.710903), at 4:53 AM (Video S1). One individual, clearly a male, marked the leaves with urine. This behavior is common among wild canids, including *S. venaticus*, where it plays a crucial role in the formation and maintenance of pair bonds (Porton 1983). Urine marking is essential for communication in many mammal species, as it allows information such as species, sex, individual identity, health, and reproductive status of the signaler to persist in the environment (Porton 1983; Johansson & Jones 2007; Fawcett et al. 2013). Despite its prevalence among canids, few studies have documented this behavior in free-living bush dogs.

Despite their extensive distribution and occurrence in various habitats, bush dogs appear to be naturally rare across their entire range (DeMatteo 2008; DeMatteo et al. 2011; Feijó & Langguth 2013). The ecology of the species remains poorly understood. Most available information is based on observations of animals in captivity or sporadic field records (Beisiegel & Ades 2002; Lima et al. 2009; Teribele et al. 2012; Meyer et al. 2015; Fick et al. 2021; Soto-Werschitz et al. 2023), making it difficult to formulate effective conservation strategies for this rare Neotropical species. While some field studies have been conducted on the bush dog, much of the information about its status and distribution relies on indirect data (DeMatteo et al. 2011). Telemetry data from the Brazilian savanna revealed that a group of bush dogs had a home range of 140 km^2, with small seasonal 'subareas'. These animals showed a strong preference for the native habitats and had a larger home range compared to other canids of similar size. Their unique seasonal movement patterns highlight the importance of preserving extensive habitats to ensure their long-term persistence (Lima et al. 2012). The area adjacent to the riparian forest, where the bush dogs were observed, was previously characterized by murundu fields (mound-fields; Renard et al. 2012) before being converted into rice paddies and later used as cattle pasture. Currently, its use is restricted.

The presence of *S. venaticus* in Parque Sesc Serra Azul, confirmed through non-invasive techniques such as camera traps, reaffirms the critical importance of preserving and establishing conservation areas. This importance has been previously emphasized in studies focused on safeguarding poorly understood species and those concerning threat statuses (DeMatteo et al. 2011, 2014; MMA 2022; de Oliveira et al. 2023). Furthermore, potential prey for the bush dog, such as *Dasypus novemcinctus* Linnaeus, 1758, *Dasyprocta azarae* (Lichtenstein, 1823), and *Cuniculus paca* (Linnaeus, 1766), which can together represent up to 90% of the biomass consumed in some regions (Zuercher et al. 2005; Lima et al. 2009), were also observed in the study area (Table 1). *Cuniculus paca* was recorded multiple times and was also captured in the camera trap documenting the bush dog. This underscores the importance of moni-

toring and studying biodiversity within protected areas, evaluating the occurrence of species that can persist in these areas and the incidence of prey, which may be more abundant in these regions.

The closest records of *S. venaticus* to our study area were from the 'Estação Ecológica da Serra das Araras' (Dalponte 1988 apud DeMatteo & Loiselle 2008), approximately 205 km away, situated within the Cerrado morphoclimatic domain. For 'Parque Nacional da Chapada dos Guimarães' (100 km away), the bush dog was not recorded, although it is known for the region (MMA 2009; Jorge et al. 2018). We currently have no information on other nearby protected areas in the region, such as the 'Estação Ecológica Águas do Cuiabá', which covers nearly 11,000 hectares and is located about 40 kilometers away.

Given this, creating ecological corridors between protected areas is of vital importance, especially along rivers with riparian forests and nearby open areas, such as those near Serra Azul park. These corridors can connect both nearby areas and more distant ones, even if they are physiognomically different and separated by regions extensively used for agriculture and livestock, as the Cerrado is covered by a variety of phytophysiognomies, such as cerrado *sensu stricto*, riparian forests, 'campo sujo', babaçu palm forests, deciduous and semideciduous forest, among other formations as flood grasslands and veredas (Palm swamp forests) (Oliveira-Filho & Ratter 2002). These formations, with varying degrees of expressiveness, are present throughout the study region and adjacent areas.

Other significant records include those from the municipality of Barão de Melgaço within the 'Reserva Particular do Patrimônio Natural Sesc Pantanal' (Lima et al. 2009), about 240 km away, which is part of the Pantanal biome, characterized by a unique ecosystem of seasonal wetlands, seasonally dry forests, large patches of cerrado, and significant vegetation variation due to periodic flooding and droughts (Lima et al. 2009; Oliveira et al. 2013). Further, in the municipality of Nova Xavantina, about 340 km to the east (Lima et al. 2012), in the Cerrado biome, similar to the study area, although much of the native vegetation has been cleared for agriculture, some fragments of native vegetation remain, which may support the persistence of the species in these areas. Given the species' distribution range, it is likely that the bush dog traverses areas outside of protected zones (Lima et al. 2012).

The records highlight the need for urgent efforts to develop holistic conservation strategies that cover all of Brazil's biomes, particularly the Cerrado, which is under extreme pressure from industrial agriculture, as has been observed for a long time and has been emphasized recently (Ratter et al. 1997; Strassburg et al. 2017), with drastic consequences in terms of the total eradication of habitats, forcing species to live on islands. Mitigating habitat degradation and safeguarding favorable environments for *S. venaticus* and its prey species are key to ensuring the long-term survival of these vulnerable populations and regionally associated species.

The rapid degradation of suitable habitat and the decline of prey species increases the need for conservation measures based on ecological knowledge to ensure the species' long-term persistence in its areas of occurrence (Zuercher et al. 2005; Lima et al. 2009; de Oliveira et al. 2023). This is particularly important given the major

changes occurring in the Cerrado, a hotspot under threat, due to land use (Ratter et al. 1997; Strassburg et al. 2017; Hofmann et al. 2021). Consequently, this research underscores the importance of implementing conservation strategies and establishing protected areas to preserve the biodiversity of rare and vulnerable species like *S. venaticus* in Brazil.

ACKNOWLEDGEMENTS

Polo Socio Ambiental Sesc Pantanal supported this work. We are especially grateful to Marcus W. Kramm for the camera sampling assistance. Our gratitude to Christiane C. Rodrigues and Cristina Cuiabália R. P. Neves, for the enthusiastic incentive to work in the Parque Sesc Serra Azul. The manuscript was finalized with the support of FAPERJ (Fundação de Amparo à Pesquisa do Estado do Rio de Janeiro; Proc.: E-26/200.119/2019). We greatly appreciate the reviewers' suggestions, which have significantly improved the quality of the text.

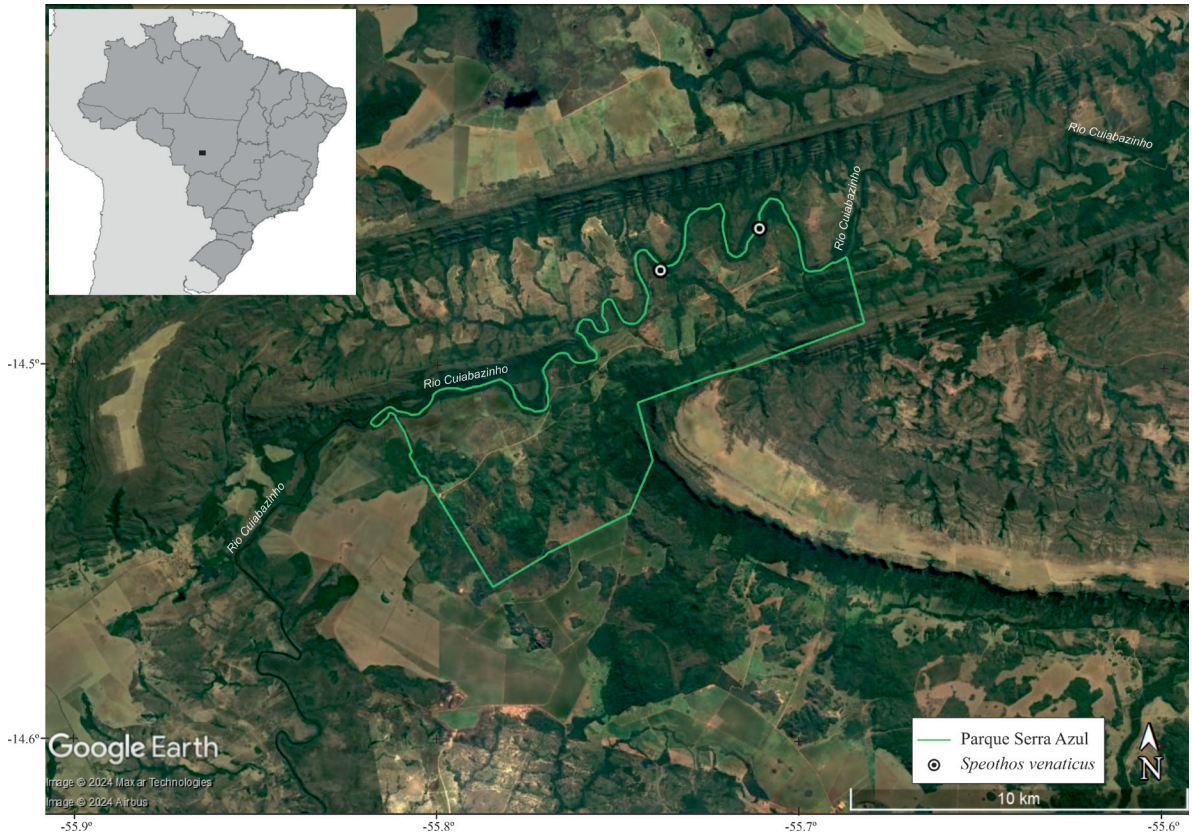

Figure 1. Map of Parque Sesc Serra Azul, Mato Grosso, western Brazil, indicating the locations of the *Speothos venaticus* records obtained in the present study.

Figure 2. Camera trap recording of four *Speothos venaticus* (bush dogs) in Parque Sesc Serra Azul, Mato Grosso, western Brazil.

Table 1. List of other species recorded by camera traps (2013-2023) at Parque Sesc Serra Azul. The nomenclature of mammals follows Abreu et al. (2022) and birds follows Pacheco et al. (2021).

Taxon	Common name
Class Mammalia	
Order Cingulata	
Priodontes maximus (Kerr, 1792)	Giant armadillo
Dasypus novemcinctus Linnaeus, 1758	Nine-banded armadillo
Order Pilosa	
Myrmecophaga tridactyla Linnaeus, 1758	Giant anteater
Tamandua tetradactyla (Linnaeus, 1758)	Southern tamandua
Order Rodentia	
Cuniculus paca (Linnaeus, 1766)	Lowland paca
Dasyprocta azarae Lichtenstein, 1823	Azara's agouti
Order Artiodactyla	
Subulo gouazoubira (Fischer, 1814)	Gray brocket deer
Mazama americana (Erxleben, 1777)	Red brocket deer
Dicotyles tajacu (Linnaeus, 1758)	Collared peccary
Order Carnivora	
Puma concolor (Linnaeus, 1771)	Puma or cougar
Panthera onca (Linnaeus, 1758)	Jaguar
Leopardus pardalis (Linnaeus, 1758)	Ocelot
Cerdocyon thous (Linnaeus, 1766)	Crab-eating fox
Lycalopex vetulus (Lund, 1842)	Hoary fox
Eira barbara (Linnaeus, 1758)	Tayra
Procyon cancrivorus Cuvier, 1798	Crab-eating raccoon
Order Chiroptera	
Desmodus rotundus (É. Geoffroy St.-Hilaire, 1810)	Common vampire bat
Order Perissodactyla	
Tapirus terrestris (Linnaeus, 1758)	Tapir
Class Aves	
Order Galliformes	
Crax fasciolata Spix, 1825	Bare-faced curassow
Penelope ochrogaster Pelzeln, 1870	Chestnut-bellied guan

SUPPLEMENTARY ONLINE MATERIAL
Supplement 1

Video S1. Record captured by a camera trap of two bush dogs in Parque Sesc Serra Azul, Mato Grosso state, western Brazil.

LITERATURE CITED

Abreu, E. F., et al. 2022. Lista de Mamíferos do Brasil (2022-1). [Data set]. Zenodo. <https://sbmz.org/wp-content/uploads/2024/01/Mammalia_SBMz_v2023-1_Dez.xlsx>.

Alvares, C. A., J. L. Stape, P. C. Sentelhas, J. L. De Moraes Gonçalves, & G. Sparovek. 2013. Köppen's climate classification map for Brazil. Meteorologische Zeitschrift 22:711–728. https://doi.org/10.1127/0941-2948/2013/0507

Beisiegel, B. D. M., & C. Ades. 2002. The behavior of the bush dog (*Speothos venaticus* Lund, 1842) in the field: a review. Revista de Etologia 4:17–23.

Beisiegel, B. D. M., & G. L. Zuercher. 2005. *Speothos venaticus*. Mammalian Species 783:1–6.

Bogoni, J. A., A. C. Peres, A. B. Navarro, V. Carvalho-Rocha, & M. Galetti. 2024. Using historical habitat loss to predict contemporary mammal extirpations in Neotropical forests. Conservation Biology 2024:e14245. https://doi.org/10.1111/cobi.14245

Chavez, D. E., et al. 2022. Comparative genomics uncovers the evolutionary history, demography, and molecular adaptations of South American canids. Proceedings of the National Academy of Sciences 119:e2205986119. https://doi.org/10.1073/pnas.2205986119

de Oliveira, G. L., et al. 2023. Wild canids and the ecological traps facing the climate change and deforestation in the Amazon Forest. Ecology and Evolution 13:e10150. https://doi.org/10.1002/ece3.10150

de Oliveira, M. B., H. S. de Andrade, J. L. Cordeiro, & L. F. B. de Oliveira. 2022. Potential feeding event of *Priodontes maximus* (Cingulata: Dasypodidae) by *Desmodus rotundus* (Chiroptera: Desmodontinae) in the Cerrado, Western Brazil. Notas sobre Mamíferos Sudamericanos 4:e22.5.1. https://doi.org/10.31687/SaremNMS22.5.1

DeMatteo, K. E. 2008. Using a survey of carnivore conservationists to gain new insight into the ecology and conservation status of the bush dog. Canid News 11:1–8.

DeMatteo, K. E., & B. A. Loiselle. 2008. New data on the status and distribution of the bush dog (*Speothos venaticus*): evaluating its quality of protection and directing research efforts. Biological Conservation 141:2494–2505. https://dx.doi.org/10.1016/j.biocon.2008.07.010

DeMatteo, K. E., I. J. Porton, D. G. Kleiman, & C. S. Asa. 2006. The effect of the male bush dog (*Speothos venaticus*) on the female reproductive cycle. Journal of Mammalogy 87:723–732.

DeMatteo, K., F. Michalski, & M. R. P. Leite-Pitman. 2011. *Speothos venaticus*. The IUCN Red List of Threatened Species 2011:e.T20468A9203243. https://dx.doi.org/10.2305/IUCN.UK.2011-2.RLTS.T20468A9203243.en

DeMatteo, K. E., et al. 2014. Noninvasive techniques provide novel insights for the elusive bush dog (*Speothos venaticus*). Wildlife Society Bulletin 38:862–873. https://doi.org/10.1002/wsb.474

Fawcett, J. K., J. M. Fawcett, & C. D. Soulsbury. 2013. Seasonal and sex differences in urine marking rates of wild red foxes *Vulpes vulpes*. Journal of Ethology 31:41–47. https://doi.org/10.1007/s10164-012-0348-7

Feijó, A., & A. Langguth. 2013. Mamíferos de médio e grande porte do nordeste do Brasil: distribuição e taxonomia, com descrição de novas espécies. Revista Nordestina de Biologia 22:3–225.

Fick, A., A. C. Hendgen, D. C. Kunzler, & L. G. da Silva. 2021. Primeiro registro do cachorro-vinagre *Speothos venaticus* (Carnivora, Canidae) para a Mata Atlântica do estado do Rio Grande do Sul, sul do Brasil. Biotemas 34:1–6. http://dx.doi.org/10.5007/2175-7925.2021.e79455

Fiori, F., R. C. de Paula, P. E. Navas-Suárez, R. L. P. Boulhosa, & R. A. Dias. 2023. The sarcoptic mange in maned wolf (*Chrysocyon brachyurus*): Mapping an emerging disease in the largest South American Canid. Pathogens 12:830. https://doi.org/10.3390/pathogens12060830

Hofmann, G.S., et al. 2021. The Brazilian Cerrado is becoming hotter and drier. Global Change Biology 27:4060–4073. https://doi.org/10.1111/gcb.15712

Johansson, B. G., & T. M. Jones. 2007. The role of chemical communication in mate choice. Biological Reviews 82:265–289. https://doi.org/10.1111/j.1469-185X.2007.00009.x

Jorge, R. P. S., B. Beisiegel, E. de Souza Lima, M. L. D. S. P. Jorge, M. R. P. Leite-Pitman, & R. C. de Paula. 2013. Avaliação do risco de extinção do cachorro-vinagre *Speothos venaticus* (Lund, 1842) no Brasil. Biodiversidade Brasileira 3:179–190.

Jorge, R. P. S., B. M. Beisiegel, E. S. Lima, M. L. S. Pinto Jorge, M. R. P. Leite-Pitman, & R. C. de Paula. 2018. *Speothos venaticus* (Lund, 1842). Livro Vermelho da Fauna Brasileira Ameaçada de Extinção: Volume II – Mamíferos (ICMBio, ed.). ICMBio/MMA, Brasília, Distrito Federal.

Jorge, R. S. P., E. S. Lima, & L. E. B. Lucarts. 2008. Sarna sarcóptica ameaçando cachorros-vinagres (*Speothos venaticus*) de vida livre em Nova Xavantina – MT. Anais do XXXIII Congresso Anual da Sociedade de Zoológicos do Brasil. Sorocaba-SP. <https://biofaces.com/upload/post/2015/07/1435957325.pdf>.

Lemos, F. G., et al. 2023. *Speothos venaticus*. Sistema de Avaliação do Risco de Extinção da Biodiversidade, SALVE. <https://salve.icmbio.gov.br>. https://doi.org/10.37002/salve.ficha.14021.2

Lima, E. S., R. S. P. Jorge, & J. C. Dalponte. 2009. Habitat use and diet of bush dogs, *Speothos venaticus*, in the Northern Pantanal, Mato Grosso, Brazil. Mammalia 73:13–19. https://doi.org/10.1515/MAMM.2009.002

Lima, E. S., et al. 2012. First telemetry study of bush dogs: home range, activity and habitat selection. Wildlife Research 39:512–519. https://doi.org/10.1071/WR11176

Louzada, N. S. V., A. C. do Monte Lima, L. M. Pessôa, J. L. P. Cordeiro, & L. F. B. Oliveira. 2015. New records of phyllostomid bats for the state of Mato Grosso and for the Cerrado of Midwestern Brazil (Mammalia: Chiroptera). Check List 11:1644. https://doi.org/10.15560/11.3.1644

Martins, N. B., et al. 2024. Occurrence of typical domestic animal viruses in wild carnivorans: an emerging threat to the conservation of endangered species. Transboundary and Emerging Diseases 2024:e3931047. https://doi.org/10.1155/2024/3931047

Meyer, N., R. Moreno, S. Valdes, P. Méndez-Carvajal, E. Brown, & J. Ortega. 2015. New records of bush dog in Panama. Canid Biology & Conservation 18:36–40.

MMA. 2009. Ministério do Meio Ambiente. Parque Nacional da Chapada dos Guimarães. Plano de Manejo. ICMBio – Instituto Chico Mendes de Conservação da Biodiversidade. Chapada dos Guimarães, Mato Grosso. <https://www.icmbio.gov.br/parnaguimaraes/images/stories/downloads/capa_apresentacao_e_indice.pdf>.

MMA. 2022. Ministério do Meio Ambiente. Portaria n. 300, de 13 de dezembro de 2022. Diário Oficial da União. <https://www.in.gov.br/en/web/dou/-/portaria-gm/mma-n-300-de-13-de-dezembro-de-2022-450425464>.

Nigro, N. A., N. L. Ocampo, D. G. Gnatiuk, M. Dombrouski, M. Britez, & K. Gnatiuk. 2021. Primeros registros del zorro pitoco *Speothos venaticus* (Lund, 1842) en el Parque Provincial Salto Encantado del Valle del Arroyo Cuñá Pirú, Misiones, República Argentina. Notas sobre Mamíferos Sudamericanos 3:e21.3.2. https://doi.org/10.31687/saremNMS.21.3.2

Oliveira, L. F. B., J. L. P. Cordeiro, & H. Hasenack. 2013. Padrões e tendências espaço-temporais na estrutura de uma paisagem antropizada no norte do Pantanal. Conservação da Biodiversidade em Paisagens Antropizadas do Brasil (C. A. Peres, J. Barlow, T. A. Gardner, & I. C. G. Vieira, eds.). Editora UFPR, Curitiba.

Oliveira, T. G. 2009. Distribution, habitat utilization and conservation of the vulnerable bush dog *Speothos venaticus* in northern Brazil. Oryx 43:247–253. https://doi.org/10.1017/S0030605307002347

Oliveira-Filho, A.T., J.A. Ratter. 2002. Vegetation Physiognomies and Woody Flora of the Cerrado Biome. The Cerrados of Brazil (P. S. Oliveira & R. J. Marquis, eds.). Columbia University Press, New York.

Pacheco, J. F., et al. 2021. Annotated checklist of the birds of Brazil by the Brazilian Ornithological Records Committee, second edition. Ornithology Research 29:94–105. https://doi.org/10.1007/s43388-021-00058-x

Padilla, L. R., & C. D. Hilton. 2015. Canidae. Fowler's Zoo and Wild Animal Medicine 8:457–467. https://doi.org/10.1016/B978-1-4557-7397-8.00046-3

Perini, F. A., C. A. M. Russo, & C. G. Schrago. 2010. The evolution of South American endemic canids: a history of rapid diversification and morphological parallelism. Journal of Evolutionary Biology 23:311–322. https://doi.org/10.1111/j.1420-9101.2009.01901.x

Porton, I. 1983. Bush dog urine-marking: its role in pair formation and maintenance. Animal Behaviour 31:1061–1069.

Prates, L. 2014. Crossing the boundary between humans and animals: the extinct fox *Dusicyon avus* from a hunter-gatherer mortuary context in Patagonia (Argentina). Antiquity 88:1201–1212. https://doi.org/10.1017/S0003598X00115406

Prevosti, F. J., et al. 2015. Extinctions in near time: new radiocarbon dates point to a very recent disappearance of the South American fox *Dusicyon avus* (Carnivora: Canidae). Biological Journal of the Linnean Society 116:704–720. https://doi.org/10.1111/bij.12625

Ratter, J. A, J. F. Ribeiro, & S. Bridgewater. 1997. The Brazilian Cerrado vegetation and threats to its biodiversity. Annals of Botany 80:223–230. https://doi.org/10.1006/anbo.1997.0469

Reis, N. R., A. L. Peracchi, W. A. Pedro, & I. P. Lima. 2011. Mamíferos do Brasil. Universidade Estadual de Londrina, Londrina, Brasil.

Renard, D., et al. 2012. Origin of mound-field landscapes: a multi-proxy approach combining contemporary vegetation, carbon stable isotopes and phytoliths. Plant and Soil 351:337–353. https://doi.org/10.1007/s11104-011-0967-8

Segura, V., & M. R. Sánchez-Villagra. 2021. Human-canid relationship in the Americas: an examination of canid biological attributes and domestication. Mammalian Biology 101:387–406. https://doi.org/10.1007/s42991-021-00129-y

Segura, V., G. H. Cassini, & F. J. Prevosti. 2021. Evolution of cranial ontogeny in South American canids (Carnivora: Canidae). Evolutionary Biology 48:170–189. https://doi.org/10.1007/s11692-020-09529-3

Soto-Werschitz, A., S. Mandujano, & M. Passamani. 2023. First record of the bush dog *Speothos venaticus* in the Atlantic Forest of Minas Gerais, Brazil. Oryx 57:673–675. https://doi.org/10.1017/S0030605323000236

Strassburg, B. B. N., et al. 2017. Moment of truth for the Cerrado hotspot. Nature Ecology and Evolution 1:13–15. https://doi.org/10.1038/s41559-017-0099

Teodoro, T. G., et al. 2018. Sarcoptic mange (*Sarcoptes scabiei*) in wild canids (*Cerdocyon thous*). Pesquisa Veterinária Brasileira 38:1444–1448. https://doi.org/10.1590/1678-5150-PVB-5700

Teribele, R., et al. 2012. New records for bush dog in Mato Grosso do Sul, Brazil. Canid News 15:1–4.

Wilson, D. E., & D. M. Reeder. 2005. Mammal species of the world: a taxonomic and geographic reference. Johns Hopkins University Press, Baltimore, Maryland, USA.

Zrzavý, J., P. Duda, J. Robovský, I. Okřinová, & V. Pavelková Řičánková. 2018. Phylogeny of the Caninae (Carnivora): combining morphology, behaviour, genes and fossils. Zoologica Scripta 47:373–389. https://doi.org/10.1111/zsc.12293

Zuercher, G. L., P. S. Gipson, & O. Carrillo. 2005. Diet and habitat associations of bush dogs *Speothos venaticus* in the Interior Atlantic Forest of eastern Paraguay. Oryx 39:86–89. https://doi.org/10.1017/S0030605305000153