

## Distribution update

### New records of bush dog in Panama

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Keywords: camera-trap, distribution, Panama, sightings, *Speothos venaticus*, wet tropical forest.

### Abstract

The detailed distribution of bush dog *Speothos venaticus* in Panama remains unclear. We present several new records across Panama resulting from camera-trapping surveys and direct observations. Camera-trap photos taken for the first time in Panama in 2012 and 2015, together with the new sightings, confirm the species' broad and continuous distribution along the Panamanian Isthmus. Our data reveal the importance of the region for bush dogs, but given the rapid depletion of forest habitat and the decline of prey species, emphasis should now be placed on developing quantitative indicators for evaluating population trends across Panama. Moreover, conservation measures based on ecological information in the tropical forest should be taken to enable the long-term persistence of the species in Panama.

### Article

The bush dog *Speothos venaticus* is a rare canid species classified as Near Threatened by the *IUCN Red List of Threatened Species* (DeMatteo et al. 2011). To date, the sparse information available on its distribution and ecology was mostly from South America (e.g. DeMatteo and Loiselle 2008, Fusco-Costa and Ingberman 2012, Oliveira 2009, Lima et al. 2012, 2015). Goldman (1920) examined three specimens from the Darién in 1912 but referred to the species as *Icticyon panamensis*. Other than Goldman (1920), reference to the species in the literature is virtually inexistent. Only DeMatteo and Loiselle (2008) briefly referred to its occurrence in Central America by reporting two confirmed sightings at the two extremes of the Isthmus of Panama, in Darién, Eastern Panama, and Chiriqui, Western Panama. However, its exact distribution across the isthmus remains unclear as reports are rare and based solely on sightings.

The two specimens in the Museum of CoZEM in Panama City are from Brazil, and reports from Costa Rica may have been equivocal (Zuercher et al. 2004, Hunter 2011). The current IUCN distribution map (DeMatteo et al. 2011) may not reflect the actual distribution of the bush dog in Panama. Thus, we review its distribution by presenting new records from direct sightings and the first camera-trap photographs taken in the isthmus. We discuss the implications of these records for the conservation of the bush dog in Panama.

Bush dogs were newly detected with camera traps in four sites all covered by wet primary forest (Figure 1 and Table 1). Digital camera-traps (Cuddeback, WI) were placed in pairs at 30-45cm above ground on trails and checked every 45 days in Pirre, Darién National Park (NP) in Eastern Panama; in Nusagandi, Guna Yala, near Central Panama; and in Donoso, Colon, a Multiple Use Protected Area, and Santa Fé NP, Veraguas, which are two sites lying on the Atlantic Coast of Western Panama

The following is the established format for referencing this article:

Meyer, N., Moreno, R., Valdes, S., Méndez-Carvajal, P., Brown, E. and Ortega, J. 2015. New records of bush dog in Panama. *Canid Biology & Conservation* 18(10): 36-40. URL: [http://www.canids.org/CBC/18/bush\\_dog\\_in\\_panama.pdf](http://www.canids.org/CBC/18/bush_dog_in_panama.pdf).

(Figure 1). All sites are relatively remote with few human settlements. In Pirre, Darién, three photographs presenting five bush dogs were taken on 20 March 2015 at 09:45h at the same station (Figure 2A); in Nusagandi a single picture with one individual bush dog was taken on 22 March 2015 at 09:50h (Figure 2B); in Donoso, Colon, bush dogs were photographed five different days at four different stations between June and December 2012, with four photographs presenting one single individual and one photograph two individuals (Figure 2C); in Santa Fé, Veraguas, two photographs for a total of three bush dogs were taken at the same station on 10 June 2015 at 06:05h (Figure 2D and Table 1).

All photographs in the four sites were taken at dawn and during day time, between 06:10h and 14:30h (Table 1), which correspond to the activity peak reported by Lima et al. (2012). Another camera-trapping study in Santa Fé NP, Veraguas, had already reported the capture of bush dog in 2009 (Donoso 2010).

**Table 1:** New records of bush dogs in Panama from camera traps and sightings

Camera trap photographs							
Site	Pirre	Nusagandi	Donoso	Santa Fé			
Province	Darién	Guna Yala	Colon	Veraguas			
Coordinates	8°01'11"N	9°34'59"N	8°96'34"N	8°55'18"N			
	77°72'25"W	78°99'62"W	80°70'55"W	81°12'18"W			
Location	Exact	Exact	Exact	Exact			
Altitude (m)	300	330	Lowland	620			
Objective	Jaguar density	Wild cats survey	Mammal abundance	Jaguar density			
Survey size	151 km <sup>2</sup>	12 km <sup>2</sup>	20 km-long trail	32 km <sup>2</sup>			
Survey date	Feb-Jun 2015	Jan-Apr 2015	Mar 2012-Sep 2013	Aug 2014 –June 2015			
# camera stations	46	10	53	15			
Total night traps	3,119	830	24,641	3,165			
Trail type	Ridge-Tourist	Ridge-Tourist	Machete	Ridge- Machete			
Photos dates	20 Mar 2015	22 Mar 2015	7 Jun;14 & 18Aug; 7 & 9 Dec 2012	10 June 2015			
# stations with photos	1	1	4	1			
# photos events	3	1	5	2			
# bush dogs	5	1	6	3			
Hour	09:44	09:50	06:10; 06:15; 07:46; 13:15; 14:28	06:05			
Sightings							
Site	Fillo del Tallo	Nusagandi	Chepo	Sierra Llorona	Soberanía	Santa Fé	Fortuna
Province	Darién	Guna Yala	Panama	Colon	Colon	Veraguas	Chiriqui
Coordinates	8°45'91"N	9°33'96"N	9°22'32"N	9°35'87"N	9°33'96"N	8° 54'52"N	8°75'56"N
	77°97'78"W	78°99'29"W	78°99'18"W	79°70'44"W	78°99'29"W	81°09'09"W	82°23'17"W
Location	Approx	Exact	Exact	Exact	Exact	Approx	Exact
Year	2000's	2004 & 2005	1985	2010	1997	2000 & 2010	1970's
Forest habitat	Moist	Wet	Moist	Wet	Moist	Wet	Wet
location	-	Road	Uni river bank	Trail	Pipeline Road	-	-
# individuals	4	3 & 6	8	2	2	1 ind. killed by hunting dogs and 5	-
Hour	-	Dusk	01:30	Morning	01:00	-	-
Source (pers. com)	A. Guevara	A. Guevara	M.Santamaria	H. Rissanen	J. Castillo	E. Toribio	R. Cook

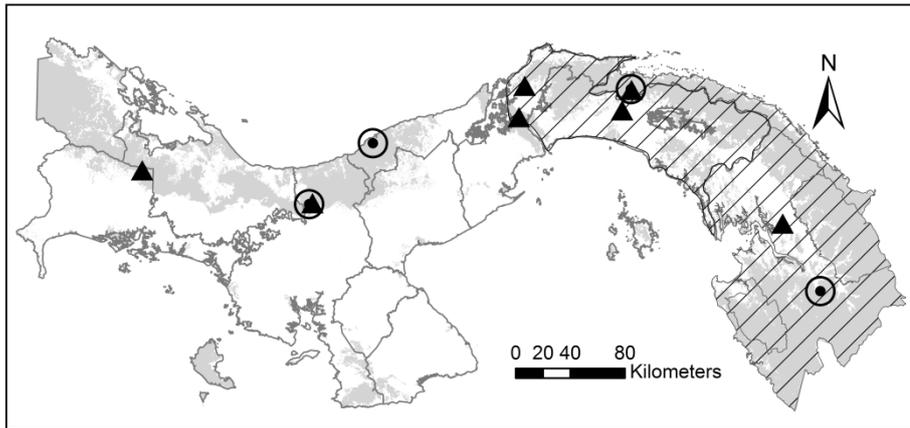


Figure 1. Map of Panama showing new records of bush dogs from direct sightings and camera-trap photographs and the species distribution. Grey shadings show areas covered by primary and secondary mature forests and hash marks indicate the historical distribution as reported by Zuercher et al. (2004); open circles with dots represent camera-traps records and triangles represent direct sightings.

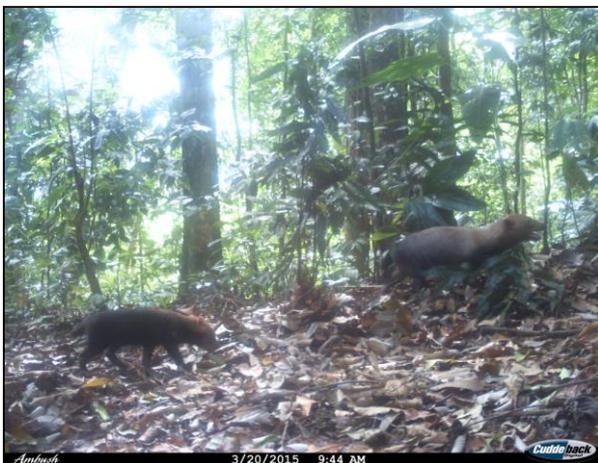


Figure 2a



Figure 2b



Figure 2c



Figure 2d

Figure 2. Bush dogs in the wet tropical forests of: (2a) Pirre, Darién, 20 March 2015 at 09:44h (Photo: GEMAS/Fondo Darién, Yaguara-Panama, SIU); (2b) Nusagandi, Guna Yala, 22 March at 9:50h (Photo: Yaguara-Panama/ Ministerio de Ambiente); (2c) Donoso, Colon, 7 December 2012 at 06:15h (Photo: MWH/MPSA); (2d) Santa Fé NP, Veraguas, 10 June 2015 at 6:20h (Photo: Yaguara-Panama/AMIPARQUE/Ministerio de Ambiente).

Sighting records suggest that bush dogs may have been present all along Panama for many years but went unnoticed. New sightings were reported in the Filo del Tallo, Darién; Chepo, Panama; Nusagandi, Guna Yala; Sierra Llorona Colon; Soberania NP, Panama; Santa Fé NP, Veraguas and Fortuna, Chiriqui (Figure 1 and Table 1). In spite of better sampling techniques and the increasing use of camera traps to survey mammals across Panama (Brown 2014; Moreno and Meyer 2014; Meyer et al. 2015; J. Giacalone and R. Moreno, unpubl. data), the capture rate of bush dog remains very low, similar to that reported across their distribution (DeMatteo et al. 2009), suggesting that they are naturally rare throughout their range (DeMatteo et al. 2011).

Unlike other carnivore species (i.e. jaguar *Panthera onca*, puma *Puma concolor* and coyote *Canis latrans*), bush dogs do not seem to be directly persecuted in Panama (Moreno et al. in press), and to our knowledge there has been no report of road kills, neither use of bush dog as pets or trade of their products. Among the threats identified are human encroachment and habitat loss (DeMatteo et al. 2011), which is particularly problematic in Panama where 15% of its forest cover has been lost between 1990 and 2010 (FAO 2010). Just 43% of the country, physically narrow - some part of the isthmus is 60km wide - remains forested (FAO 2010) and is highly subject to fragmentation. A radio tracking study of bush dogs in the Brazilian Cerrado showed that the species has a very large home range for its size -up to 709km<sup>2</sup> (Lima et al. 2015) - and relies on large tracts of native vegetation for its long-term persistence (Lima et al. 2012). Habitat fragmentation may result in a further increase of the area needed to support the species (Lima et al. 2015), which constitutes a major issue in Panama where the risk increases that habitats may no longer be large enough to maintain viable breeding population of the species. Since bush dogs were reported to occur in various types of open and covered habitats, i.e. cultivated areas, savannahs and forest (Oliveira 2009, Lima et al. 2012, 2015), they may be able to move through the Panamanian fragmented landscape, as suggested by their presence along the isthmus that does not count with continuous tracts of native habitats from one extreme of the country to the other. However, forest fragmentation and human encroachment also augment the effects of the two other principle threats identified (DeMatteo et al. 2011) which may further impede the long-term persistence of bush dogs in Panama: (i) the high hunting pressure in Panama (pers. obs. and supporting photographs) reduces the natural prey abundance (e.g. spotted paca *Cuniculus paca*) thus inducing direct competition between poachers and bush dogs (Oliveira 2009), (ii) and the risk of exposure to disease transmission by hunting dogs and other domestic animals (DeMatteo et al. 2011).

Our new records are highly valuable as they constitute evidence for a broad and continuous presence of bush dogs across Panama, as previously modelled by DeMatteo and Loiselle (2008), and confirms the important conservation role of the isthmus as a natural bridge for movement (Moreno et al. 2014). The limited amount of data does not allow us to determine reliably or compare bush dog density with other regions and other biomes, nor estimate their population size. However, the very low detection rate of bush dog despite numerous surveys undertaken across the country for ten years (Moreno 2006, Brown 2014, Moreno and Meyer 2014, Meyer et al. 2015, J. Willis unpubl. data) substantiates their rarity in the isthmus. This, added to the numerous threats they directly face that may impede movement and gene flow across the isthmus, justify their 'Endangered' status in Panama (ANAM 2008).

To date, no conservation measures exist for bush dogs in Panama apart from the prohibition of hunting. There is no captive population in Panama to educate people about the key role the species plays in the eco-

system and to foster greater awareness towards its importance. Conservation planning in the isthmus remains seriously limited by a lack of basic information, especially because their ecology, diet and space requirements may vary in different biomes. Consequently, it is relevant to collect more data in the wet tropical forests by bringing together researchers working in the different regions of Panama to identify priority areas, determine their needs and define adequate conservation strategies. Considerable emphasis should especially be placed on developing quantitative indicators to evaluate the trend of the species populations across the remaining forested areas of Panama by using alternative and effective non-invasive sampling techniques such as detection dogs (DeMatteo et al. 2009). However, given the slow rate of data collection, implementing without further delay some basic conservation actions such as enhanced forest protection will benefit the bush dogs along with other rare species they co-occur with.

## Acknowledgements

We are grateful to A. Guevara, H. Rissanen, R. Cook, M. Santamaria, E. Toribio and J. Castillo for valuable information, and J. Giacalone for sharing her data from Barro Colorado Island. We thank MWH and Minera Panama S.A. for data from Donoso; GEMAS/Fondo Darién for data from Pirre; C. Nielsen and A. Carver of SIU for their help in the Darien Project in Pirre; AMIPARQUE for data from Santa Fé; Ministerio de Ambiente for data from Santa Fé and Nusagandi; CEASPA for helping R. Moreno with equipment; A. Cornejo from the CoZEM Museum in Panama, and E. Sanchez, E. Flores, I. Cisneros and O. Shen for field assistance. We thank a reviewer for helpful comments on a previous version of this manuscript.

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## Biographical sketch

**Ninon Meyer** works on the ecology of large mammals and is now focusing on Baird's tapirs in Panama and Mexico.

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