

## Field Report

### First camera trap record of bush dogs in the Paraguayan Upper Paraná Atlantic Forest



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#### Abstract

The Upper Paraná Atlantic Forest is a biodiverse ecoregion that has seen major agricultural growth in the last 40 years, particularly in eastern Paraguay. Large tracts of forest have been transformed into crop land and the only remaining forested areas have been relegated almost exclusively to nature reserves or protected areas. Here we present a remarkable camera-trap record of bush dogs (*Speothos venaticus*) from the first systematic survey of terrestrial mammals performed within the eight private protected areas managed by ITAIPU Binacional, a hydroelectric entity administered by the governments of Paraguay and Brazil. The purpose of our ongoing study is to collect presence data on the community of medium- and large-bodied mammals in these protected areas, which constitute some of the most significant fragments of the Upper Paraná Atlantic Forest in eastern Paraguay and have previously never been surveyed using camera-traps. We recorded photos of 1-2 individual bush dogs, locally known as the “jagua yvyguy,” an elusive canid species, in the Carapã Nature Reserve in May 2018. Presence of this species in the Itaipu Area of Influence was first documented in 1979. Since then, its presence has been reported only through opportunistic sightings and never photographically. Given the high levels of deforestation and poaching the region has experienced in recent decades, this record suggests a travel corridor if not a potential population in the Carapã Nature Reserve. We hope to continue collecting data on this species through camera-traps and other methods to better inform potential management decisions and conservation strategies that will benefit the continued persistence of this regionally endangered carnivore.

#### Introduction

The bush dog, *Speothos venaticus* (Lund, 1824), locally known in Paraguay as “jagua yvyguy” (Guarani) meaning “dog under the ground,” is a small, little-known canid listed as Near Threatened by the IUCN (DeMatteo et al. 2011). Both traditional (transect monitoring) and more modern methods (e.g. camera-trapping) have been somewhat unsuccessful in detecting this species, poorly understood throughout its range (DeMatteo and Loiselle 2008, DeMatteo et al. 2011), from Costa Rica to Paraguay and northeastern Argentina (DeMatteo and Loiselle 2008, Neris et al. 2002, Carretero-Pinzón 2013, Rodríguez-Castellanos et al. 2017). Most bush dog records have been reported in tropical forest; however, there are reports from the humid savannah, the cerrado, unconfirmed reports from the Gran Chaco, and reports from altered habitat and fragmented forest in an agricultural matrix (de Oliveira et al. 2018, DeMatteo et al. 2014, Lima et al. 2012, Michalski 2010, Michalski et al. 2015, Neris et al., 2002, Zuercher and Villalba 2002).

Bush dogs are generally diurnal or crepuscular, and their unique physical characteristics—including a small, elongated body, relatively small eyes,

small rounded ears, and a short snout, tail, and legs—give them a distinctive appearance among canids (Lima et al. 2012, Beisiegel and Zuercher 2005, Busto and Perez 1998, Alderton and Tanner 1994, Sheldon 1992). They are thought to be the most social of the small Neotropical canid species (Sheldon 1992, Sillero-Zubiri et al. 2004) and have been reported alone or in groups of 4–7 or more individuals (Emmons 1999). Bush dogs have been documented to swim and dive in search of food, and they can be found near streams and seek refuge in armadillo burrows and hollow tree trunks (Guimarães et al. 2015, Strahl et al. 1992, Bates 1944), like the site in which we recorded the species.

In Paraguay, bush dogs have been described as extremely rare (Giordano et al. 2017); their confirmed distribution is limited to eastern Paraguay, although there are reports from the Paraguayan Chaco (Neris et al. 2002, Zuercher and Villalba 2002). Arguably, the largest and most well protected population of bush dogs in Paraguay occurs in the Mbaracayú Forest Nature Reserve (NR; Zuercher and Villalba 2002), the largest fragment of Atlantic Forest in the country (Yahnke et al. 1998). However, even in the Mbaracayú Forest NR there is little information about the status of the population, with

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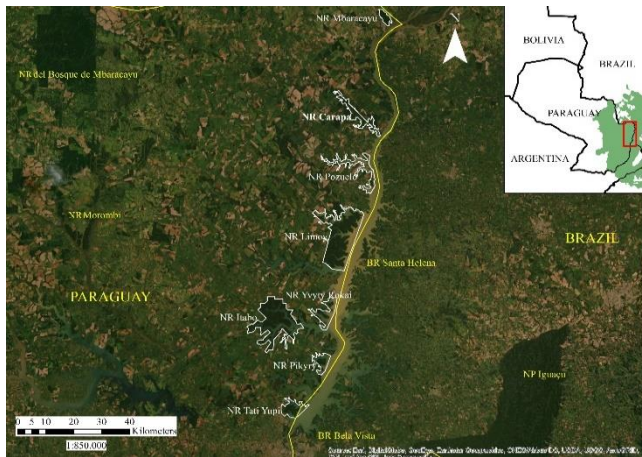


Figure 1. Protected areas managed by ITAIPU Binacional (white polygons and white labels) on the world imagery basemap (Source: Esri), showing mostly agricultural lands (reddish-brown and light green areas) with few patches of forest (dark green areas). Other nearby protected areas are labelled in yellow. Inset: Map of Paraguay, in which green shading indicates the extent of the Atlantic Forest in Paraguay, and red square indicates the area in the satellite image.

only sporadic records, the latest being a direct observation by a park ranger in 2010 (F. Ramirez, pers. comm.). Elsewhere in the country, reports have been rare or unconfirmed.

Few bush dog studies have been carried out in Paraguay. Van Humbeck and Perez (1998) made behavioural observations in captivity of five individuals captured in the headwaters of the Acaray River to facilitate captive breeding techniques at ITAIPU Binacional's Wildlife Research Center. In the Mbaracayú Forest NR in eastern Paraguay, Beccaceci (1994) reported information on their behaviour through interviews with the Ache people, Zuercher et al. (2005) studied their diet and habitat use, and DeMatteo et al. (2004) studied methods to attract bush dogs for research purposes. Considering that only 9% of the Upper Paraná Atlantic Forest is still standing in Paraguay (Da Ponte et al. 2017) and bush dogs have been so understudied, new local records of the species are needed to better understand their current status.

## Results

The record we describe here was made in Carapá NR during a survey of the medium- and large-bodied mammal communities in the eight nature reserves managed by ITAIPU Binacional in Paraguay (Figure 1). An objective of this study was to provide information applicable to management decisions and practices for these reserves, the first such information ever collected systematically.

Table 1. Distances (in km) from the edge of Carapá Nature Reserve and the centre of Carapá Nature Reserve to other important protected areas in the region. Abbreviations are as follows: IB = operated by ITAIPU Binacional, Paraguay; PY = in Paraguay; and BR = in Brazil.

Protected Area	Distance to the edge of Carapá NR	Distance to the centre of Carapá NR
Pozuelo Nature Reserve (IB, PY)	10	27
Limoy Nature Reserve (IB, PY)	30	47
Mbaracayú Biological Reserve (IB, PY)	33	37
Ilha Grande National Park (BR)	39	85
Santa Helena Biological Refuge (IB, BR)	40	52
Itabo Nature Reserve (IB, PY)	74	81
Morombi Nature Reserve (PY)	84	88
Mbaracayú Forest Nature Reserve (PY)	85	102
Iguacu National Park (BR)	93	120

This ongoing 20-month study began in January 2018 and employs camera traps (Bushnell Trophy Cam, Model 603691, Overland Park, Kansas, United States) across 505 sites (47 or 9.3% of which are located in Carapá NR) distributed proportionally in the different vegetation types in the reserves to their relative cover. Camera traps were placed 50 cm off the ground, and placement was random, relative to the presence of animal trails and other habitat features. No bait was used. Each of the 505 sites has been or will be sampled for 21 days. By July 2019, 49% (483 trap nights) of the sites in Carapá NR and 52% (5,502 trap nights) of the total sampling sites were sampled, with bush dogs recorded in a single event.

On 29 May 2018, we recorded two camera trap photos of individual bush dogs 11 seconds apart at 10:02h (Figure 2) in a densely wooded area with a thick understory of lianas, grasses, and tree seedlings ( $-54.39^\circ$ ,  $-24.37^\circ$ )—habitat typical of the region. We suspect that these photos represent two individuals, but lack of photo clarity prevents confirmation. The Carapá NR is a 4,382 ha (3,277 ha land and 1,105 ha water) protected area in the Department of Canindeyú (Figure 3). The eight ITAIPU NRs in Paraguay encompass a total of 63,000 ha and are connected by an approximately 200-meter-wide strip of forest (Figure 3C) that runs along the Itaipu Reservoir, protecting the reservoir from erosion and connecting the NRs. Therefore, while small and somewhat isolated in a matrix of farmland, Carapá NR is connected to a total of 87,000 ha of forest and other forms of potential habitat. Distances measured in a straight line to other significant forest remnants or protected areas range from 10–93 km (Table 1).

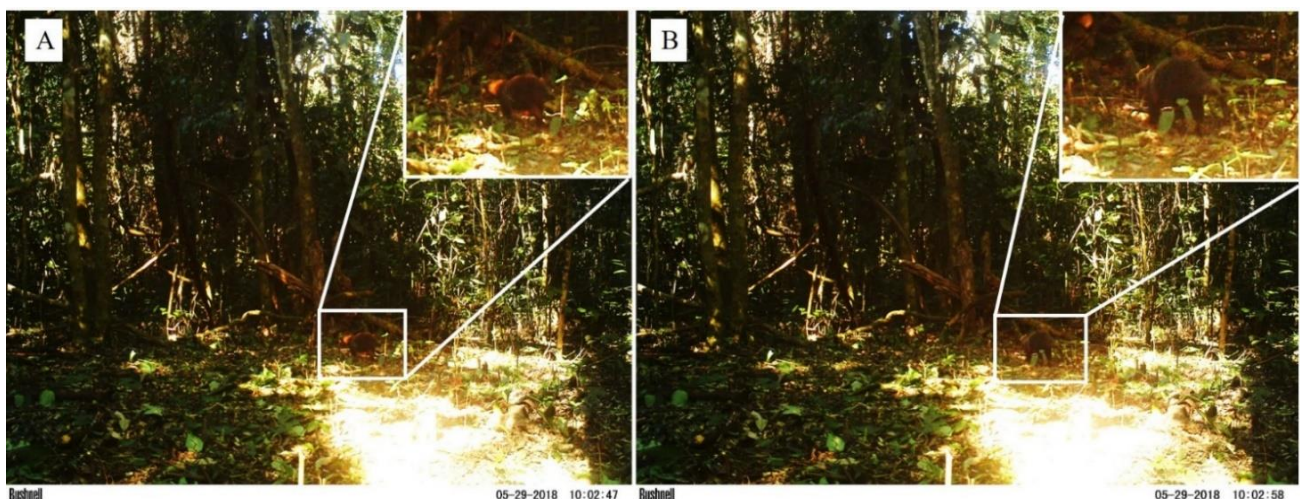


Figure 2. First and second camera trap photos of bush dog(s) in the Carapá Nature Reserve on 29 May 2018 A) at 10:02:47 h and B) at 10:02:58 h, with closeups in the insets.

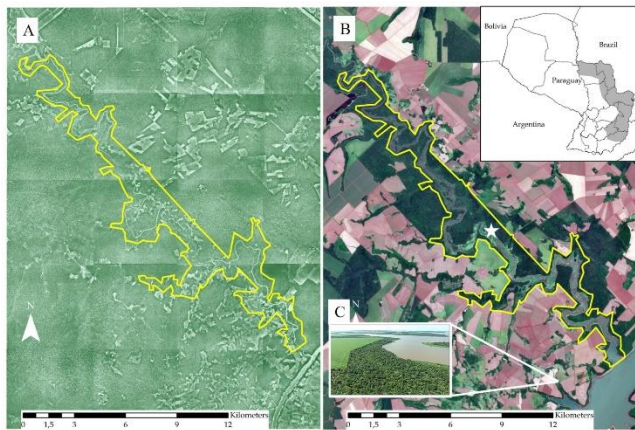


Figure 3. A) Orthophotos of Carapã Nature Reserve and its surroundings in 1979, showing mostly forested areas (green) with few patches of agriculture or cattle ranching areas (white). B) Map of Carapã Nature Reserve and the location of the bush dog record (star) in a Sentinel 2A satellite image (Composition RGB 432) in 2019, showing mostly agricultural lands (reddish-brown areas) with few patches of forest (dark green areas). C) Part of the forested reservoir protection strip along the Paraná River on the Itaipu Reservoir; the entire strip is approximately 1,524 km long and 200 m wide from Hernandarias north to Salto del Guairá in Paraguay. Photo credit: Itaipu Division of Environmental Action – Reforestation Sector. Inset: Map of Paraguay, in which shading indicates distribution of bush dogs in the country (Asociación Paraguaya de Mastozoología y Secretaría del Ambiente, 2017); location of Carapã indicated by black arrow.

The camera trap was located ~200 m from the bank of the Carapã River in a Restricted Use Zone (RUZ). RUZs are areas designated by the Carapã NR's management plan as having access restricted to only managers and scientists, and they are considered areas where historical and current human impact is minimal (ITAIPU Binacional 2016). Carapã NR is long and narrow, flanking the two banks of the Carapã River at the mouth of the Paraná River and the Itaipu Reservoir (Figure 3). Wetlands and streams surround the Carapã River, as well as higher areas with steeper terrain, shallow soils, and rocky outcrops with gallery forest. Carapã NR was officially created in 2008 (Itaipu Binacional Directory Resolution No. 183/2008) and recognized by the Paraguayan government in 2017 (Paraguayan Government Presidential Decree No. 447) but has been protected by ITAIPU Binacional since 1979, as an area of "permanent conservation of forests and other forms of natural vegetation" (Paraguayan Law No. 752/79).

## Discussion

Other historical and more recent records of bush dogs in other parts of the Itaipu Reservoir Basin, including protected areas, lack photographic confirmation. The oldest records of bush dogs include one on the banks of the Pozuelo River in 1979 (van Humbeck and Pérez 1998) before the agricultural boom in Paraguay and the creation of the Reservoir through damming. Decades later, a sighting was recorded in 2001 in Itabo NR (H. del Castillo, A. Bodrati and H. Casañas pers. comm.). More recently, an individual was observed in Limoy NR in 2017 by an ITAIPU Binacional research staff member (A. Carosini pers. comm.). It is noteworthy that among the sites this study has sampled to date—including 66 sites in Itabo NR and 65 in Limoy NR, the two largest ITAIPU Binacional NRs—the species has yet to be recorded. Our record represents the first photographic confirmation of the species in any of the Itaipu NRs and, to our knowledge, the first for the region along the Paraná River.

This record supports the idea that a population of bush dogs occurs or recently occurred in the region. Furthermore, despite Carapã NR's small size, rocky soil, elongated and narrow shape, and partial isolation from other forest stands for the past 40 years, it continues to be dispersal habitat, if not home to a resident population of bush dogs. While further records have not been made in the seven other Itaipu NRs, it is possible that bush dogs can move between the NRs by way of the reservoir protection strip or even the matrix of farmland (Figures 1 and 3C, Table 1), as documented by other researchers (DeMatteo et al. 2014, Michalski, F. 2010). Further research and

continued surveys will shed more light on the potential importance of the reserves to the persistence of bush dog populations in the region.

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