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Research Report

Using a survey of carnivore conservationists to gain new insight into the ecology and conservation status of the bush dog

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Abstract

The lack of knowledge of the basic ecological requirements of the bush dog *Speothos venaticus* has made developing conservation strategies for this small, social, neotropical canid extremely difficult. While there have been a few field studies of the bush dog, the majority of information about the species' ecology is based on opportunistic field observations. The value of these observations, a type of indirect knowledge, was the basis for developing the *Speothos venaticus* Status and Distribution Survey. The goal of the Survey, sent to people working in the area of carnivore conservation, was to increase our knowledge of the bush dog's basic ecology, its abundance and status, public and governmental attitudes towards the species, and to identify species-specific conservation efforts. A broad prey base, varied habitat use, and reproductive flexibility indicate complexity in the bush dog's ecology. Unfortunately, gaining insight into the species' abundance and status continues to be one of the most difficult challenges of working with this rare and elusive canid. Disease and poaching of prey species may have devastating effects on bush dog populations due to the species' group living and association with partially fragmented or fragmented habitat. Despite the lack of human-bush dog conflict, largely indifferent public attitudes, and the high value the government places on bush dog conservation, bush dogs continue to be threatened by the destruction of their habitat and the lack of enforcement of protection laws. Improved legal protection, combined with public education campaigns and additional field data, may allow for the long-term survival of the bush dog.

Introduction

The bush dog, listed as Near Threatened by the IUCN (Zuercher et al. 2008) and listed in CITES Appendix I, is a small, social canid from Central and South America (Figure 1) whose distribution, status, and ecological requirements are poorly understood (Eisenberg 1989; Redford and Eisenberg 1992; Silveira et

al. 1998; Eisenberg and Redford 1999; Zuercher et al. 2004). Most of what is known about the morphologically (Berta 1984; Langguth 1975) and genetically (Wayne et al. 1997) distinct bush dog has been gained through captive behavioural studies (e.g., Biben 1982; Brady 1981; Jantschke 1973; Kleiman 1972; Porton 1983; Porton et al. 1987; DeMatteo et al. 2006). With the exception of a few field studies that have been able to study the bush dog directly (radio-collared animals - E. Lima/ K. DeMatteo, pers. comm.) or indirectly (using scats for diet analysis – Zuercher et al. 2005; GIS analysis of historical locations – DeMatteo and Loiselle 2008; scat detection dogs – K.DeMatteo, pers. comm.), opportunistic sightings form the basis for the limited and sometimes confusing information available for the bush dog in the wild. These data include various sightings of bush dogs alone, in pairs, or groups ranging from several individuals to a couple dozen during day and night, in both open grasslands and dense forest (e.g., Defler 1986; Strahl et al. 1992; Beccaceci 1994; Silveira et al. 1998).

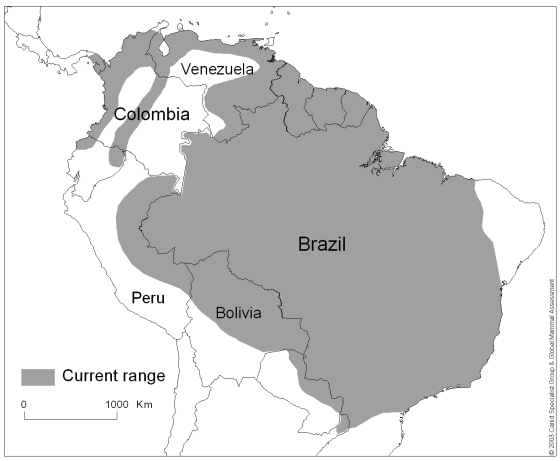

Figure 1. Distribution of *Speothos* indicated by shaded areas (2003 Canid Specialist Group and Global Mammal Assessment) (Zuercher et al. 2004).

The indirect knowledge from opportunistic observations was the basis for developing the *Speothos venaticus* Status and Distribution Survey. The survey was sent to people working in the area of carnivore conservation, especially throughout the bush dog's historical distribution (Figure 1). Four goals were associated with this data collection effort: (1) increase our knowledge of the bush dog's basic ecology, (2) gain insight into species' abundance and status, (3) evaluate public perception, governmental attitude, and legal protection for the bush dog, and (4) determine if conservation efforts are being directed at bush dogs.

Methods

In January 2003, the *Speothos venaticus* Status and Distribution Survey was developed with one of its aims directed at learning more about the ecology and conservation status of the bush dog, specifically: local names, basic ecology (i.e. habitat, diet, reproduction, mortality, disease, competition), species' abundance and status, potential human conflicts (e.g. livestock losses), public perception, governmental attitude and legal protection, past and future field studies, and identifying proposed or needed conservation measures. In order to maximize the number of people that could directly respond to the Survey, it was made available in English, Spanish, and Portuguese. The Survey was sent to more than 100 people working in the area of carnivore conservation (e.g. field researchers, non-government organisations, government organizations, conservation organisation, museums, universities) and posted on the IUCN CSG website (www.canids.org). The Survey was sent to individuals in the 12 Central and South America countries that include part of the bush dog's historical distribution (Argentina [AR], Bolivia [BO], Brazil [BR], Colombia [CO], Ecuador [EC], French Guiana [FG], Guyana [GY], Panama [PA], Paraguay [PY], Peru [PE], Suriname [SR], and Venezuela [VE]), as well as to various contacts in the USA and Europe.

Results

Survey response – Of the 138 surveys distributed, 35 (25%) were returned. Twenty-one surveys from ten countries (4 AR, 2 BO, 7 BR, 1 EC, 2 FG, 1 GY, 1 PA, 1 PY, 1 PE, and 1 VE) provided valuable information on the ecology and conservation status of the bush dogs.

Local names for Speothos – A total of 35 names in 20 different languages were reported (Table 1). Sixty-six percent of these names (n = 23) were not previously published (Zuercher et al. 2004).

Table 1. List of 35 local *Speothos* names in 20 different languages from 10 countries (in parenthesis) where * indicates previously unreported names.

Aché: Mbetapa (Paraguay)
Ayoreo: Tamocoquenai-Tamoquena * (Bolivia)
Barí: You'raba * (Venezuela)
Chiquitano: Tamokoxi-eañaki-niunxi * (Bolivia)
English: Bush dog (Guyana)
Guarani: Yaguá-tuí-neé *, Yaguá-güí-güí * (Argentina); Aguara Chutu * (Bolivia); Jagua Yvygüy, Juagua turu ñe'e * (Paraguay)
Guarayo: Cavécapipedar * (Bolivia)
Guyanais/Guyana: Chien bois * (French Guiana)
Machiguenga: Ochitiniro * (Peru)
Mojeño: Zorrino * (Bolivia)
More: Quinámco Umi * (Bolivia)
Mosetén: Achúj därätjanshí * (Bolivia)
Pemón: Yai * (Venezuela)
Portuguese: Cachorrinho *, Cachorro-pitoco, Cachorro-vinagre *, Cachorro do mato, Cachorro-do-mato-cotó, Cachorro do-mato-vinagre (Brazil); Cachorro-do-mato-na região nordeste * (Maranhão, Brazil)
Sirionó: Nyakua retä * (Bolivia)
Spanish: Perro grullero * (Venezuela); Perrito de monte (Bolivia/Peru); Perro de monte (Bolivia/ Ecuador/ Panama/Venezuela); Perro vinagre, Zorro pitoco, Zorro vinagre (Argentina)
Tacana: Uchi Ejije-Ejije Uchi * (Bolivia)
Tsimane: Achuj ovec * (Bolivia)
Yaminahua: Tsoblkoro * (Peru)
Yuracaré: Pirriju * (Bolivia)

Habitat – Bush dogs were reported associated with a variety of forested habitats: Paranense (AR), interior Atlantic (Misiones AR and PY), undisturbed (Misiones AR and VE), Beni alluvial plain (BO), gallery riparian (BR), gallery (BR and FG), Amazonian with firm ground and a closed canopy (BR), evergreen or more open forests (FG), upland moist forest (FG), mixed forest on brown sands (GY), rainforest ≤800m (PE), humid/wet forest and semi-deciduous (VE). Only three countries reported bush dogs as associated with grasslands: Beni grasslands with nearest forest 1km away (BO), grasslands near forest (range: 200 to 5700m away) (BR), and savannas (PY). There were only two reports of bush dogs relative to ranchlands: <800m (BR) and <5km (PY). The latter referred to a location near a farmhouse that cultivates soybean in the middle of a reserve. While a number of bush dog locations were either associated with water (AR, PE, and VE) or within 2km of water (AR, BO, EC, FG), there were also a number of sightings that reported varied distances with water, i.e. 50m to 500m (BR, EC, FG, GY, and PY).

Diet – A variety of small and medium prey species were reported for bush dogs: paca (*Agouti paca*; BO, BR, FG, and VE), agouti (*Dasyprocta azarae*; EC and VE), red acouchi (*Myoprocta* sp.; EC), nine-banded armadillo (*Dasypus novemcinctus*; BR), small mammals (VE), and small aquatic invertebrates and vertebrates (PE).

Reproduction – Seven countries in South America (AR, BR, FG, GY, PY, PE, and VE) reported 13 sightings of infants, juveniles, and subadults. A summary of the dates of sightings of infants, juveniles, and subadults permitted estimates of age and date of birth. There was no evidence of reproductive seasonality, suggesting that bush dogs are aseasonal (DeMatteo et al. 2006). The estimated birth dates were divided into four groups based on latitude, from South to North: October to April (24-26°S; n = 5; Argentina and Paraguay), February/March to May (15°53'S; n = 2; Brazil); May to September/October (4°30'S-4°42'S; n=3; Peru); and September to September/October (2°55'N-6°20'N; n= 3; French Guiana, Guyana, and Venezuela) (DeMatteo et al. 2006). While six countries reported that litter size was unknown (BO, EC, GY, PN, PY, and PE), three countries reported two pups (BR, FG, and VE). In Misiones AR, actual litter size was unknown but a group of approximately ten individuals was reported.

Abundance and status – Population abundance estimates for bush dogs in a specific region or country were unknown, with the exception of four reports: <100 bush dogs in Misiones AR, >1,000 bush dogs in BO, >1,000 – or one bush dog/4km^2 in 4,022km^2 – in Cusco PE within the Camisea River region, and a note that the population to the north of the Orinoco River in VE is considered to be more depressed than populations located to the south of the river. Only two countries (GY and PE) reported bush dogs as a common species with the latter based on the previously mentioned study where natives reported that they do not con-

sider the bush dog an unusual species; however, eight countries reported bush dog status as rare or unknown (rare: EC; rare or unknown: AR, BO, BR, FG, and PY; unknown: PA and VE;). The lack of surveys and field studies and the fact the species is known to be notoriously difficult to observe in the wild are associated with a general void in knowledge of the species and their status in the wild. When this lack of knowledge is combined with loss of suitable habitat (e.g. progressive fragmentation, increasing urbanisation, expanding agriculture), defined population trends for bush dogs are unclear: in two countries' the trend is unknown (GY and PA), in three unknown but suspected declining (AR, BO, and BR), in two declining (PY and VE), in one unknown or stable (FG), and in two stable (EC and PE). The latter reports with stable population trends refer to the eastern or Amazonia region of EC (e.g. Napo, Pastaza, and Sucumbíos) and the specific study area in Cusco PE.

Mortality, disease, and competition – Two countries reported information on *Speothos* mortality: AR reported that potential causes include poachers and loss of habitat and BR reported vehicles, although the overall impact of all three on the population was unknown. Three countries noted potential diseases affecting bush dogs: skin problems (e.g. scabies/ *Desmodex* sp.; AR, BR, PE), rabies (BR and PE), canine distemper (PE), and other canine diseases (PE). Six countries reported the main competitors of bush dogs included species belonging to Felidae (i.e. ocelot *Leopardus pardalis*, tirika *Leopardus wiedii*, puma *Puma concolor*, jaguar *Panthera onca*; AR, BO, EC, and VE), Mustelidae (AR), Procyonidae (crab-eating raccoon *Procyon cancrivorus*; AR), Canidae (i.e. short-eared dog *Atelocynus microtis,* crab-eating fox *Cerdocyon thous*; BO, BR, and PE), Didelphidae (common opossum *Didelphis marsupialis*; PE), and Dinomyidae (pacarana *Dinomys branickii*; PE).

Public perception, governmental attitude, and legal protection – In eight countries (AR, BO, BR, EC, FG, GY, PE, and VE) the local attitude was reported as indifferent due to the fact that people rarely or never see bush dogs in the wild and lack knowledge about the species; however, this indifference was replaced with a positive attitude when people see bush dogs in a zoo or photo (BE and PY). The indifferent attitude is likely associated with no reported problems of bush dogs predating livestock in five countries (AR, FG, GY, PY, and VE) and limited poultry losses in three (BO, BR, and EC). In fact, BR noted there are more problem interactions between bush dogs and domestic dogs than with livestock. Six countries (BO, BR, EC, FG, GY, and PY) reported bush dogs were not shot, poisoned or trapped; however, bush dogs have been shot in four countries (AR, PA, PE, and VE) and trapped in two (PA and PE). In PE, these occurrences were linked with natives reporting they will eat bush dogs if snared or if they have the rare opportunity to collect them with traditional hunting; however, VE reported shootings were associated with the occasional trophy collection for its rarity.

Fortunately, this indifferent attitude is not reflected in the government's attitude towards bush dogs. Instead, bush dogs are considered a valuable asset (AR, BO, BR, EC, FG, GY, PY, and VE) with no bounties offered (AR, BO, BR, EC, FG, GY, PA, PE, PY, and VE). Eight countries (AR, BO, BR, EC, FG, GY, PY, and VE) have stood behind this belief by enacting laws, in addition to the legal protection afforded by its CITES Appendix I listing, forbidding hunting, trapping, and capturing bush dogs. However, there are instances when protection is waived as in the case of hunting and trapping exemptions to natives (PE). Despite official government policies and laws protecting bush dogs, there is a widespread problem of lack of enforcement of these laws. In contrast to VE that reported protection throughout the national territory, the level of legal enforcement is considered unknown (AR, FG, and PE) or poor (BO, BR, EC, GY, PA, and PY) due to a deficiency in personnel, especially in areas far from urban centers and outside of protected areas.

Field studies and conservation measures – A lack of field studies was reported in four countries (EC, FG, GY, and PA). A variety of short-term projects directly and indirectly linked to the bush dog were reported in six others: a preliminary survey of fauna (AR), questionnaires and interviews with indigenous people on the bush dog's distribution and relative abundance (BO 2000-2001), opportunistic studies and mammal surveys (BR), rapid ecological assessments to determine species' presence or absence (PY 1990 and 2002), genetic surveys using scat to determine carnivore assemblages

(PY 1999 and 2000), tracking stations and playback recordings (PY 2000 and 2001), a large mammal assessment that used surveys, observations, and comparison of life histories (PE 1997 and 1998), and studies recording presence and distribution (VE). Only BR reported specifics for future studies that include carnivore community ecology studies in the states of Goiás, Mato Grosso, and Mato Grosso do Sul, determining population status of medium- and large-bodied mammals in Minas Gerais, and opportunistic studies in unspecific locations; however, respondents noted that there is a wide spread need for species-specific studies on basic ecological requirements and habitat use, public education campaigns about conserving the bush dog and its habitat, and government action to stop the destruction of natural resources and increase the level of protection afforded to it. Only AR reported that specific conservation plans are in place for the development of a new protected area.

Discussion

Speothos ecology – Results of the survey suggest the bush dog's ecology is variable and complex. The reported variety of prey consumed and habitats used by the bush dog echo the broad ecological requirements reported in literature (e.g., Deutsch 1983; Aquino and Puertas 1997; Beisiegel 1999; Silveira et al. 1998; Zuercher et al. 2005; DeMatteo and Loiselle 2008) and contrast with those of the other nine South American canids which were omnivorous and found in only one to two habitat types (Eisenberg 1989; Redford and Eisenberg 1992; Eisenberg and Redford 1999). Understanding how the bush dog's prey selection varies with habitat type and group size may allow additional insight into the female's flexible reproductive cycle. That is, aseasonal births or the lack of a single rigid breeding season each year may be associated with the bush dog's high sociality, cooperative hunting strategy, and broad prey base that allows for it to secure sufficient food through the year despite seasonal variations in prey availability (DeMatteo et al. 2006). In addition, understanding how individuals or groups of bush dogs are using different habitat types and how these differences affect the species' basic ecological requirements, such as home range size, are important factors in developing conservation strategies for the species. This is especially true since a recent analysis of >250 historic bush dog locations determined that almost one-quarter (20%) were associated with fragmented or altered habitat (DeMatteo and Loiselle 2008).

Abundance and status – While bush dogs are reported as widely distributed in Central and South America, historically they have always been reported as rare, independent of human disturbance. It is unknown if this low sighting frequency is associated with bush dogs truly being rare or just rarely seen due to behavioural avoidance of humans. The limited abundance estimates reported in the Survey combined with the unclear trend of declining or stable populations demonstrate that gaining insight into these basic population parameters continues to be one of the most difficult aspects of this rare and elusive canid. Focusing studies in areas where bush dogs are reported as more common or where there are higher population estimates might allow researchers to gain insight into variables that positively and negatively affect bush dogs; however, the number and distribution of these areas are limited. Where there are gaps in knowledge or knowledge is limited, ecological niche modelling can be used to focus research efforts and direct conservation actions (DeMatteo and Loiselle 2008).

Mortality, disease, and competition – Understanding what factors might be resulting in declines of bush dog populations is important given their apparent rarity throughout their distribution and suspected population declines. While it is not surprising that habitat loss is a potential cause of bush dog mortality, vehicles and poachers have not been considered. Poachers typically focus on killing the bush dog's prey species (e.g. paca, agouti, armadillo) and not the bush dog itself; however, these actions can indirectly and directly effect bush dogs. First, poaching can have an indirect effect on bush dog populations by causing declines in abundance of prey species. The impact of reduced food abundance may be compounded by the large number of reported potential competitors to bush dogs for the same prey species. Second, poaching can have a direct effect by resulting in the death of individuals or groups of bush dogs (K.DeMatteo, pers. obs.). Poachers typically use domestic dogs to flush out species that den under-

ground. Because bush dogs will reuse these underground dens, hunting dogs may mistakenly enter a burrow with bush dogs and a deadly dog fight will inevitably ensue.

Feral and hunting dogs enter into protected areas, are typically unvaccinated, and are not treated for a variety of parasites, adding disease as another potential cause of mortality for bush dogs. The risk of exposure risk is high because bush dogs are associated with unprotected, fragmented, and altered habitat, such as ranchlands (DeMatteo and Loiselle 2008). This risk is further compounded by the fact that the bush dogs is thought to be a highly social species that lives in extended family groups (Kleiman 1972; Macdonald 1996) and hunts in packs (Bridges 1954) so exposure of a single individual can result in the death of entire group. It is important to gain a better understanding of what this risk is and how these risks can be minimized through surveys of both wild and domestic canids and vaccination programs in edge areas.

Public perception, governmental attitude, and legal protection – Fortunately, the public appears to have little or no negative attitudes towards bush dogs and the government considers the species an asset. The laws preventing the hunting, trapping, and capturing of bush dogs and the few reports of violations is likely associated with the lack of human-bush dog interactions, such as livestock or poultry losses. This lack of interactions is probably the source of the public's indifferent attitude towards the species. While this attitude has many beneficial aspects, it is also can have a negative effect because people are unaware of how their actions can have potentially devastating effects on the species. For example, the use of hunting dogs in areas where bush dogs exist can result in their death through direct (i.e. entering into a den) or indirect (i.e. parasite or pathogen introduction) interactions. As the Survey noted, education programs may be the key in changing attitudes from indifferent to positive.

While bush dogs are not directly associated with poaching pressure or human-wildlife conflicts and there are numerous national and international laws that protect hem, there is a widespread problem with enforcement of all laws related to flora and fauna. Therefore, while bush dogs may not be targeted, their habitat and prey items are. Increasing the level of legal enforcement, especially in areas far from urbanization and outside of protected areas is critically needed for the species' long-term survival.

Field studies and conservation measures – One of the largest problems facing conservation efforts for bush dogs is lack of definitive information from the field. The Survey was able to confirm that a few studies have attempted to determine presence/absence of the species and how it fits within the larger carnivore community and a few additional projects are planned. Additional data from the field, preserving/protecting natural resources, and expanded public education campaigns are all tightly linked to developing a long-term conservation strategy for the bush dog.

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Karen DeMatteo's research is focused on gaining an understanding of the basic biology and ecological interactions that occur at both the species and community level. Her research has focused on neotropical carnivores, with a special interest in the rare and elusive bush dog.