

called seguros, with different purposes. Some shamans use also the Sechuran fox's fat for the treatment of bronchial illness and stomach disorders (D. Cossíos unpubl.).

Occurrence in protected areas

- *Ecuador*: Parque Nacional Machalilla, Manabí; Reserva Ecológica Manglares Churute, Guayas.
- *Perú*: Zona Reservada de Tumbes, Tumbes; Parque Nacional Cerros de Amotape, Tumbes; Coto de Caza el Angolo, Piura; Coto de Caza Sunchubamba, Cajamarca; Santuario Histórico Bosque de Pomac, Lambayeque; Zona Reservada Algarrobal el Moro, Lambayeque; Zona Reservada de Laquipampa, Lambayeque; Reserva Nacional de Calipuy, Ancash; Reserva Nacional de Lachay, Lima.

Protection status CITES – not listed.

Current legal protection Between 1975 and 2000, a governmental authorisation was required to hunt the species in Peru. Since 2000, hunting outside the established areas and trade of the species has been prohibited. The police and the Ministry of Agriculture are responsible for the control of illegal trade. However, it has proven especially difficult to control trade in rural areas and in some cities. Currently, there are no international treaties or conventions regarding this species.

Conservation measures taken The Sechuran fox was not traditionally protected, for cultural reasons, until recently. Now it is protected in Santa Catalina de Chongoyape, a rural community of Lambayeque department, because they are considered important for tourism and as seed dispersers (D. Cossíos unpubl.).

Occurrence in captivity

Some specimens are kept in the following authorised collections: Parque de las Leyendas Zoo, Lima (26 specimens) and Atocongo Zoo, Lima (3 specimens).

Current or planned research projects

E. Vivar (Museum of Natural History, U.N.M.S.M, Lima, Peru) is currently conducting research on the taxonomy and distribution of the Sechuran fox.

Investigations of its relationship with humans, its role in seed dispersal and its diet in Peru are being conducted by D. Cossíos (Instituto Nacional de Recursos Naturales – INRENA, Peru).

Core literature

Asa and Wallace 1990; Birdseye 1956; Cabrera 1931; Huey 1969; Langguth 1975.

Reviewers: Elena Vivar, Michael P. Wallace. **Editors:** Michael Hoffmann, Claudio Sillero-Zubiri.

3.9 Hoary fox
Pseudalopex vetulus (Lund, 1842)
Data Deficient (2004)

J. Dalponte and O. Courtenay

Other names

English: hoary zorro, small-toothed dog; **French:** renard du Brésil; **German:** Brasilianischer, kampffuchs; **Portuguese:** raposa-do-campo, raposinha (Brazil); **Spanish:** zorro de campo común; **Indigenous names:** Tupy: jaguarapitanga; Xavante: waptsã wa (Brazil).

Taxonomy

Canis vetulus Lund, 1842. K. Dansk. Vid. Selsk. Naturv. Math. Afhandl., 9:4. Type locality: Lagoa Santa, Minas Gerais [Brazil] (Cabrera 1958).

Burmeister (1854) created the genus *Lycalopex* for the hoary fox. Osgood (1934) reduced *Lycalopex* to a subgenus of *Dusicyon*, followed by Simpson (1945), Cabrera (1958) and Clutton-Brock *et al.* (1976). Langguth (1969, 1975) placed the species in *Lycalopex*, and Van Gelder (1978) included it in *Canis* (*Lycalopex*). Berta (1987) placed the species in *Pseudalopex* and was followed by Wozencraft (1993).

Chromosome number: 2n= 37 (Wurster-Hill and Benirschke 1968).

Description

The hoary fox is a slender animal with a relatively short, pointed muzzle, and large ears (Table 3.9.1). Pelage colour is variable: the upper body regions are pale grey, whereas the underparts are generally buff yellow to chestnut including the neck, chest and patch behind the ears. The anterior part of the neck is buff white, but the underside of

Table 3.9.1. Combined body measurements for the hoary fox from Pirapora (Minas Gerais), Franca (São Paulo) (Vieira 1946); Chapada dos Guimarães (Mato Grosso) (Thomas 1903); São Miguel (Minas Gerais) (Courtenay unpubl.); Nova Xavantina, Cuiabá, Chapada dos Guimarães (Mato Grosso), Arinos (Minas Gerais) (J. Dalponte unpubl.); Planaltina (Distrito Federal), São Miguel (Minas Gerais) (J. Marinho-Filho pers. comm.)

HB male	587mm (490–715) n=13
HB female	575mm (510–660) n=6
T male	338mm (270–380) n=13
T female	282mm (250–310) n=5
HF male	129mm (120–135) n=11
HF female	129mm (127–130) n=3
E male	69mm (60–76) n=10
E female	67mm (60–75) n=3
WT male	3.3kg (2.5–4) n=8
WT female	3.4kg (3.0–3.6) n=3



Hoary fox, age and sex unknown. São Paulo State, Brazil, 2003.

Adriano Gambarini

the lower jaw is dark, almost black, as is both the tail base and tail tip; a dark spot on dorsal surface of tail base variably present. Near melanic forms have been described (Cabrera 1931; Vieira 1946; Cabrera and Yepes 1960; J. Dalponte pers. obs.). Dental formula is $3/3-1/1-4/4-2/3=42$.

Subspecies Monotypic (Stains 1975).

Similar species Crab-eating fox (*Cerdocyon thous*): sympatric throughout the geographical range of the hoary fox; more robust, larger (4.5–8.5kg), and has coarse bristly pelage; colour variation is substantial within and between populations, ranging from dark grey/black (e.g., Amazonia, central Brazil) to grey/yellow rufous (e.g., Ceará, north-east Brazil), with or without a dark dorsal line along the body to tail tip (specimens of the lighter colour type could be confused with the hoary fox); footpad (and footprint) differentiation of the two species is possible by the experienced field worker (Becker and Dalponte 1991). Pampas fox (*P. gymnocercus*): possibly sympatric with the hoary fox in southern São Paulo state; more robust and larger (4–6kg); pelage colour and body proportions are similar. Sechuran fox (*P. sechurae*): not sympatric, occurring in north-west Peru and south-west Ecuador; similar size (4–5kg), and pelage colour, but lacks the dark stripe along the dorsal line of the tail.

Current distribution

The hoary fox is confined to Brazil (Figure 3.9.1), associated with the cerrado habitats (mosaic of grasslands and xerophytic vegetation) of the central Brazilian plateau, and peripheral transitional zones including dry open habitats of the Pantanal (Mato Grosso state). Confirmed in the

states of Minas Gerais, São Paulo, Mato Grosso do Sul, Mato Grosso, Tocantins and Goiás (J. Dalponte unpubl.), southern and western Bahia (Juarez and Marinho-Filho 2002; J. Dalponte pers. obs.), and western Piauí in Parque Nacional Serra da Capivara (F. Olmos pers. comm.). Capture records of an extant specimen held in Teresina Zoological Park indicate its northerly geographical limit is probably in north Piauí (Costa and Courtenay 2003). A previous report of its occurrence in Ceará (north-east Brazil) (Deane 1956) was contested by Courtenay *et al.* (1996). Records along the Brazil-Bolivian border in Mato Grosso (Anderson 1997) are unsubstantiated; the nearest record is 70km to the south in the Pantanal (Mato Grosso do Sul) (J. Dalponte unpubl.).

Figure 3.9.1. Current distribution of the hoary fox.



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Historical distribution A single fossil record exists from Vila de Lujan, Província de Buenos Aires, Argentina, dating back to the Lujanian period, late Pleistocene (Berta 1987). In Brazil, fossil records are those of Lund's expeditions in Lagoa Santa caves, Minas Gerais, south-east Brazil (Lund 1842).

Range countries Brazil (Cabrera 1958).

Relative abundance

There are no reliable data available. Locally abundant in the central highland cerrado biome, but populations appear smaller than those of the sympatric Crab-eating fox for which population estimates are similarly lacking.

Habitat

Occurs in open cerrado habitats, but readily adapts to insect-rich livestock pastures and areas of agriculture (soybean, rice, corn, eucalyptus plantation). Rarely observed in densely wooded cerrado, floodplains, dry or gallery forests.

Food and foraging behaviour

Food Omnivorous, though diet mainly of insects, particularly ground-dwelling harvester termites (*Synthermes* spp. and *Cornitermes* spp.), recorded in 87% of faeces collected in six localities across its geographical range (Dalponte 1997; Silveira 1999; Juarez and Marinho-Filho 2002; O. Courtenay unpubl.; J. Dalponte unpubl.). Dung beetles are consumed in great quantities when seasonally abundant. Other dietary items include small mammals, grasshoppers, birds and reptiles. Seasonal variation in most diet components has been noted (Dalponte 1997; Silveira 1999; Juarez and Marinho-Filho 2002; O. Courtenay unpubl.).

Foraging behaviour Hoary foxes are predominantly nocturnal and tend to hunt as individuals, or in loosely-knit pairs, with or without their juvenile offspring. Foraging group sizes of 3–5 were most common during periods of insect swarming (O. Courtenay unpubl.). They consume termites directly from the ground surface, or from the underside of dried disks of cattle dung which they flip over by pushing the dried disks along the ground at speed. Hoary fox cubs consume insects from the age of at least two months (O. Courtenay unpubl.). During the early rainy season, adult and young foxes catch swarming winged ant and termite elates, and dung beetles, on the wing by acoustic and visual location.

Damage to livestock or game There is no evidence that hoary foxes prey upon livestock or domestic fowl, despite their frequent close proximity to human dwellings (Dalponte 1997; Silveira 1999; Juarez and Marinho-Filho 2002; O. Courtenay unpubl.).

Adaptations

Small carnassials and wide crushing molars and the exceptionally large auditory bullae (Clutton-Brock *et al.* 1976) suggest adaptations to a predominantly insectivorous rather than larger prey-based diet. However, their cranio-dental morphology is not dissimilar to members of the *Dusicyon* [*Pseudalopex*] group (Clutton-Brock *et al.* 1976), which are not insectivorous. Whether their small size and slender build is an adaptation to, or consequence of, a small prey-base and/or hunting in grasslands is not known. Their preference for insects allows them to partition food resources and coexist with other sympatric canids such as the crab-eating fox and maned wolf (*Chrysocyon brachyurus*) (Juarez and Marinho-Filho 2002).

Social behaviour

Monogamous. One study group living in pasture comprised an adult breeding pair and five (3M:2F) juvenile offspring that shared largely overlapping home ranges of 4.6km² (range = 4.5–4.6km²) (O. Courtenay unpubl.). In Bahia, an adult female occupied a home range of 3.8km² (Juarez and Marinho-Filho 2002). Contact rates of a single breeding pair estimated by radio-telemetry indicated that they spend up to 35% of their activity period in close proximity, with substantial variation during offspring rearing (October to May) (O. Courtenay unpubl.). Spot sightings in different habitats and localities revealed that groups were composed of single animals on 75% of occasions, followed by pairs (30%), and groups larger than two (4%) (J. Dalponte and E. Lima unpubl.).

Vocalisations include a roar and threat bark; vocalisations are most common during the mating season (J. Dalponte unpubl.). Hoary foxes urinate using a raised leg urination position; frequent urination in small quantities is typical of territory marking behaviour (J. Dalponte unpubl.).

Reproduction and denning behaviour

In the wild, females produce litters of 4–5 offspring once a year during July and August, at observed male:female sex ratios of 4:2 (O. Courtenay unpubl.), and 2:2 (J. Dalponte and E. Lima unpubl.). A similar parturition season (September/mid-October) occurs in captive animals, with litter sizes of 3–4 (n=2) (Coimbra-Filho 1966, J. Dalponte pers. obs.). The precise length of the gestation period is not known, but mating occurs in late May/early June suggesting that it falls within the range of other members of the *Pseudalopex* group (53–60 days).

Pups are born in dens in disused armadillo holes, particularly that of the yellow armadillo (*Euphractus sexcinctus*) (n=5 social groups, J. Dalponte and E. Lima unpubl., O. Courtenay unpubl.). Offspring are cared for by the breeding male and female; there is currently no evidence of helpers. In one case, a lone breeding female was observed to successfully nurse and rear four cubs to

six months of age (J. Dalponte and E. Lima unpubl.). During late lactation, the female visits the den perhaps a couple of times per night to nurse; in her absence, the male baby-sits, grooms and guards the cubs against potential predators (O. Courtenay unpubl.). Post-weaning, adult gender roles change: female contact declines substantially, whereas the male stays with the cubs as chaperone during hunting expeditions to insect patches close to the den (O. Courtenay unpubl.). The estimated lactation period in the wild is three months indicated by the cessation of nursing in mid-November (O. Courtenay unpubl.). Juveniles of both sexes disperse in May when 9–10 months old and may establish home-ranges adjacent to their natal territory (J. Dalponte and E. Lima unpubl., O. Courtenay unpubl.).

Competition

The main competitors are likely to be the similarly sized crab-eating fox (4.5–8.5kg) and the larger-sized maned wolf (23kg) which often occur in sympatry. Inter-specific divergence in diet composition appears to allow these three canid species to coexist (Juarez and Marinho-Filho 2002). Adult hoary foxes with their young have been observed to tolerate the presence of crab-eating foxes at insect foraging grounds (Courtenay *et al.* unpubl.). Due to its predominantly insectivorous diet, the hoary fox potentially competes also with the large guild of myrmecophagous predators of the cerrado biome. However, the latter group tend to forage termite species that are mound builders and produce chemical secretions, making them largely inaccessible to the hoary fox.

Mortality and pathogens

Natural sources of mortality Hoary fox remains (hairs, teeth and bone fragments) have been identified in 0.3–4% of maned wolf faeces from three different sites in Central Brazil: Parque Nacional de Chapada dos Guimarães (J. Dalponte and E. Gomes da Silva unpubl.), Parque Nacional de Emas (Silveira 1999; A.T. Jácomo pers. comm.), and Parque Nacional Grande Sertão Veredas (J. Dalponte unpubl.), suggesting that maned wolves are opportunist consumers of hoary foxes, presumably as scavengers. It is debatable that maned wolves actively hunt live adult foxes. Hoary foxes are not represented in stomach contents or faeces of large predatory birds or large felines, though Xavante hunters in the Rio das Mortes Indigenous Reserve, Mato Grosso state, reported at least one fox being killed and eaten by a puma (*Puma concolor*) (E. Lima pers. comm.).

Persecution Hoary foxes are killed indiscriminately as predators of domestic fowl, although they probably earn this reputation from crab-eating foxes which are formidable thieves (Courtenay and Maffei chapter 3.2 this volume). Young foxes are often taken as pets, and domestic dogs

are responsible for cub deaths when dens are located in peri-urban areas.

Hunting and trapping for fur Occasional hunting occurs as a predator control measure, but populations are not trapped for fur.

Road kills In north-east São Paulo state, seven hoary fox deaths were recorded along 13,500km of road between January 1981 and December 1983, with a ratio of crab-eating to hoary foxes of about 10:1 (J. Dalponte and J.A. Tavares-Filho unpubl.). The proportion of male to female hoary foxes in an additional sample of 19 road-killed foxes in central Brazil was approximately 2:1 (J. Dalponte unpubl.).

Pathogens and parasites Population declines due to pathogen infection have not been documented; however, at least one death due to sarcoptic mange is thought to have occurred in the Serra da Canastra (J. Dietz pers. comm.). Two other individuals, a female and her infant, which had been radio-tracked in the Rio Pratudão ranch, Posse, W Bahia, seemingly died following a sarcoptic mange infection that was also seen to infect at least one maned wolf (J. Marinho-Filho pers. comm.). Reports of hoary fox infection with the rabies virus and the protozoan parasite *Leishmania infantum* in the state of Ceará (Deane 1956; Barros *et al.* 1989) almost certainly refer to crab-eating fox and not hoary fox (Courtenay *et al.* 1996). Disease outbreaks due to other common canid pathogens (e.g., canine distemper virus and canine parvovirus) have not been reported in the wild. Other documented parasites of hoary foxes include *Trypanosoma cruzi* (Albuquerque and Barretto 1970), and *Angiostrongylus vasorum* found in eight animals captured in Minas Gerais (Lima *et al.* 1994).

Longevity No information available, however an eight-year-old captive female (in August 2002) was observed in Teresina Zoological Park (Costa and Courtenay 2003).

Historical perspective

Unknown.

Conservation status

Threats The principal biome where hoary foxes occur is the cerrado which is being destroyed at a rate of 3% each year, largely in the interests of agriculture (livestock and soybean) (MMA-BRASIL 1998). It appears that hoary foxes adapt to livestock pasture rich in termites and dung beetles. Breeding hoary foxes are found in deforested wooded areas (J. Dalponte pers. obs.), thus it is possible that deforestation may not have a negative impact on the species. Areas of high human population density are unlikely to be suitable. There are no population estimates available.

Commercial use Not exploited for fur or any other products.

Occurrence in protected areas *Brazil*: Parque Nacional de Chapada dos Guimarães, Parque Nacional da Serra da Capivara, Parque Nacional da Serra da Canastra, Parque Nacional de Emas, Parque Nacional Grande Sertão Veredas, Estação Ecológica de Águas Emendadas, Parque Nacional de Brasília, Refúgio de Vida Silvestre da Fazenda Nhumirim e RPPN do Rio Negro, Parque Estadual da Serra do Lageado, Parque Estadual de Santa Bárbara, Santuário de Vida Silvestre do São Miguel, Fazenda São Miguel.

Protection status CITES – not listed.

Listed as “Vulnerable” by the Canid Conservation Assessment and Management Plan (CAMP) 1993 meeting in São Paulo; “Vulnerable” in individual state faunal status accounts, but not listed in the Brazilian official list of threatened mammals (Fonseca *et al.* 1994).

Current legal protection Hunting and trade in wildlife is generally forbidden in Brazil. There is no specific hunting legislation for hoary foxes.

Conservation measures taken Nothing proposed. No cultural protection reported.

Occurrence in captivity

Specimens in Brazilian zoos at the time of writing include: Brasília (1); São Paulo (1); Ribeirão Preto (1); Belo Horizonte (5); Teresina (1). High mortality rates due to starvation amongst captive cubs are reported. There are no current plans to reintroduce hoary foxes into the wild.

Current or planned research projects

J. Dalponte (Universidade de Brasília, Brazil) is currently studying the ecology and behaviour of the hoary fox in Mato Grosso, Brazil.

Gaps in knowledge

Areas for further research include focusing on aspects of behavioural ecology, population status, geographical range, the potential role of disease in population regulation, and their status as potential reservoirs of veterinary (e.g., scabies, distemper) and public health (e.g., leishmaniasis, rabies) pathogens.

Core literature

Costa and Courtenay 2003; Dalponte 1997, 2003; Juarez and Marinho-Filho 2002; Silveira 1999.

Reviewers: Louise Emmons, Jader Soares Marinho-Filho.

Editors: Claudio Sillero-Zubiri, Michael Hoffmann.

3.10 Bush dog

Speothos venaticus (Lund, 1842)

Vulnerable – VU: C2a(i) (2004)

G.L. Zuercher, M. Swarner, L. Silveira and O. Carrillo

Other names

English: vinegar dog, savannah dog; **Dutch:** boshond, busdagoe (Suriname); **French:** chiens des buissons, zorro; **German:** waldhund; **Italian:** speoto, itticione; **Portuguese:** cachorro-do-mata, cachorro-do-mato-vinagre, cachorro-do-mato-cotó, cachorro-pitoco (Brazil); **Spanish:** zorrito vinagre (Argentina); zorro/perro vinagre, perro/perrito de monte (Bolivia/Ecuador/Venezuela); perrito venadero, umba (Colombia); perro de la selva, pero selvático, perro de agua, Guanfando (Ecuador – origin undetermined); **Indigenous languages:** Cubeo: maca tawimi, Huitoto: itón+maido, Shuku: puinave, Yucuna: huerateyaniminami (Colombia); Achuar: tuwen'k, patukam yawa, Chachi: pikucha, Huaorani: babeguinta, Quichua: sacha alcu, Secoya: airo jo'ya, masiqoco yai (Ecuador); Aché: mbetapa, Guaraní: jagua vyguy (Paraguay); Amarakaeri: dumba cuhua, cuan cuan, Shibipo: hueshes (Peru).

Taxonomy

Cynogale venatica Lund, 1842. K. Dansk. Vid. Selsk. Naturv. Math. Afhandl. 9:67. Type locality: “Lagoa Santa” [Minas Gerais, Brazil, c. 19°39'S, 43°44'W].

The bush dog is accepted as the sole extant representative of the monotypic genus *Speothos*. *Speothos pacivorus* Lund, 1839, an extinct species, is known only from fossil deposits discovered at the Lagoa Santa caves in Minas Gerais, Brazil, and may not have existed past the Holocene (Berta 1984). This is the same site for the type locality specimen of *S. venaticus*. The two species are distinguished by several dental features, including the presence of a metaconule and hypocone on M₁, a large, double-rooted M₂, as well as the larger size of *S. pacivorus* (Berta 1987). A third species, *S. major* (Lund 1843), is now considered synonymous with *S. venaticus* (Berta 1984).

The taxonomic relationship of bush dogs to other canids remains debatable. The presence of a unicuspid M₁ talonid led to the inclusion of the bush dog in the subfamily Simocyoninae, along with two other species that share this characteristic, the African wild dog (*Lycaon pictus*), and dhole (*Cuon alpinus*). Berta (1984, 1987) suggested bush dogs are most closely related to small-eared dogs (*Atelocynus microtis*), and members of the *Cerdocyon* clade (one of four monophyletic groups of South American canids). This group includes the raccoon dog (*Nyctereutes procyonoides*). Berta (1987) suggests a single ancestor for this group, ranging over Eurasia and North America, with isolation of the raccoon dog occurring when the Bering Land Bridge disappeared. Recent molecular analyses,