

### Gaps in knowledge

Little is known of population status, particularly in lowland Amazon forest. The significance of infection and disease in population regulation, and behavioural ecology in the context of resource dispersion, are of interest.

### Core literature

Berta 1982, 1987; Brady 1978, 1979; Courtenay *et al.* 1994, 1996, 2001, 2002; Macdonald and Courtenay 1996; Maffei and Taber 2003; Montgomery and Lubin 1978; Sunquist *et al.* 1989.

**Reviewers:** Julio Dalponte, Carlos A. Delgado-V, M. Renata P. Leite Pitman, Mauro Lucherini, Anibal Parera.  
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## 3.3 Maned wolf *Chrysocyon brachyurus* (Illiger, 1815) Near Threatened (2004)

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### Other names

**French:** loup à crinière; **German:** mähenwolf; **Portuguese:** lobo guará, guará; **Spanish:** aguará guazú (Argentina), lobo de crin, borochi (Bolivia).

### Taxonomy

*Canis brachyurus* Illiger, 1815. Abh. Phys. Klasse K. Pruess. Akad. Wiss., 1804–1811 :121. Type locality: not specified, but later listed by Cabrera (1958) as “los Esteros del Paraguay”.

The species was originally placed in the genus *Canis*, but is now widely included in the genus *Chrysocyon* (Langguth 1975; Stains 1975; Van Gelder 1978; Berta 1987; Wozencraft 1993).

Chromosome number is  $2n=76$ , very close to that of *Canis* ( $2n=78$ ). A comparison of chromosome morphology and banding patterns suggest that the maned wolf and grey wolf (*Canis lupus*) share a common wolf-like ancestor (Wayne *et al.* 1987a).

### Description

The maned wolf is hard to confuse with any other canid due to its long, thin legs, long reddish orange fur and large ears. The English common name comes from the mane-like strip of black fur running from the back of the head to the shoulders, averaging 470mm in length. Muzzle black, throat white, inner ears white, forelegs black and most of distal part of hindlegs black. An average of 44% of the tail length is white at the distal end, but the amount varies between individuals (from 17–66% of the tail length). No under fur present. The adult dental formula is  $3/3-1/1-4/4-2/3=42$ . See table 3.3.1 below for body measurements.

**Table 3.3.1. Combined body measurements for the maned wolf** from Serra da Canastra National Park, Brazil (Dietz 1984), Emas National Park, Brazil (Silveira 1999; Bestelmeyer 2000) and Águas Emendadas Ecological Station, Brazil (F. Rodrigues unpubl.).

HB	1,058mm (950–1150) n=23
T	446mm (380–500) n=22
E	163mm (135–200) n=23
WT	25.0kg (20.5–30) n=16



Adult female maned wolf. Serra da Canastra National Park, Minas Gerais State, Brazil, 2001.

Rogerio Cunha



**Figure 3.3.1. Current distribution of the maned wolf.**

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**Subspecies** Monotypic (Dietz 1984).

**Similar species** Juveniles could possibly be confused with the crab-eating fox (*Cerdocyon thous*) because of their similar black and grey colouring.

**Current distribution**

The maned wolf inhabits the grasslands and scrub forest of central South America from the mouth of the Parnaiba River in north-eastern Brazil, south through the Chaco of Paraguay into Rio Grande do Sul State, Brazil, and west to the Pampas del Heath in Peru (Dietz 1985) (Figure 3.3.1. Beccaceci (1992a) found evidence of maned wolves in Argentina as far south as the 30th parallel, and a sighting in the province of Santiago del Estero was recently reported (Richard *et al.* 1999). They probably range into northern Uruguay. Their presence in this country was confirmed through a specimen trapped in 1990 (Mones and Olazarri 1990), but there have not been any reports of sightings since that date (S. Gonzalez pers. comm.).

**Range countries** Argentina, Bolivia, Brazil, Paraguay, Peru, Uruguay (Dietz 1985; Mones and Olazarri 1990; Beccaceci 1992a).

**Relative abundance**

With their primarily solitary habits and large home ranges (see Social behaviour), maned wolves are found in low densities throughout the range. In some areas of central

Brazil, they appear to be more common, but increasing habitat fragmentation may threaten the viability of wild populations (Table 3.3.2).

**Estimated populations/relative abundance and population trends**

<b>Table 3.3.2. The status of maned wolves in various range countries.</b> (Population trend: D=declining, ?=unknown, Ex=extinct).		
<b>Country</b>	<b>Population size</b>	<b>Trend</b>
Argentina	1,000?	D?
Bolivia	>1,000	?
Brazil	?	?
Peru	?	?
Paraguay	?	?
Uruguay	Ex?	?

**Habitat**

Maned wolves favour tall grasslands, shrub habitats, woodland with an open canopy (cerrado), and wet fields (which may be seasonally flooded). Some evidence indicates that they may prefer areas with low to medium shrub density (Bestelmeyer 2000). Maned wolves are also seen in lands under cultivation for agriculture and pasture. Daytime resting areas include gallery forests (Dietz 1984), cerrado and marshy areas near rivers (Bestelmeyer 2000; F. Rodrigues unpubl.). There is some evidence that they can utilise cultivated land for hunting and resting (A.

Jácomo and L. Silveira unpubl.), but additional studies are essential in order to quantify how well the species tolerates intensive agricultural activity.

### Food and foraging behaviour

**Food** Omnivorous, consuming principally fruits and small- to medium-sized vertebrates. Numerous authors (Dietz 1984; Carvalho and Vasconcellos 1995; Motta-Júnior *et al.* 1996; Azevedo and Gastal 1997; Motta-Júnior 1997; Rodrigues *et al.* 1998; Jácomo 1999; Santos 1999; Silveira 1999; Juarez and Marinho 2002; Rodrigues 2002) have investigated the diet of the maned wolf. These studies have all found a wide variety of plant and animal material in the diet, with about 50% of the diet comprising plant material and 50% animal matter (Table 3.3.3). The fruit *Solanum lycocarpum* grows throughout much of the range and is a primary food source; other important items include small mammals (*Caviidae*, *Muridae*, *Echimyidae*) and armadillos, other fruits (*Annonaceae*, *Myrtaceae*, *Palmae*, *Bromeliaceae*, and others), birds (*Tinamidae*, *Emberizidae* and others), reptiles and arthropods. Although the frequency of plant and animal items found in faecal samples is approximately equal (Table 3.3.2), the biomass of animal items is usually greater than that of plant items (Motta-Júnior *et al.* 1996; Santos 1999; Rodrigues 2002). Certain items, such as rodents and *Solanum*, are consumed year round, but the diet varies with food availability. At least occasionally, pampas deer (*Ozotoceros bezoarticus*) are also consumed (Bestelmeyer and Westbrook 1998). In Jácomo's (1999) study, deer appeared in 2.4% of 1,673 samples analysed.

**Foraging behaviour** Nocturnal and crepuscular, maned wolves may forage for up to eight consecutive hours, feeding on everything they can catch and every ripe fruit they detect (Bestelmeyer 2000; L. Silveira and A. Jácomo unpubl.). Strategies for hunting animal prey include: 1) stalking prey with a final pounce; 2) digging after burrowing animals; 3) leaping into the air to capture flying birds and insects, and 4) sprinting after fleeing deer. Approximately 21% of all hunting attempts end with the successful capture of prey, and the strategies do not differ in their success rates (Bestelmeyer 2000). Beccaceci (1992a) and C. Silva (unpubl.) recorded maned wolves feeding on coypus (*Myocastor coypus*) that were caught in traps set by hunters. L. Silveira and A. Jácomo (unpubl.) observed maned wolves scavenging opportunistically on road-kill carcasses.

**Damage to livestock and game** The maned wolf has been known to prey on domestic animals, especially chickens (Dietz 1984). However, poultry remains were found in only 0.6–1.4% of analysed scat samples (Dietz 1984; Motta-Júnior *et al.* 1996; Rodrigues 2002).

### Adaptations

The maned wolf's long legs, large ears and pacing gait are considered adaptations for standing in and moving above tall grasses to hear small prey below. The long legs also enable maned wolves to run swiftly, at least occasionally tracking down fleeing pampas deer (Bestelmeyer and Westbrook 1998).

**Table 3.3.3. Frequency of classes of food items in the maned wolf's diet in 11 places of the Cerrado of Brazil.** (1) Juarez and Marinho 2002; (2) Dietz 1984; (3) Motta-Júnior *et al.* 1996; (4) – Motta-Júnior 1997; (5) Azevedo and Gastal 1997; (6) Jácomo 1999; (7) Silveira 1999; (8) Santos 1999; (9) Carvalho and Vasconcellos 1995; (10) Rodrigues 2002.

Items	Locality										
	Faz. Rio Pratudão/ BA (1)	P.N.S. da Canastra/ MG (2)	Faz. Água Limpa/ DF (3)	E.E. de Jataí/ SP (4)	Faz. Salto e Ponte/ MG (4)	Campus da UFSC AR/ SP (4)	APA Gama- Cab Veado/ DF (5)	P.N. Emas/ GO (6, 7)	Faz São Luis/ MG (8)	Santa Bárbara/ SP (9)	Águas Emendadas E.E./ DF (10)
<i>Solanum lycocarpum</i>	31.9	32.6	25.7	15.6	31.0	24.4	23.1	18.0	29.3	32.3	27.4
Miscellaneous fruit	9.4	7.3	9.2	14.7	2.8	10.2	10.7	36.3	7.8	6.3	24.2
Grass	9.4	11.1	11.8	14.3	20.0	12.8	13.8	3.2	17.2	9.4	8.2
<b>Subtotal – vegetable</b>	<b>50.7</b>	<b>51.0</b>	<b>46.7</b>	<b>44.6</b>	<b>53.8</b>	<b>47.4</b>	<b>47.6</b>	<b>57.5</b>	<b>54.3</b>	<b>48.0</b>	<b>59.8</b>
Arthropods	3.6	5.7	2.0	5.5	2.1	5.1	23.1	1.6	12.1	7.3	5.8
Reptiles	1.6	0.3	2.6	3.4	4.8	1.3	–	3.1	1.8	–	0.1
Birds	8.4	12.0	13.8	8.4	10.4	7.7	10.7	11.1	11.1	12.5	10.1
Eggs	–	–	–	–	–	–	3.1	0.2	–	–	0.4
Rodents & marsupials	33.0	26.6	25.0	32.1	27.5	34.6	15.4	24.0	14.1	29.2	16.7
Armadillos	1.6	3.1	9.2	2.9	–	1.3	–	2.1	6.3	1.0	6.7
Other mammals	1.0	0.7	0.7	2.1	1.4	1.3	–	0.2	0.5	–	0.5
Other vertebrates	–	0.6	–	1.0	–	1.3	–	–	0.3	2.1	–
<b>Subtotal – animal</b>	<b>49.2</b>	<b>49.0</b>	<b>53.3</b>	<b>55.4</b>	<b>46.2</b>	<b>52.6</b>	<b>52.3</b>	<b>42.3</b>	<b>46.2</b>	<b>52.1</b>	<b>40.3</b>
No. of occurrences	191	2,056	304	237	145	78	65	4,540	396	96	901
No. samples	70	740	104	61	46	21	20	1,673	150	?	328

## Social behaviour

Maned wolves appear to be facultatively monogamous. Pairs are not often seen together, although researchers have observed pairs resting, hunting and travelling together.

Dietz (1984) found that home ranges of pairs in Serra da Canastra National Park varied between 21.7 and 30.0 km<sup>2</sup> (average 25.2 ± 4.4 km<sup>2</sup>; n=3 pairs). The home ranges of individuals studied in other areas are larger, ranging from 15.6–104.9 km<sup>2</sup> (average 57.0 ± 34.3 km<sup>2</sup>, n=5) in Águas Emendadas Ecological Station (Rodrigues 2002) and 4.7–79.5 km<sup>2</sup> (average 49.0 ± 31.8 km<sup>2</sup>, n=5) in Emas National Park (Silveira 1999). Home range boundaries appear stable over time and are defended against adjacent pairs, although there may be overlap at the edge of the home range (Rodrigues 2002). Males and females do not differ in their rates of scent marking. Termite mounds are preferentially used as urine-marking sites, and more marks are placed on the upwind side of objects than on the downwind side (Bestelmeyer 2000). Floater individuals without territories appear to move along territory boundaries (Dietz 1984) and do not scent mark (Bestelmeyer 2000).

The most frequently heard vocalisation is the roar-bark, a loud vocalisation that has been heard during all times of the day and night and at all times of the year (Brady 1981; Bestelmeyer 2000; L. Silveira and A. Jácomo unpubl.).

## Reproduction and denning behaviour

Female maned wolves enter oestrus once per year, for approximately five days. Peak breeding season is from April to June. There are numerous published accounts of breeding behaviour in captivity, but little information is available from wild populations (Silveira 1968; Encke 1971; Brady and Ditton 1979; Bartmann and Nordhoff 1984; Dietz 1984; Rodden *et al.* 1996; Bestelmeyer 2000). In captivity, the frequency of vocalisations (roar-bark) and scent marking increases during the weeks prior to mating (Brady 1981), and the amount of time a pair spends in close proximity increases significantly during the oestrous period. Courtship is characterised by frequent approaches, mutual anogenital investigation, and playful interactions. Mounting may occur frequently during oestrus; successful breeding includes a copulatory tie that may last several minutes. In Emas National Park, Brazil, a breeding pair observed at night for approximately 3.5 hours foraged together and vocalised frequently whenever one partner was out of sight. The male marked with urine or faeces wherever the female marked. A breeding display lasting 10 minutes included a two-minute copulatory tie. After copulation, the pair continued to forage together (L. Silveira and A. Jácomo unpubl.).

Gestation length is approximately 65 days, with the majority of births occurring from June to September, during the dry season. One female gave birth to three pups in a bed of tall marsh grass. At 45 days of age the pups had

not yet left the den and weighed 2.0 kg (female) and 2.25 kg (males) (L. Silveira and A. Jácomo unpubl.). All dens found in the wild have been above ground, gaining shelter from natural features such as the canopies of shrubs, rock crevices, gullies, and dry mounds in marshy, tall-grass areas.

In captivity, an analysis of 361 births indicated that parturition peaks in June (winter), and the average litter size is 3 (range=1–7; Maia and Gouveia 2002). Birth weights average 390–456 g (n=8). In captive animals, nursing bouts begin to decline after the first month, and weaning is complete by around 15 weeks. Pups begin consuming solids regurgitated by the parents at around four weeks of age; regurgitation has been recorded up to seven months after birth (Brady and Ditton 1979). Females with 7–14-week-old pups have been observed hunting for continuous periods of eight hours over 3 km from their den sites and pups (Bestelmeyer 2000; F. Rodrigues unpubl.). Pups stay in the mother's home range for approximately one year, when they begin to disperse. Juveniles attain sexual maturity at around the same time, but usually do not reproduce until the second year.

One of the many unknown aspects of maned wolf behaviour is the role the male plays in rearing pups. Pups have been seen accompanied by two adults (Dietz 1984), and a female with pups was seen accompanied by a male many times (F. Rodrigues unpubl.). In captivity, males increase pup survival rates and are frequently observed regurgitating to pups and grooming pups (Bestelmeyer 2000). Nonetheless, direct confirmation of male parental care in the wild is still lacking.

## Competition

No direct competition has been observed with other carnivores sharing maned wolves' primary habitat, including the bush dog (*Speothos venaticus*), crab-eating fox (*Cerdocyon thous*), hoary fox (*Pseudalopex vetulus*), pampas fox (*P. gymnocercus*), puma (*Puma concolor*), jaguar (*Panthera onca*), pampas cat (*Oncifelis colocolo*), jaguarundi (*Herpailurus yaguarondi*), crab-eating raccoon (*Procyon cancrivorus*), hog-nosed skunk (*Conepatus semistriatus*), and grison (*Galictis cuja* and *G. vittata*). The diet of the maned wolf significantly overlaps with that of the crab-eating fox, and to a lesser extent with that of the smaller hoary fox (Silveira 1999; Juarez and Marinho 2002). However, maned wolves can take larger prey than either fox species (Bestelmeyer and Westbrook 1998; Silveira 1999; Juarez and Marinho 2002). Evidence from northern Argentina indicates that the maned wolf and pampas fox may eat many of the same food items (L. Soler pers. comm.). Packs of domestic dogs may also compete for prey with maned wolves.

## Mortality and pathogens

**Natural sources of mortality** Because of its size, other carnivores do not usually prey upon the maned wolf,

although there is a record of predation by a puma (M. Reis pers. comm.). In areas inhabited by humans, domestic dogs have been observed pursuing and killing maned wolves (A. Hass pers. comm.; F. Rodrigues unpubl.; and see also Threats).

**Persecution** Maned wolves are not viewed as a serious threat to livestock, although they may occasionally be shot when caught raiding chicken pens. Diet studies indicate that domestic chickens have little importance in their diet, but this relationship needs to be studied more thoroughly.

**Hunting and trapping for fur** The pelt of the maned wolf is of no value to the fur trade.

**Road kills** Road kills are one of the main causes of mortality of maned wolves, especially for young individuals and sub-adults (Beccaceci 1992a; Vieira 1996; Silveira 1999; Rodrigues 2002; L. Soler pers. comm.). Road kills on highways are responsible for mortality of approximately half of the annual production of pups in some reserves (Rodrigues 2002).

**Pathogens and parasites** The giant kidney worm, *Dioctophyma renale*, which infects wild and captive maned wolves in South America, is considered a serious health threat (Matera *et al.* 1968; Beccaceci 1990). Beccaceci (1992b) found evidence of tuberculosis in a wild specimen, and hemo-parasites have also been recorded (F. Vinci pers. comm.).

In captivity, maned wolves are susceptible to typical canine viruses, including canine distemper, parvovirus, rabies, and adenovirus. Infectious diseases and digestive disorders are among the main causes of death among pups 31–120 days old (Maia and Gouveia 2002). Ovarian tumours are frequently found in adult females (Munson and Montali 1991). Cystinuria, a metabolic disease of the renal system, is prevalent in both captive and wild maned wolves, although its impact on wild populations is not known (Bush and Bovee 1978; Bovee *et al.* 1981; Mussart and Coppo 1999).

**Longevity** In captivity, maned wolves may live up to 16 years. To the best of our knowledge, there is no information available for longevity in the wild.

### Historical perspective

Throughout its range, attitudes towards the maned wolf range from tolerance to fear and dislike. Native folklore and superstitions contribute to the attitudes of local people. For example, in Brazil certain parts of the maned wolf are used in local medicines to cure bronchitis and kidney disease or as a treatment for snakebite. Other body parts are believed to bring good luck (C. Silva pers. comm.). In

Bolivia, cowboys believe that sitting on the pelt of a maned wolf will protect them from bad luck (L. Sainz pers. comm.).

Although it is one of the largest carnivores in the grasslands, the species is apparently not well known to a large segment of the population. In a study of visitors at Brasilia Zoo, which is surrounded by cerrado, 32% of 30 adults and 30 children surveyed did not recognise the maned wolf when shown a photograph of the animal (Bizerril and Andrade 1999).

### Conservation status

**Threats** The most significant threat to maned wolf populations is the drastic reduction of habitat, especially due to conversion to agricultural land (Fonseca *et al.* 1994). The cerrado has been reduced to about 20% of its preserved original area (Myers *et al.* 2000), and only 1.5% of it is currently protected (Ratter *et al.* 1997). In addition, habitat fragmentation causes isolation of sub-populations. Many maned wolves are killed on the nation's roads. Highways border many of the Conservation Units of the Brazilian cerrado, and drivers often do not respect speed limits. Reserves close to urban areas often have problems with domestic dogs. These dogs pursue and may kill maned wolves and can also be an important source of disease. Domestic dogs also possibly compete with the maned wolf for food. Interactions with humans also pose a threat to the maned wolf. Diseases, such as those mentioned above, can be important causes of mortality in the wild, but there is very little information available about the health of wild populations. In areas where there are domestic dogs, the problem is certainly greater.

**Commercial use** None. Indications are that the use of maned wolf parts for medicinal purposes does not involve any sort of large-scale commercial transactions and is confined to native folk medicine (see Historical perspective).

### Occurrence in protected areas

- *Argentina*: Chaco National Park, Mburucuyá National Park, Iberá Provincial Reserve, San Juan de Poriahú, San Alonso Private Reserves, Río Pilcomayo National Park, El Bagual Private Reserve, Campo Bouvier, La Esmeralda Reserve, and possibly La Loca Provincial Reserve;
- *Bolivia*: Estación Biológica del Beni, Parque Nacional Noel Kempff Mercado, Parque Nacional and Area Natural de Manejo Integrado Otuquis and San Matías, Parque Nacional Madidi. May occur in Parque Nacional Kaa Iya del Gran Chaco and Territorio Indígena & Parque Nacional Isiboro Sécuré;
- *Brazil*: occurs in the following National Parks: Brasília, Emas, Chapada dos Veadeiros, Araguaia, Serra da Canastra, Grande Sertão Veredas, Serra do Cipó,

Chapada dos Guimarães, Serra da Bodoquena, Ilha Grande, Aparados da Serra, Serra Geral, São Joaquim, Serra da Bocaina, Itatiaia. Ecological Reserve Roncador, Ecological Stations Águas Emendadas, Uruçuí-Una, Serra das Araras, Pirapitinga and Taiaimã. State Parks: Ibitipoca, Itacolomi, Nascentes do Rio Taquari, Caracol, Iatapuã, Turvo, Cerrado, Vila Velha; — *Paraguay*: Mbaracayu Forest Biosphere Reserve; — *Peru*: Pampas del Heath?

#### **Protection status** CITES – Appendix II.

Protected in Argentina (classified as Endangered on the Red List); and included on the list of threatened animals in Brazil (Bernardes *et al.* 1990).

**Current legal protection** Hunting is prohibited in Brazil, Paraguay and Bolivia. Maned wolves are protected by law in many parts of their range, but enforcement is frequently problematic. Included in the United States Endangered Species list.

**Conservation measures taken** We are not aware of any conservation actions specific to the maned wolf. However, they are the beneficiaries of broader attempts to protect the cerrado (for example, recent actions to reduce the impact of road kills in Brasília).

#### **Occurrence in captivity**

Records of captive maned wolves have been kept in an International Studbook, which was maintained by the University of Heidelberg from 1973 to 1978, and since 1979 by Frankfurt Zoo, Germany. As of 31 December 2003, 146 institutions reported a total of 431 maned wolves in captivity, including 208 males and 222 females. Cooperative breeding programmes exist among zoos in Europe, North and South America, and there has been considerable research on reproductive behaviour and physiology, nutrition, diseases and other husbandry issues. There are no known reintroduction projects currently underway. Individuals are sometimes kept as pets or in private collections.

#### **Current or planned research projects**

In Brazil, there are several ecological studies underway, investigating aspects such as home range, feeding ecology, behaviour and reproductive behaviour, including studies by: F. Rodrigues, Rogério Cunha and Eduardo Eizirik (Associação Pró-Carnívoros), Adriana Hass (CNPq) and F. Vinci (União de Ensino do Planalto Central) in Serra da Canastra National Park; F. Rodrigues (Associação Pró-Carnívoros) in Distrito Federal; A. Jácomo and L. Silveira (Associação Pró-Carnívoros) in Goiás; J. Carlos Motta-Júnior (Universidade de São Paulo) in São Paulo and Minas Gerais; L. Fernando Silva (Fundação ZooBotânica de Belo Horizonte) in Minas Gerais; J. Eduardo Mantovani

(Instituto Nacional de Pesquisas Espaciais) in São Paulo; C. Silva (Instituto Brasileiro de Meio Ambiente) in Paraná.

Studies of genetic variability are being done by J. Roberto Moreira (Centro Nacional de Recursos Genéticos / Empresa Brasileira de Agropecuária) and M. Nazaré Clautau (Universidade de Brasília). J. Roberto Moreira is also revising the distribution of the species in Brazil.

In Argentina, A. Soria and S. Heinonen Fortabat (Delegación A.P.N.) have been conducting surveys of maned wolves in three National Parks: Pilcomayo, Chaco, and Mburucuyá. L. Soler (HUELLAS, and Grupo de Ecología Comportamental de Mamíferos, GECM) has proposed a study in the Mburucuyá National Park in the province of Corrientes, to examine habitat use and availability and to census the carnivore species utilising the park and surrounding areas. The attitudes of local people will be a major focus of the study. Although HUELLAS and Oikoveva (a French NGO) are providing partial funding, additional support is being sought. S. Gonzalez (División Citogenética, Universidad de la República Oriental del Uruguay) and M. Beccaceci (Universidad del Salvador) have also proposed a study of the genetic variability of wild populations in Argentina.

In Bolivia, additional studies of canid ecology in eastern Bolivia have been proposed (L. Emmons, Smithsonian National Museum of Natural History, and L. Sainz, Museo de Historia Natural Noel Kempff Mercado).

A captive study of maned wolf nutritional requirements (M. Allen and S. Childs), supported by the American Zoo and Aquarium Association's Maned Wolf Species Survival Plan, the National Zoological Park, and Purina Mills, is underway. A second captive study focusing on the modes of inheritance of cystinuria, is supported by the AZA MWSSP, University of Pennsylvania, and Morris Animal Foundation (J. Kehler and P. Henthorn, University of Pennsylvania).

#### **Gaps in knowledge**

Population surveys throughout the species' range are needed. The impact of human encroachment on suitable habitat is not clearly understood, and the suitability of agricultural land as maned wolf habitat needs to be investigated. The impact of disease processes on wild populations is not well understood.

#### **Core literature**

Bestelmeyer 2000; Brady and Ditton 1979; Dietz 1984, 1985; Jácomo 1999; Motta-Junior *et al.* 1996; Silveira 1999.

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