

D. Knobel (Mammal Research Institute, University of Pretoria, South Africa and Centre for Tropical Veterinary Medicine, University of Edinburgh, UK) is investigating the development of a bait and baiting system for the delivery of oral rabies vaccine to free-ranging wild dogs.

H. Davies (Wildlife Conservation Research Unit, University of Oxford, UK and Endangered Wildlife Trust, South Africa) is the principal investigator of the De Beers Venetia Reserve Wild Dog Project, which involves the study of the biology of a reintroduced wild dog pack and the value of the species to ecotourism in a small reserve.

A. Visee (George Adamson Wildlife Preservation Trust, Tanzania) is studying infectious disease and safety/effectiveness of vaccination, as well as husbandry, of captive wild dogs in Mkomazi, Tanzania.

K. Leigh (University of Sydney, Australia) is the principal investigator of the Lower Zambezi African Wild Dog Conservation Project, a study of the threats to wild dogs in Lower Zambezi National Park aimed at generating conservation recommendations for the Zambia Wildlife Authority.

G. Rasmussen (Wildlife Conservation Research Unit, University of Oxford, UK) runs Painted Dog Conservation, a long-running project aimed at monitoring and protecting wild dogs outside protected areas in Hwange and elsewhere in Zimbabwe.

J. Chambers (Lowveld Wild Dog Project, Save Valley, Zimbabwe) is involved in the ecological monitoring of wild dogs in south-eastern Zimbabwe.

K. McCreery and R. Robbins (African Wild Dog Conservancy, Olympia, Washington, USA) have recently surveyed wild dog populations in East Kenya.

R. Lines (Namibia Nature Foundation, Windhoek, Namibia) is studying wild dog livestock conflict in Namibia.

C. Sillero-Zubiri and J.-M. Andre (Wildlife Conservation Research Unit, University of Oxford, UK) are surveying wild dogs in and around protected areas of central and northern Mozambique.

The Wild Dog Advisory Group of South Africa is overseeing the strategic reintroduction of wild dogs in a network of fenced reserves across South Africa and conducting detailed monitoring of dogs in Hluhluwe-Umfolozi Park, Pilansberg National Park, Marekele National Park and Madikwe Game Reserve.

Other long- and short-term projects have been carried out in Tanzania (Selous Game Reserve, S. and N. Creel; Serengeti National Park, L. and H. Frame, J. Malcolm, H. van Lawick, J. Fanshawe, R. Burrows), Kenya (P. Kat, T. Fuller), Zimbabwe (Hwange National Park, J. Ginsberg) and Senegal (Niokola-Koba National Park, C. Sillero-Zubiri). Restricted surveys have recently been carried out in Cameroon (T. Breuer), Mozambique (C. Sillero-Zubiri), Tanzania (Ruaha Game Reserve, Mikumi National Park, S. and N. Creel) and Nigeria (S. Baggett).

Gaps in knowledge

Several pieces of information are needed to enable more effective conservation of African wild dogs. These include: (1) establishing which techniques will be most effective and sustainable for protecting wild dogs from disease, including whether vaccinating wild dogs against rabies and distemper can ever be safe and effective, and whether other methods (including control or vaccination of domestic dogs) can reduce the risks to wild dogs; (2) determining the true impact of wild dogs on livestock under different conditions of husbandry, and the effectiveness of techniques to reduce this; (3) establishing the true impact of wild dogs on managed wild game and the effectiveness of techniques to resolve conflicts with game ranchers; (4) surveys of wild dog distribution and status are also required, particularly in Algeria, Angola, Cameroon, Central African Republic, Ethiopia, Mozambique and Sudan; (5) genetic research would be valuable to establish the distinctiveness of wild dog populations remaining in west, central and north-east Africa; and (6) the reasons for and degree of fluctuation in packs and populations need to be better understood. In addition, several aspects of wild dogs' basic biology require further study, particularly: (1) mechanisms of ranging and dispersal; (2) causes of increased mortality among dispersers; (3) reasons for large home range; (4) mechanisms of sex-ratio biasing; (5) paternity; and (6) communication.

Core literature

Creel and Creel 1995, 1996, 2002; Frame *et al.* 1979; Fuller and Kat 1990; Fuller *et al.* 1992a,b; Girman *et al.* 1997, 2001; Malcolm and Marten 1982; McNutt 1996a,b; Mills and Gorman 1997; Woodroffe and Ginsberg 1999a; Woodroffe *et al.* 1997.

Reviewers: Scott Creel, Joshua Ginsberg, Kim McCreery, Gregory Rasmussen, Robert Robbins. **Editors:** Claudio Sillero-Zubiri, Michael Hoffmann.

6.6 Bat-eared fox *Otocyon megalotis* (Desmarest, 1822) Least Concern (2004)

J.A.J. Nel and B. Maas

Other names

Afrikaans: bakoovos, bakoorkakkals, draaijakkals; **French:** l'otocyon; **German:** löffelhund; **Indigenous names:** ||K'au||en and !Kung San (Bushmen): !u (Botswana and Namibia); Amharic: joro-kib kebero (Ethiopia); Swahili: bwega masigio; Karamojong: ameguru; Kichagga: kipara; Kigogo: nchenjeji; Kikomo: mchutu; Kinyaturu: bii; Kiramba: bili (Kenya, Tanzania); Herero: okata-ká-ha; Nama: bergdamara; Hei||kum San (Bushmen): ||ab;

Ovambo: ombúü (Namibia); Northern Sotho: mo-tlhose; Tswana: motlósi; Zulu: udlamhloshwana (South Africa).

Taxonomy

Canis megalotis Desmarest, 1822. Mammalogie, in Encyclop. Meth., 2 (suppl): 538. Type locality: “le Cap de Bonne-Espérance” [South Africa, western Cape Province, Cape of Good Hope].

Included by some authors, e.g., Simpson (1945) and Ellerman *et al.* (1953), in a separate subfamily, the *Otocyoninae*, on account of its aberrant dentition; more recently (Clutton-Brock *et al.* 1976 and subsequent authors) this species is regarded as having affinities with the vulpine line.

Chromosome number: 2n=72 (Wayne *et al.* 1987).

Description

A small, slight canid with slim legs, a long bushy tail and conspicuously large ears. Males (4.1kg) are heavier than females (3.9kg) (average for both sexes 3.9kg) (see Gittleman 1989), although, in Botswana, females weigh marginally more than males (Table 6.6.1). The back of the ears, front part of the snout, face mask, front and lower part of the back legs, and the mid-dorsal part of the tail are black. A whitish band extends from across the forehead to below and up the first three-quarters of the frontal rim of the ears. Some animals have a broad, dark mid-dorsal band. Beige- to honey-coloured fur covers the lower jaw from behind the muzzle and extends across the throat, chest and under parts. Fur coloration is paler in older individuals. Body and tail fur are thick and soft on upper parts with a black base and white tip, giving a grizzled or grey appearance; sides appear more buff. Underfur on the

Table 6.6.1. Body measurements for the bat-eared fox from Botswana (Smithers 1971).

HB male	529mm (462–607) n=25
HB female	536mm (467–607) n=29
T male	298mm (230–340) n=25
T female	303mm (278–340) n=29
HF male	149mm (140–161) n=25
HF female	150mm (139–165) n=29
E male	124mm (119–137) n=25
E female	124mm (114–134) n=29
WT male	4.0kg (3.4–4.9) n=22
WT female	4.1kg (3.2–5.4) n=29

upper body is about 30mm long, while the dense overcoat of guard hairs measures about 55mm. A sprinkling of tactile hairs (up to 65mm) occurs amongst the guard hairs (Skinner and Smithers 1990). Bat-eared foxes are unique amongst living eutherians (odontocetes excepted) in having four to five functional lower molars, and unique amongst modern canids in having three to four upper molars (Guilday 1962). The milk dentition is typically canid, with unreduced carnassials. In adults, the carnassial shear is lost and molars become the most bunodont, verging on zalambodont, of any canid (see Kieser 1995). Supernumerary molars yield a dentition of 3/3-1/1-4/4-3-4/4-5=46-50, the largest number for any non-marsupial land mammal.

Subspecies Two subspecies are recognised (Coetsee 1977):

- *O. m. megalotis* (southern Africa)
- *O. m. virgatus* (East Africa)



Bat-eared fox. Robertson Karoo, Western Cape Province, South Africa.

Chris and Tilde Stuart

Similar species Cape fox (*Vulpes chama*): somewhat smaller; silver-grey upper parts, under parts off-white to pale fawn; head and back of ears reddish fawn; no black on back; tail more bushy, only tip black.

Current distribution

The bat-eared fox has a disjunct distribution range, occurring across the arid and semi-arid regions of eastern and southern Africa in two discrete populations (representing each of the known subspecies) separated by about 1,000km (Figure 6.6.1). *Otocyon m. virgatus* ranges from southern Sudan, Ethiopia and Somalia down through Uganda and Kenya to south-western Tanzania; *O. m. megalotis* occurs from Angola through Namibia and Botswana to Mozambique and South Africa (Coetzee 1977; Kingdon 1977; Skinner and Smithers 1990). The two ranges were probably connected during the Pleistocene (Coe and Skinner 1993). This disjunct distribution is similar to that of the aardwolf (*Proteles cristatus*) and black-backed jackal (*Canis mesomelas*).

Range extensions in southern Africa in recent years (e.g., Stuart 1981; Marais and Griffin 1993) have been linked to changing rainfall patterns (MacDonald 1982).

Range countries Angola, Botswana, Ethiopia, Kenya, Mozambique, Namibia, Somalia, South Africa, Sudan, Tanzania, Uganda, Zimbabwe (Smithers 1971; Smithers

and Lobão-Tello 1976; Coetzee 1977; Kingdon 1977; Smithers and Wilson 1979; Skinner and Smithers 1990).

Relative abundance

The species is common in conservation areas in southern and eastern Africa, becoming uncommon in arid areas and on farms in South Africa where they are occasionally persecuted. Within a circumscribed habitat, numbers can fluctuate from abundant to rare depending on rainfall, food availability (Waser 1980; Nel *et al.* 1984), breeding stage and disease (Maas 1993a, b; Nel 1993).

Estimated populations/relative abundance and population trends

In the south-western Kalahari, bat-eared fox numbers can vary over time: regular counts along a 21km stretch of dry riverbed, with an area of c.10km², were of 7–140 individuals, i.e., 0.7–14/km² (Nel *et al.* 1984; Nel 1996). In the Limpopo province, South Africa, Berry (1978) found densities of 5.7 foxes/km², and in the nearby Mashatu Game Reserve, Botswana, densities of 9.2 foxes/km² in the breeding season, and 2.3 foxes/km² at other times. At the Tussen-die-Riviere Game Reserve, Free State province, South Africa, Mackie (1988) recorded densities that varied from 0.3–0.5 foxes/km² over a three-year period, while Kuntzsch (1992) found densities that ranged from 1.1–2.0 foxes/km² on two farms in the central Karoo of the Northern Cape province. Hendrichs (1972) recorded a density of 0.3–1.0 foxes/km² in the Serengeti.

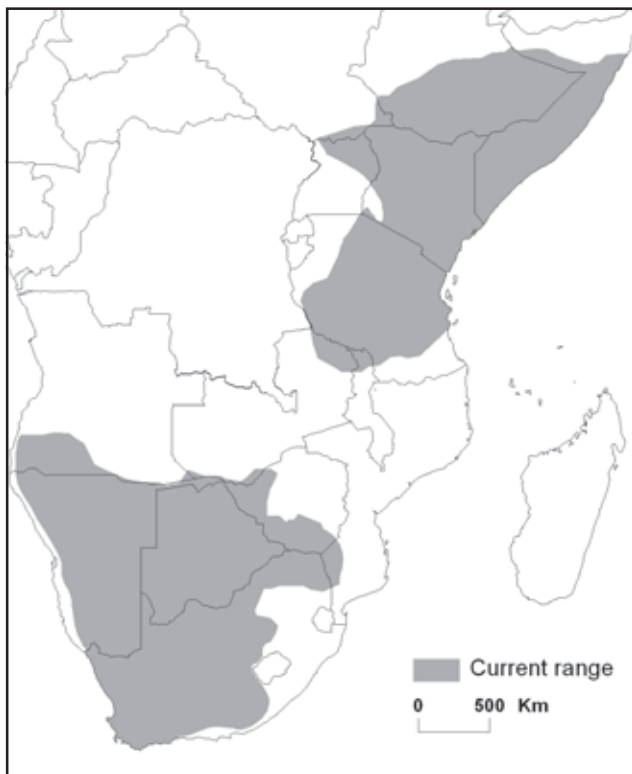
Habitat

In southern Africa, the prime habitat is mainly short-grass plains and areas with bare ground (Mackie and Nel 1989), but they are also found in open scrub vegetation and arid, semi-arid or winter rainfall (fynbos or Cape macchia) shrub lands, and open arid savannah. The range of both subspecies overlaps almost completely with that of *Hodotermes* and *Microhodotermes*, termite genera prevailing in the diet (Mackie and Nel 1989; Maas 1993a). In the Serengeti, they are common in open grassland and woodland boundaries but not short-grass plains (Lamprecht 1979; Malcolm 1986); harvester termite (*H. mossambicus*) foraging holes and dung from migratory ungulates are more abundant in areas occupied by bat-eared foxes, while grass is shorter and individual plants are more widely spaced (Maas 1993a).

Food and foraging behaviour

Food In the Serengeti's woodland boundary, and the open grasslands of southern and East Africa, insects are the primary food sources, with harvester termite and beetles predominating, and supplemented by smaller numbers of orthopterans, beetle larvae and ants (Shortridge 1934; Berry 1978; Nel 1978; Lamprecht 1979; Waser 1980; Stuart 1981; Malcolm 1986; Mackie 1988;

Figure 6.6.1. Current distribution of the bat-eared fox.



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Skinner and Smithers 1990; Maas 1993a). In open shrub savannah in Botswana other taxa such as arachnids can be more common, while fruit is taken seasonally (Nel 1978; Skinner and Smithers 1990) but can be important in open shrub vegetation with scattered trees (Skinner and Smithers 1990; Kuntzsch and Nel 1992). Small mammals, birds, eggs and reptiles are eaten sporadically in southern Africa (Nel 1978; Skinner and Smithers 1990) but rarely in eastern Africa (Lamprecht 1979; Maas 1993a).

Seasonal changes in the proportion of particular taxa occur (Nel 1978; Nel and Mackie 1990; Maas 1993a). In the Serengeti dung beetles are the main source of food during the rainy season when termite activity is reduced (Waser 1980; Maas 1993a). When both are scarce, beetle larvae are often dug up from the ground (Maas 1993a). *Hodotermes mossambicus* is patchily distributed throughout the Serengeti and may constitute a limiting resource in this part of the species' range (Maas 1993a). Harvester termites and dung beetles are more abundant in areas inhabited by clusters of bat-eared fox families, and local differences in *H. mossambicus* density are inversely related to territory size (Maas 1993a). *Hodotermes* foraging-hole density is positively related to a variety of demographic and reproductive variables, such as litter size and female recruitment rate (Maas 1993a). Although the animals' water requirements may be met by the high water content of their insect prey or, in southern Africa, berries during the summer (Nel 1978; Kuntzsch and Nel 1992), water constitutes a critical resource during lactation (Maas 1993a).

Foraging Foraging techniques depend on prey type (Maas 1993a), but food is often located by walking slowly, nose close to the ground and ears cocked forward. Prey is detected mostly by sound; sight and olfaction play a lesser role (Nel 1978). Changes in daily and seasonal *H. mossambicus* availability directly affect bat-eared fox activity patterns. In eastern Africa nocturnal foraging is the rule (Lamprecht 1979; Malcolm 1986; Maas 1993a). In southern Africa nocturnal foraging during summer gradually changes to an almost exclusively diurnal pattern in winter, mirroring activity changes of *H. mossambicus* (Nel 1990). By day, foraging peaks at the height of insect activity (Koop and Velimirov 1982; Nel 1990). Foraging and feeding rate is higher when feeding on termite patches, than on more dispersed insects (e.g., beetle larvae or grasshoppers) (Nel 1990).

In the Serengeti groups frequently patrol known *Hodotermes* patches in their territory after leaving the den in the evening (Maas 1993a). When feeding on termite patches, group members feed closely together, but when feeding on beetles, beetle larvae or grasshoppers group members can forage up to 200m apart (Nel 1978; Maas 1993a). Group members call each other to rich food patches with a low whistle. In the hard-capped soils of the

Karoo shrubland and inter-dune, excavations made during foraging by bat-eared foxes, aardvark (*Orycteropus afer*), porcupines (*Hystrix africae australis*) and Cape foxes (*Vulpes chama*) act as microsites, which foster germination of plant seedlings (Dean and Milton 1991). See also Reproductive and denning behaviour.

Damage to livestock or game There is no evidence for predation on livestock or game (e.g., Kok 1996). However, in South Africa bat-eared foxes are sometimes mistaken for livestock predators when seen feeding on fly larvae in lamb carcasses.

Adaptations

Bat-eared foxes are adapted to their predominantly insectivorous diet with a variety of morphological, demographic and behavioural characteristics. Morphologically, the animals' huge ears, used to detect insect prey, are the most conspicuous morphological adaptation and may also serve a thermoregulatory function (Maas 1993b). Insectivory has also affected the number and shape of the animals' teeth (see above). A modification in the insertion point of the digastric muscle facilitates very rapid chewing (Gaspard 1964; cited in Malcolm 1986).

In southern Africa nocturnal foraging during the hot summer changes to a diurnal pattern in winter, when subzero night temperatures are common (Nel 1990). Group members can huddle in dens by night or in the early morning to escape the cold, or seek shade to escape the worst heat, or in the open, facing multiple directions, to ease predator detection. In southern Africa, an eight-week moult takes place between August and September and again between January and February (Smithers 1971).

Male parental care, allo-suckling and, in some areas, communal breeding occurs because insect prey has a high renewal rate, the cost of food sharing is low and dispersal risk high amidst limited breeding territories (Maas 1993a; see also Reynolds 1977; and see Reproductive and denning behaviour).

Social behaviour

Bat-eared foxes in southern Africa live in monogamous pairs with cubs (Nel *et al.* 1984), while those in eastern Africa live in stable family groups consisting of a male and up to three closely related females with cubs (Maas 1993a). Group size varies with time of year, with a mean of 2.72 (range=1–10; n=623) for *O. m. megalotis* (Nel *et al.* 1984); in the Serengeti, average adult group size is 2.44 (± 0.1 ; n=18), and group size prior to dispersal of pups is 6.0 (± 0.4 ; n=18) (Maas 1993a). Additional females in extended family groups are philopatric daughters, sometimes from several generations, which form a hierarchy based on age. All females in such 'super families' breed (Maas 1993a, see also Reproductive and denning behaviour).

Groups forage as a unit, and have home ranges from less than 1km² to more than 3km². In southern Africa home ranges overlap widely (Nel 1978; Mackie and Nel 1989). However, in East Africa they can either overlap (Malcolm 1986) or, as in the Serengeti, where they cluster around harvester termite colonies, be defended as territories that are patrolled and urine-marked during part of the year (Lamprecht 1979; Maas 1993a). Group size determines the outcome during territorial conflict (Maas 1993a, 1993b). Territory inheritance is not uncommon in the Serengeti and neighbouring groups can be closely related, with animals visiting each other from time to time (Maas 1993a).

Bat-eared foxes engage in frequent and extended allo-grooming sessions, which serve to strengthen group cohesion (Maas 1993a). In the south-western Kalahari, it increases markedly (as does urine-marking) during courtship, when huddling, playing and mutual chasing. Vigorous and extended social play is very common in this species, not only in cubs but also adults even after the young have left (B. Maas unpubl.).

Communication is primarily visual, with a variety of ear and tail positions, emphasised by dark markings, used for displays (Nel and Bester 1983; B. Maas pers. obs.). The unique inverted U position of the tail is indicative of a range of states of arousal including fear, play and alarm (Nel and Bester 1983). Vocalisations are mostly soft and sparingly used (Lamprecht 1979; Nel and Bester 1983), except when the animals are highly alarmed or excited during play (Maas 1993a).

Reproductive and denning behaviour

Bat-eared foxes become sexually mature at 8–9 months of age. Pair-bonding and mating takes place from July to September with up to 10 copulations per day for several days (Rosenberg 1971), and with a copulatory tie lasting *c.* 4 minutes, followed by peculiar post-copulatory play (Le Clus 1971). Bat-eared foxes have one litter per year, with births occurring from October to December (Nel *et al.* 1984; Maas 1993a), following a gestation period of 60–75 days. Litter size ranges from 1–6, and in the Serengeti averages 2.56 (n=90). Neonates weigh from 99–142g.

Dens are excavated by breeding adults or adapted from disused dens of other mammals (e.g., springhare *Pedetes* spp., aardvark, and even termite mounds and warthog holes *Phacochoerus* spp.; Lamprecht 1979; Maas 1993a). Dens may have several entrances and chambers and tunnels up to 3m long (Smithers 1971; Berry 1978), and are used for protection against predators and the elements (e.g., flooding, temperature extremes), particularly by the newborn cubs. Small cubs nurse inside the den, later outside and first emerge for brief periods when they are 8–12 days old. Cubs are sometimes moved between dens (Maas 1993a; Pauw 2000, see above), and in the Serengeti, bat-eared foxes utilise ‘foraging dens’ for

the protection of cubs in different parts of the territory (Maas 1993a). Dens are carefully maintained throughout the year, often for generations (Maas 1993a). Breeding dens can be clustered: in the south-western Kalahari six dens were found in a 0.5km² section of the riverbed in 1976 (J.A.J. Nel unpubl.), and each was occupied by an adult pair and 2–3 cubs (16 in total). Two further dens were nearby.

The male spends more time close to the cubs than females, grooming, guarding and playing with them and defending them against predators. Maternal investment during lactation is high in bat-eared foxes compared with other canids, but due to an insectivorous diet mothers and/or cubs cannot be provisioned directly in the conventional sense (Maas 1993a; but see Pauw 2000). The high level of male parental care, however, enables females to maximise their foraging time, which limits nutritional intake in small, dispersed food items. The disparity in care between the sexes becomes less prominent after weaning (10–15 weeks; Berry 1978; Maas 1993a), which in the south-western Kalahari occurs after the first rains and subsequent flush of insects.

Young cubs are initiated into foraging by the male (Nel 1978), and in the Serengeti parents facilitate better access to different *H. mossambicus* patches for small and vulnerable cubs by regularly guiding the cubs from the breeding den to ‘nocturnal feeding dens’ (Maas 1993a). Social learning by cubs seems to be involved (Nel 1999). The nuclear family group persists until the following June when cubs disperse and the pair – which mates for life (Maas 1993a) – reaffirm their pair bond (Nel 1984).

In East Africa (Serengeti), polygyny, communal breeding and indiscriminate allo-suckling is common. In extended family groups (‘super families’; see Social behaviour), where there is more than one breeding female, nursing effort per cub is higher in daughters than in alpha females (Maas 1993a). The number of cubs to emerge from the den in ‘super families’ is inversely related to the number of breeding females. Cubs raised per ‘super family’ average 3.6 in the Serengeti (n=48), in contrast to the normal 2.56 (see above), but is subject to annual variation potentially linked to food availability (Maas 1993a). Because of the benefits, particularly amongst related females, of sharing both males and insect prey, additional breeding females spread the energetic costs associated with reproduction (Maas 1993a).

Although communal breeding is rare in southern Africa (Nel *et al.* 1984; Pauw 2000), family groups can also coalesce, with up to 10 non-suckling juveniles and three adults (J.A.J. Nel unpubl.).

Competition

In southern Africa bat-eared foxes are sympatric with other carnivores (e.g., suricates *Suricata suricatta*, yellow mongoose *Cynictis penicillata*, black-backed jackal *Canis*

mesomelas and Cape fox *Vulpes chama*) that also feed on insects and therefore scramble (and even interference) competition cannot be ruled out. However, in most cases, although there is dietary overlap, rank order of particular prey in the diet of these sympatric carnivores differs (Bothma *et al.* 1984; MacDonald and Nel 1986; Kok and Nel 1992; Kok 1996; Nel and Kok 1999). Bat-eared foxes attack and mob and can displace Cape foxes, aardvarks, aardwolves, and black-backed jackals and even hyenas, especially if the latter approach a den with cubs.

Mortality and pathogens

Natural sources of mortality During droughts, or in the absence of suitable breeding territories (Maas 1993a), lack of food can cause starvation, or decrease ability to avoid predators. Predators include spotted hyaena (*Crocuta crocuta*), martial eagle (*Polemaetus bellicosus*), spotted eagle owl (*Bubo africanus*), Verreaux's eagle owl (*Bubo lacteus*), rock pythons (*Python sebae*) (Maas 1993a), cheetah (*Acinonyx jubatus*), wild dog (*Lycaon pictus*) (Rasmussen 1996), and leopard (*Panthera pardus*) (Bothma and Le Riche 1982; J.A.J. Nel pers. obs.). Pups also fall prey to black-backed jackal (*Canis mesomelas*) (Pauw 2000; J.A.J. Nel and B. Maas pers. obs.).

Persecution In southern Africa persecution is limited to farms where these foxes are sometimes erroneously regarded as predators of young lambs (see Kok 1996).

Hunting and trapping for fur Limited to indigenous peoples in southern Africa, especially Botswana, where hunting and trapping for fur in the colder months can be severe. Treated skins (often as blankets) are known as "macloutsi". Individuals and sometimes families are also captured for food in Botswana (see Sheldon 1992; B. Maas pers. obs.). Surprisingly, bat-eared foxes are sold as trophy animals in South Africa, but the extent of this trade is unknown.

Road kills In South Africa, Namibia and Tanzania, road kills can be numerous; often pairs and some young are run over together.

Pathogens and parasites Rabies (Maas 1993b; Nel 1993; Thomson and Meredith 1993) and canine distemper (Roelke-Parker *et al.* 1996; E.A.N. Le Riche pers. comm.) can cause drastic declines in populations. In East Africa, both diseases have been linked to reservoirs in domestic dogs (Cleaveland and Dye 1995; Carpenter *et al.* 1998). In the Serengeti, 90.4% of mortality was caused by disease (3.2% each by predation and road accidents (n=94)). Trichinellosis has been found in one Serengeti bat-eared fox, but any effect on mortality is unknown (Pozio *et al.* 1997). Canine parvovirus (CPV-2b) has also been isolated from a bat-eared fox (Steinel *et al.* 2001).

Longevity Recorded up to 13 years in captivity, but probably shorter in the wild.

Historical perspective

In southern Africa, especially Botswana, treated skins (macloutsi) are commonly used for making karosses (skin blankets).

Conservation status

Threats: In southern Africa the primary threats are hunting for skins or, because they are perceived as being predators of small livestock. Populations fluctuate due to disease or drought.

Commercial use Very limited, but winter pelts are valued and sold as blankets. They are also sold as hunting trophies in South Africa.

Occurrence in protected areas

- **Botswana:** Kgalagadi Transfrontier Park, Central Kalahari Game Reserve, Chobe National Park;
- **Ethiopia:** Abiata-Shalla Lakes National Park, Awash National Park, Mago National Park, Nachisar National Park, Omo National Park;
- **Kenya:** Maasai Mara;
- **Namibia:** Etosha National Park, Namib-Naukluft National Park, Fish River Canyon National Park;
- **South Africa:** Au-grabies Falls National Park, Kgalagadi Transfrontier Park, Karoo National Park, Richtersveld National Park, Namaqua National Park, West Coast National Park, Mountain Zebra National Park, Goegap Nature Reserve, Bloemhof Nature Reserve, Soetdoring Nature Reserve, Willem Pretorius Nature Reserve, Tussen-die-Riviere Nature Reserve;
- **Tanzania:** Serengeti National Park;
- **Uganda:** Kidepo National Park;
- **Zimbabwe:** Hwange National Park.

Protection status CITES – not listed.

Current legal protection None known.

Conservation measures taken None known. Species widespread and mostly common.

Occurrence in captivity

Records from the International Species Information System (ISIS) indicate bat-eared foxes are kept in captivity in North America, Europe, South Africa and Asia, although never in large numbers. There are no management programmes or studbooks for the species in any of these regions. Importations have occurred throughout the history of the captive population despite successful captive breeding since 1970. Bat-eared foxes can coexist well with

other species and are frequently seen in African plains exhibits at zoos.

In South Africa an unknown number are being kept as pets, while they are also kept at a small number of international zoos. South African zoos keeping bat-eared foxes include Congo, Bester Birds, Hartbeespoort Dam, World of Birds, Bloemfontein Zoological Gardens, Johannesburg Zoological Gardens, Emerald, and Monkey Den.

Current or planned research projects

H. Wright (Warwick University, UK) is studying the behavioural ecology of monogamy in the bat-eared fox in Kenya.

N. Jordan (Department of Zoology, Cambridge University, UK) is planning a research project in the south-western Kalahari.

Gaps in knowledge

There is a conspicuous lack of information about both abundance and population trends in this species across its range. In southern Africa, little is known about dispersal of young and the formation of new breeding pairs. The causal factors for differences in home range size in different localities, group size and changes in density as a function of food availability are poorly known. In the Serengeti, behavioural evidence on group and pair formation and the existence of ‘super families’, consisting of one male and up to three closely-related breeding females, raises interesting questions about regular inbreeding between males and their daughters from several generations (see Maas 1993a).

Core literature

Lamprecht 1979; Maas 1993a,b; Maas and Macdonald 2004; Mackie 1988; Mackie and Nel 1989; Malcolm 1986; Nel 1978, 1990, 1993; Nel *et al.* 1984.

Reviewers: James R. Malcolm, Patricia D. Moehlman.

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6.7 Cape fox *Vulpes chama* (A. Smith, 1833) Least Concern (2004)

C. Stuart and T. Stuart

Other names

Afrikaans: silwervos, silwerjakkals, draaijakkals; **English:** silver fox, silver jackal; **French:** le renard du Cap; **German:** Kapfuchs; **Spanish:** zorro chama, zorro del Cabo; **Indigenous languages:** Xhosa: uGqeleba (South Africa); Heikum San: !khamalǰirib; Herero: ombánji-ururápa (Namibia); Ovambo: ombánji-kalulúnga, karurúnga

(Namibia); Tswana: leSie, thósê, thlósê, khanína (Botswana, South Africa).

Taxonomy

Canis chama A. Smith, 1833. S. Afr. Quart. J. 2: 89. Type locality: “Namaqualand and the country on both sides of the Orange river”, determined by Shortridge (1942: 41) as “Port Nolloth, Little Namaqualand” [South Africa, c. 29°15'N, 16°52'E].

Chromosome number not known.

Description

The smallest canid and only true fox occurring in southern Africa, the Cape fox has a slender build and a black-tipped bushy tail. Males are approximately 5% larger than females (Table 6.7.1). The overall coloration of the upperparts is grizzled silver-grey, with the lower limbs, head and back of the long ears reddish-brown to pale tawny-brown. There is some freckling of white hairs on the face with the greatest concentration being on the cheeks; the fronts of the ears are also fringed with white hairs. A narrow dark patch above and between the eyes and at the tip of the muzzle may be present. The upper chest is fawny-red, with the underparts coloured off-white to pale fawn, often with a reddish-brown tinge. The upper region of the front legs is reddish-yellow, paler as one descends to the paws, with a dark brown patch on the backs of the thighs of the hind legs. Overall, the body pelage is soft, with a dense underfur of wavy hairs (averaging about 25mm in length) overlaid by a thick guard coat, with individual hairs averaging 45mm in length; the latter are predominantly black in colour but with light-coloured bases and banded silver. Slightly longer black tactile hairs are scattered through the body coat. During the moulting period, from October to December, much of the guard coat is lost, giving the foxes a rather dull and ‘naked’ appearance. The upper surfaces of the paws are pale fawn to reddish, with the claws of the front feet being sharp, curved and averaging 15mm around the curve. There is pronounced hair growth between the foot-pads. The tail is very bushy with individual

Table 6.7.1. Body measurements for the Cape fox from the former Cape Province, South Africa (Stuart 1981).

HB male	554mm (450–610) n=21
HB female	553mm (510–620) n=15
T male	348mm (300–406) n=25
T female	338mm (250–390) n=17
HF male	131mm (123–140) n=20
HF female	126mm (115–140) n=17
E male	98mm (90–110) n=22
E female	97mm (87–105) n=17
WT male	2.8kg (2.0–4.2) n=17
WT female	2.5kg (2.0–4.0) n=11