A conservation assessment of Otocyon megalotis

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Otocyon megalotis – Bat-eared Fox

Ruan de Bruin

Regional Red List status (2016)	Least Concern
National Red List status (2004)	Least Concern
Reasons for change	No change
Global Red List status (2014)	Least Concern
TOPS listing (NEMBA) (2007)	Protected
CITES listing	None
Endemic	No

"The colloquial name draws attention to the large ears, so characteristic of the species. The bat referred to is probably the Egyptian Slit-faced Bat (*Nycerteris thebaica*), which is common and widespread in the subregion and has very large ears for the size of its body" (Skinner & Chimimba 2005).

Taxonomy

Otocyon megalotis (Desmarest 1822)

ANIMALIA - CHORDATA - MAMMALIA - CARNIVORA - CANIDAE - *Otocyon* - *megalotis*

Common names: Bat-eared Fox, Delalande's Fox (English), Bakoorjakkals, Bakoorvos, Draaijakkals (Afrikaans), Unga (Ndebele), Motlhosa (Sepedi), Phokojwee e ditsebe tsa mankgane, Motlhose (Sesotho), Udlamhloshana, Imphunushe (Swati), Xilwanandau, Xilwa-na-ndzawo (Tsonga), Motlhose, Motlhôse, Lethose, Tlhose, Tlhôsi (Tswana), Phunguhwe i re na Ndevhe Khulwane (Venda), Impungutye (Xhosa), Udlamhloshana (Zulu)

Taxonomic status: Species

Taxonomic notes: This is a monotypic genus with two recognised subspecies, *Otocyon megalotis megalotis* in southern Africa and *O. m. virgatus* from East Africa (Nel & Maas 2013).

Assessment Rationale

This species is listed as Least Concern because it is common in conservation areas and occurs widely on farms throughout the assessment region. Bat-eared Foxes are occasionally persecuted mistakenly as damage-causing animals. However, these threats, while suspected to cause local declines periodically, are not expected to be affecting the population trend overall. Monitoring, management and education are recommended to mitigate losses on farmlands, ranches and roads.

Regional population effects: There is a continuous population consisting of the assessment region and neighbouring countries. It is unlikely that the population in the assessment region is a sink. It is unknown whether or not immigrants from outside the region are frequent enough to enhance the regional population significantly. Bat-eared Foxes are efficient dispersers (Kamler et al. 2013a).

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 1,000 km. *Otocyon m. virgatus* ranges from southern Sudan, Ethiopia and Somalia down through Uganda and Kenya to southwestern Tanzania; *O. m. megalotis* occurs from Angola through Namibia and Botswana to Mozambique and South Africa (Coetzee 1977; Kingdon 1977; Skinner & Chimimba 2005). The two ranges were probably connected during the Pleistocene (Coe & Skinner 1993). This disjunct distribution is similar to that of other endemic, xeric species, for example Aardwolf (*Proteles cristata*) and Black-backed Jackal (*Canis mesomelas*). Bat-eared Foxes are considered widespread in both Namibia and Botswana and their distribution extends narrowly into Zimbabwe (Skinner & Chimimba 2005). In Mozambique, they are limited to the southwestern areas.

Within the assessment region, the species is absent from Lesotho, Swaziland and KwaZulu-Natal Province (Skinner & Chimimba 2005; Nel & Maas 2013). This could possibly be due to a lack of their preferred termite food source. Bat-eared Foxes are widespread throughout the rest of the assessment region, and indeed their distribution coincides mostly with that of harvester termites. There appears to have been a recent range expansion into the Gauteng and Mpumalanga provinces, as well as the southern parts of the Limpopo Province. The species occurs throughout the arid western parts of the North West Province (Power 2014) and, during above average rainfall years, abundance increases in arid savannahs (i.e. areas receiving < 300 mm rainfall / year) and decreases in mesic savannahs (> 500 mm / year) (Macdonald 1982), which would explain the species' local abundance in any given year. In the Western Cape, Bat-eared Foxes are found within the Cape Point Nature Reserve and along the coastal areas (e.g. West Coast National Park and

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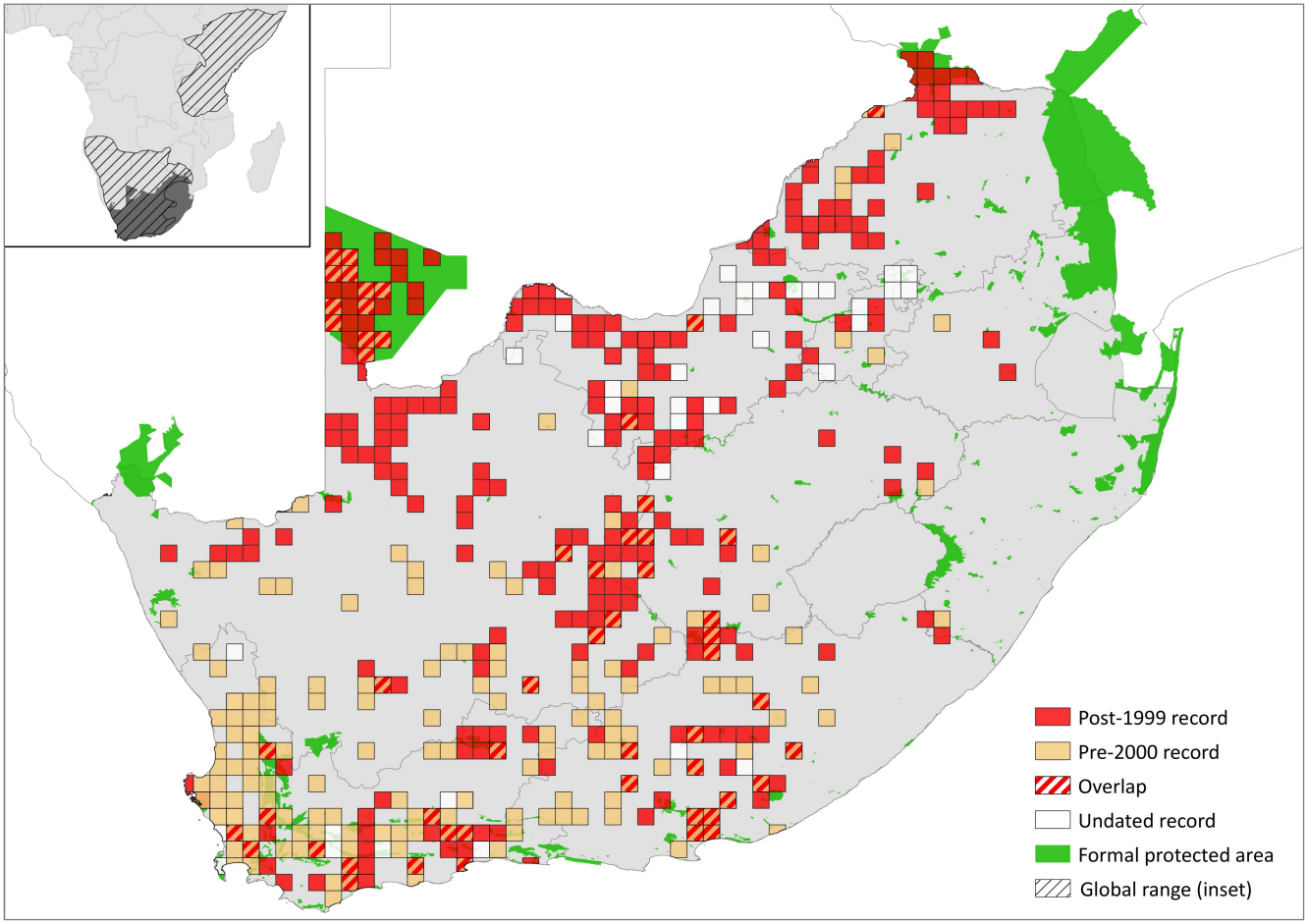

Figure 1. Distribution records for Bat-eared Fox (*Otocyon megalotis*) within the assessment region

Table 1. Countries of occurrence within southern Africa

Country	Presence	Origin
Botswana	Extant	Native
Lesotho	Absent	-
Mozambique	Extant	Native
Namibia	Extant	Native
South Africa	Extant	Native
Swaziland	Absent	-
Zimbabwe	Extant	Native

Elandsbaai). In the Eastern Cape, they have a more restricted distribution – being confined to the western inland areas of the province (Skinner & Chimimba 2005).

Population

The species is common in conservation areas in southern Africa, and locally common in arid areas and on farms on the Karoo plateau. However, natural population fluctuations can complicate estimates of population trends. Within a circumscribed habitat, numbers can fluctuate depending on rainfall, food availability (Waser 1980; Nel et al. 1984), breeding stage and disease (Maas 1993a,b; Nel 1993). Persecution may cause local declines in other areas of their distribution. Living in nuclear family groups with high rates of amicable behaviour, Bat-eared Foxes may be particularly susceptible to local outbreaks of diseases such as canine distemper virus, canine parvovirus and rabies (Kamler et al. *in press*). Populations in the Kimberley area (Northern Cape Province) that were being peripherally monitored during ongoing sympatric carnivore studies were seen to crash following such outbreaks, only recovering after a year or two (B. Wilson & F. Dalerum pers. obs. 2007–2012).

Population densities can vary enormously, from Bat-eared Foxes being rare to abundant. The estimated density of Bat-eared Foxes on a a sheep farm and a game farm near Kimberley, were estimated at 1.1 and 0.7 individual(s) / km^2, respectively (Kamler et al. 2012, 2013b). In the south western Kalahari in dry river beds, Nel et al. (1984) recorded densities between 0.7–14 individual(s) / km^2. Densities were higher in Limpopo Province at 5.7 individuals / km^2. At Tussen-die-Riviere Game Reserve in the Free State, Mackie and Nel (1989) reported varying densities of 0.3–0.5 individual / km^2 over a 3-year period, while in the central Karoo densities were higher with between 1.1 and 2.0 individuals / km^2 (Kuntzsch & Nel 1992).

Current population trend: Overall stable despite sometime drastic local fluctuations.

Continuing decline in mature individuals: No

Number of mature individuals in population: Unknown

Number of mature individuals in largest subpopulation: Unknown

Number of subpopulations: It is not currently possible to determine the extent or number of subpopulations.

Severely fragmented: No. Although this species seems to largely depend on the presence of harvester termites,

Photo 1. A group of Bat-eared Foxes (*Otocyon megalotis*) foraging during the afternoon in the Kgalagadi Transfrontier Park (Emmanuel Do Linh San).

its distribution is relatively continuous as favourable habitats are generally connected.

Habitats and Ecology

In southern Africa, the prime habitat is mainly short-grass plains and areas with bare ground (Mackie & Nel 1989), but Bat-eared Foxes are also found in open scrub vegetation and arid, semi-arid or winter rainfall (Fynbos or Cape Macchia) shrub lands, and open arid savannah. They are absent from true desert or afforested areas. The range of both subspecies overlaps almost completely with that of *Hodotermes* and *Microhodotermes* termite genera prevailing in the diet (Mackie & Nel 1989; Maas 1993a). Recent empirical evidence confirms that these foxes are primarily acoustic foragers (Renda & Le Roux 2017), unlike many other canids who rely on visual and olfactory cues while hunting.

Density, home range size, and group size appear to be affected by both bottom-up (i.e. termite abundance; Maas 1993b) and top-down factors (i.e. Black-backed Jackal numbers; Kamler et al. 2013b). Group size varies with the time of the year, with the monogamous pair being accompanied by up to six cubs prior to the dispersal period (Kamler et al. *in press*). Groups forage as a unit in home ranges that may increase during the dry season, due to changes in food resources and group sizes. These home ranges are patrolled and urine-marked and will be defended, with the outcome determined by group size. These family groups may be extended by philopatric daughters from several generations (Maas 1993b). In the Serengeti (Tanzania), 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). That said, dispersal patterns by all sex and age groups, especially adult females, appears to reduce the opportunities for inbreeding (Kamler et al. 2013a).

Pair-bonding and mating peak during late winter and early summer, with births occurring at the onset of the wet season, in September to December. A single litter of 1–6 cubs (usually 5) is produced annually after a 60 to 75-day gestation period. Extra-pair paternity is low in this species, presumably because the diet of Bat-eared Foxes allows pair members to maintain proximity, while discouraging roaming (Wright et al. 2010). Males play an important role in the raising of the young, spending more time than females with cubs, grooming, guarding and playing with them, and defending them against predators (Wright 2006; Nel & Maas 2013). In the Kalahari, weaning is prompted after the first rains and subsequent flush of insects.

Ecosystem and cultural services: Several bird species apparently benefit from this species during winter, as they consume termites which are dug up by the Bat-eared Foxes (Stenkewitz & Kamler 2008).

- Ecosystem service: influence vegetation structure by digging.
- Ecosystem service: influence disease dynamics as possible vectors of a number of viruses (such as rabies and canine distemper virus).
- Cultural service: skin use, plus various other body parts used in traditional zootherapeutic preparations.

Table 2. Use and trade summary for the Bat-eared Fox (*Otocyon megalotis*)

Category	Applicable?	Rationale	Proportion of total harvest	Trend
Subsistence use	Yes	Used as bushmeat and traditional medicine (skin, anal glands).	Unknown	Unknown, probably stable.
Commercial use	Yes	Trophy hunting and pet trade.	Limited	Unknown, probably stable.
Harvest from wild population	Yes	Trophy hunting	Limited	Unknown, probably stable.
Harvest from ranched population	-	-	-	-
Harvest from captive population	Yes	Pet trade	Limited	Unknown, probably stable.

Table 3. Possible net effects of wildlife ranching on the Bat-eared Fox (*Otocyon megalotis*) and subsequent management recommendations

Net effect	Positive
Data quality	Estimated
Rationale	Overstocked wildlife ranches may increase termite abundance which would increase Bat-eared Fox abundance.
Management recommendation	Reduce persecution of this species through holistic management techniques.

Use and Trade

Bat-eared Foxes may be persecuted as damage-causing animals, and will also be subject to accidental persecution where the intended target is another species.

Skins are traded commercially, at the national scale, and they are also offered as trophies in small numbers throughout South Africa, Namibia and Tanzania. Commercial use is very limited, but winter pelts are valued and sold as blankets. Bat-eared Foxes are also kept in captivity in North America, Europe, South Africa and Asia as exotic pets, although never in large numbers.

In general, Bat-eared Foxes do well on game/wildlife farms. Because this species focuses on termite consumption, it is compatible with a broad range of habitats and management strategies. However, their well-being may be inversely affected by high numbers of larger predators, particularly Black-backed Jackals, due to intraguild predation.

Threats

In the assessment region, the primary threats are hunting for skins and intended or accidental persecution, although the exact relative impacts need to be quantified. Bat-eared Foxes often fall prey to a variety of raptor species, as well as most larger carnivores. Black-backed Jackals are likely the greatest predator of Bat-eared Foxes (Kamler et al. 2012, 2013b). Jackals may not only have negative impacts on numbers of Bat-eared Foxes (Blaum et al. 2009), but they can also affect the group size and home range size of this species (Kamler et al. 2013b).

Climate change is likely to affect distribution patterns, but not necessarily population numbers. This species does not exclusively feed on harvester termites (Klare et al. 2011), and therefore could adapt to locally changing conditions by switching to other food sources, such as other invertebrates or fruits. Bat-eared Foxes are able to quickly move into areas that are rehabilitated or suited to their needs (Rova 2003), probably due to their extensive dispersal abilities (Kamler et al. 2013a). The expansion of agricultural areas (direct anthropogenic change) may have a stronger impact on numbers and distribution, given their persecution by farmers, and the increased potential for diseases such as rabies and canine distemper being spread through contact with domestic dogs (Rova 2003; Kamler & Macdonald 2006; Kamler et al. *in press*).

Bat-eared Foxes are also very often killed on roads (Bullock et al. 2011). For example, 37 dead individuals (possibly killed over a few weeks' period) were counted on a single day along a 170 km stretch of road along the R360 towards Upington in the Northern Cape (K. Jumban unpubl. data). Further, between 2009 and 2016, at least 602 Bat-eared Foxes were killed as a result of vehicle collisions across South Africa (EWT unpubl. data). This data was collected on an *ad hoc* basis and therefore, it is expected that numbers are likely to be higher.

Current habitat trend: Stable overall. As with Aardwolf and Aardvark (*Orycteropus afer*), Bat-eared Foxes may benefit from increased livestock levels as trampled vegetation and grazing increases termite numbers. Kurberg (2005) showed that grazing on a medium level favours Bat-eared Foxes in Namibia, but also that they are negatively affected by grazing when it becomes too intense. Partially degraded grasslands do constitute good termite habitat, hence potentially providing excellent conditions for the establishment of this canid.

Conservation

Bat-eared Foxes occur in many protected areas within the assessment region, including the Kgalagadi Transfrontier Park, as well as in numerous game ranches and farms throughout the assessment region (with the exception of KwaZulu-Natal).

Education aimed at improving public awareness of this species is seen as a primary conservation intervention. Awareness campaigns targeting landowners and farmers to the fact that this species primarily eats termites and does not damage livestock is paramount. Similarly, the

Table 4. Threats to the Bat-eared Fox (*Otocyon megalotis*) ranked in order of severity with corresponding evidence (based on IUCN threat categories, with regional context)

Rank	Threat description	Evidence in the scientific literature	Data quality	Scale of study	Current trend
1	*5.1.1 Hunting & Collecting Terrestrial Animals:* skins of Bat-eared Foxes traded commercially.	-	-	-	Stable
2	*5.1.3 Persecution/Control*: Bat-eared Foxes intentionally killed by landowners as they are mistakenly perceived as damage-causing animals.	-	-	National	Stable
3	*5.1.2 Hunting & Collecting Terrestrial Animals:* Bat-eared Foxes are accidentally killed by landowners during control operations (snares, poison) for damage-causing animals.	-	-	National	Stable
4	*8.2.2 Problematic Native Species/ Diseases*: moderate to high Black-backed Jackal numbers.	Blaum et al. 2009 Kamler et al. 2012, 2013b	Empirical Empirical	Local Local	Unknown, but possibly increasing due to recent increases in jackal numbers.
5	*8.5 Viral/Prion-induced Diseases:* lethal diseases (rabies, canine distemper virus) transmitted to Bat-eared Foxes through contact with domestic dogs.	-	-	-	Unknown, but possibly increasing due to expansion of agricultural areas.
6	*4.1 Roads & Railroads*: road collisions.	EWT unpubl. data Bullock et al. 2011	Empirical Empirical	National Local	Increasing with road construction.

Table 5. Conservation interventions for the Bat-eared Fox (*Otocyon megalotis*) ranked in order of effectiveness with corresponding evidence (based on IUCN action categories, with regional context)

Rank	Intervention description	Evidence in the scientific literature	Data quality	Scale of evidence	Demonstrated impact	Current conservation projects
1	*4.3 Awareness & Communication:* establish a national campaign to discourage the public from buying Bat-eared Fox pelts.	-	-	-	-	-
2	*4.1 Formal Education:* education and awareness for landowners and farmers.	-	-	-	-	-
3	*2.1 Site/Area Management*: the promotion of the "holistic" approach to the management of damage-causing animals.	-	-	-	-	-
4	*2.2 Problematic species control*: reduction in unnaturally high jackal numbers, either through reintroduction/protection of apex carnivores (preferable) or human control.	Blaum et al. 2009 Kamler et al. 2012, 2013b	Empirical Empirical	Local Local	Bat-eared Fox densities higher on farms with low Black-backed Jackal densities.	None
5	*2.1 Site/Area Management*: install sign boards on sensitive roads and particularly on collision hotspots.	Grilo et al. 2009	Empirical	Local	-	"Bat-eared Fox sign boards" installed on the R360 from Upington to Kgalagadi Transfrontier Park.
6	*2.3 Habitat and natural process restoration:* improve short-growth grassland through suitable grazing regimes.	-	-	-	-	-

public should be discouraged from buying Bat-eared Fox pelts or, at least, a sustainable and well-monitored trade should be established.

The species is a particularly high road-collision risk in some areas (EWT unpubl. data). In the Kalahari, sign boards were used to warn visitors travelling to the Kgalagadi Transfrontier Park to reduce their speed. It was later determined through interviews that the majority of Bat-eared Fox incidents were actually from local residents who were more familiar with the roads and travelled at faster speeds after sunset. However, such signage is used internationally as a standard mitigation measure and can be effective in raising general public awareness if used correctly (Bond & Jones 2013).

Recommendations for land managers and practitioners:

- Monitoring population trends of Bat-eared Foxes.
- Reducing persecution as damage-causing animals through improved local knowledge.
- Maintain short-growth grassland through suitable grazing regimes.
- Managing numbers of Black-backed Jackals, especially in areas without apex predators, may benefit this species.

Research priorities: In southern Africa, a recent study documented important aspects of Bat-eared Fox ecology, such as home range size, habitat use, seasonal movements, mortality, dispersal patterns of adults and young, and formation of breeding pairs (Kamler et al. 2012, 2013a,b, *in press*). However, there is a conspicuous lack of information about both abundance and population trends in this species across its range. Overall, the following research priorities have been identified:

- Quantification of population trends and causes for population fluctuations.
- Quantification of large-scale population structure.
- Quantification of dispersal capabilities.
- Effects of disease on population dynamics.
- Role of Bat-eared Foxes in disease transmission.
- The effect of road mortalities on local populations and at a national level.
- The 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.
- The impacts of awareness campaigns and whether they can effectively reduce persecution by landowners and farmers.
- The impact of the absence of apex predators on farmland.

Encouraged citizen actions:

- Report sightings on virtual museum platforms (for example, iSpot and MammalMAP), especially outside protected areas.
- Report road mortalities to roads@ewt.org.za.
- Create conservancies by dropping fences between properties and holistically managing large areas.

Data Sources and Quality

Table 6. Information and interpretation qualifiers for the Bat-eared Fox (*Otocyon megalotis*) assessment

Data sources	Field study (literature, unpublished), indirect information (literature, expert knowledge, unpublished)
Data quality (max)	Inferred
Data quality (min)	Suspected
Uncertainty resolution	Author consensus
Risk tolerance	Evidentiary

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Details of the methods used to make this assessment can be found in *Mammal Red List 2016: Introduction and Methodology.*