

Felis nigripes, Black-footed Cat

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Taxonomy

Kingdom	Phylum	Class	Order	Family
Animalia	Chordata	Mammalia	Carnivora	Felidae

Taxon Name: *Felis nigripes* Burchell, 1824

Common Name(s):

- English: Black-footed Cat, Small-spotted Cat
- French: Chat à pieds noirs
- Spanish: Gato de Pies Negros, Gato Patinegro

Taxonomic Notes:

Two subspecies have been described and these persist in theory (Meester *et al.* 1986). *Felis nigripes nigripes*, the nominate genotype form described by Burchell, was first described from near Kuruman in the Northern Cape. Its range includes present-day south eastern Namibia, Botswana, Northern Cape, North West, Gauteng, Limpopo and marginally into Mpumalanga. *Felis nigripes thomasi* (Shortridge 1931) is described from a specimen collected near Grahamstown in the Eastern Cape. Its range includes the present-day Eastern Cape, westwards to the southern regions of the Northern Cape and the Free State.

However, Smithers (1971) doubted the validity of two subspecies, and his thought is shared by Sliwa (2013) who suggests that the species may be polymorphic in the centre of its range but does exhibit on some geocline variations towards the extremes of its range. The northern race typically tends to be paler with less distinct striping whereas the southern race has a more tawny appearance with bolder patterning. However, since there are no obvious geographical or ecological barriers between the ranges which are the leading causes of genetic drift and speciation (Hoskin *et al.* 2005), it is likely that the subspecies status is invalid (Wilson 2016).

Assessment Information

Red List Category & Criteria: Vulnerable C2a(i) [ver 3.1](#)

Year Published: 2016

Date Assessed: February 5, 2016

Justification:

This assessment is based on the national Red List assessment for South Africa (Wilson *et al.* 2016). Black-footed Cats are endemic to the arid regions of southern Africa, occurring widely across the western reaches in a relatively restricted and patchy distribution. The historical paucity of data has led to inconsistencies and perpetuated inaccuracies in current literature, which in turn has affected the accuracy of conservation measures. The naturally rare, cryptic colouring, small size and secretive nocturnal nature of this species has contributed considerably to the lack of information. Black-footed Cats are known to occur at low densities and it is difficult to establish population sizes. The stronghold of the species is suspected to be in the central Karoo region of South Africa where highest densities are

reached, whereas other regions are suspected to have medium or low densities. Using density estimates of 0.03 km², 0.02 km² and 0.01 km² for high, medium and low density areas respectively, we converted kernel densities to isopleths to calculate population size. Estimated population size is 13,867 individuals, of which 9,707 are considered to be mature (using a 70% mature population structure), where no subpopulation is suspected to comprise more than 1,000 mature individuals as the species is patchily distributed. However, defining subpopulations for this species needs further work. We also caution that these estimates will be confounded by uneven sampling across the range, thus leading to inaccurate density isopleths. This is a first attempt and should be refined as more data from across the range become available.

There is a general suspected continuing decline from to loss of prey base due to bushmeat poaching (especially Springhare *Pedetes capensis*), persecution (direct or incidental), road collisions and predation by domestic animals. Continuing decline is also inferred from a long-term study in Benfontein, Northern Cape where estimated density declined from 0.17 cats / km² in 1998–1999 to 0.08 cats / km² in 2005–2015. Additionally, c. 50% of radio-collared individuals are lost annually to a combination of natural mortality and predation from abundant Black-backed Jackals (*Canis mesomelas*) and Caracals (*Caracal caracal*). An emerging threat may be increasing interspecific competition, including intraguild predation, by overabundant mesopredators (for example, Black-backed Jackals *Canis mesomelas*).

Thus, we list this species as Vulnerable C2a(i), as population size is estimated to be fewer than 10,000 mature individuals, where no subpopulation is suspected to be more than 1,000 mature individuals, and there is an inferred continuing decline. We note that this is a precautionary assessment given the low density estimates used in the analysis, the lack of systematic field surveys across the range and the lack of a robust subpopulation definition. This species should be reassessed once such data are available. Key interventions include the establishing of large conservancy areas and sustaining viable Springhare subpopulations in areas where alternative refuge systems are unavailable.

For further information about this species, see [Supplementary Material](#).

Previously Published Red List Assessments

2008 – Vulnerable (VU) – <http://dx.doi.org/10.2305/IUCN.UK.2008.RLTS.T8542A12917449.en>

2002 – Vulnerable (VU)

1996 – Lower Risk/least concern (LR/lc)

Geographic Range

Range Description:

Black-footed Cats have the most restricted distribution of any of the African felid species (Nowell and Jackson 1996). The species is endemic to the arid grasslands, dwarf shrub, and savannah of the Karoo and Kalahari in southern Africa. The majority of the range occurs within the boundaries of South Africa, thinning out northwards into Botswana, Namibia and Zimbabwe (Table 1). The species is found primarily in Namibia and South Africa, but also Botswana (where there are historical records but only limited recent ones), marginally in Zimbabwe and likely marginally in extreme southern Angola (Sliwa 2013).

In South Africa, where the majority of research effort has taken place, recent records suggest range expansions in virtually all directions from previous literature (Wilson *et al.* 2016.). It is unlikely that true range extensions have occurred but is rather an artefact of reporting bias as a result of recently increased citizen scientist reports combined with increased research effort (Wilson 2016). On the eastern side of its range, occurrence records are confirmed to just west of the Kruger National Park, into north-western KwaZulu-Natal, and new data suggest that the species occurs further south and south-westwards in the Southern Cape and more westwards in the Northern Cape than previously realised (Wilson 2016). The occurrence of the species in Swaziland (M. Reilly and A. Monadjem pers. comm. 2014) and Lesotho (N. Avenant pers. comm. 2014) is considered highly unlikely and certainly no records exist to date.

Apart from Addo Elephant National Park and Mountain Zebra National Park in the Eastern Cape Province, and SA Lombard Nature Reserve in North West Province, there appears to be no consistent sightings of Black-footed Cats in formally protected areas, despite considerable research effort and game drive reporting (Wilson 2016). This is likely due to unsuitable habitat or the presence of a higher density of mesopredators which increases competition and incidences of intraguild predation. They probably occur in Karoo National Park. However, further field surveys are needed to determine in which protected areas subpopulations of the species are resident.

The current extent of occurrence in South Africa is roughly about 930,000 km² (Wilson 2016). However, we suspect that area of occupancy is considerably lower, due to sensitivity to environmental disturbances and threats (Sliwa 2013).

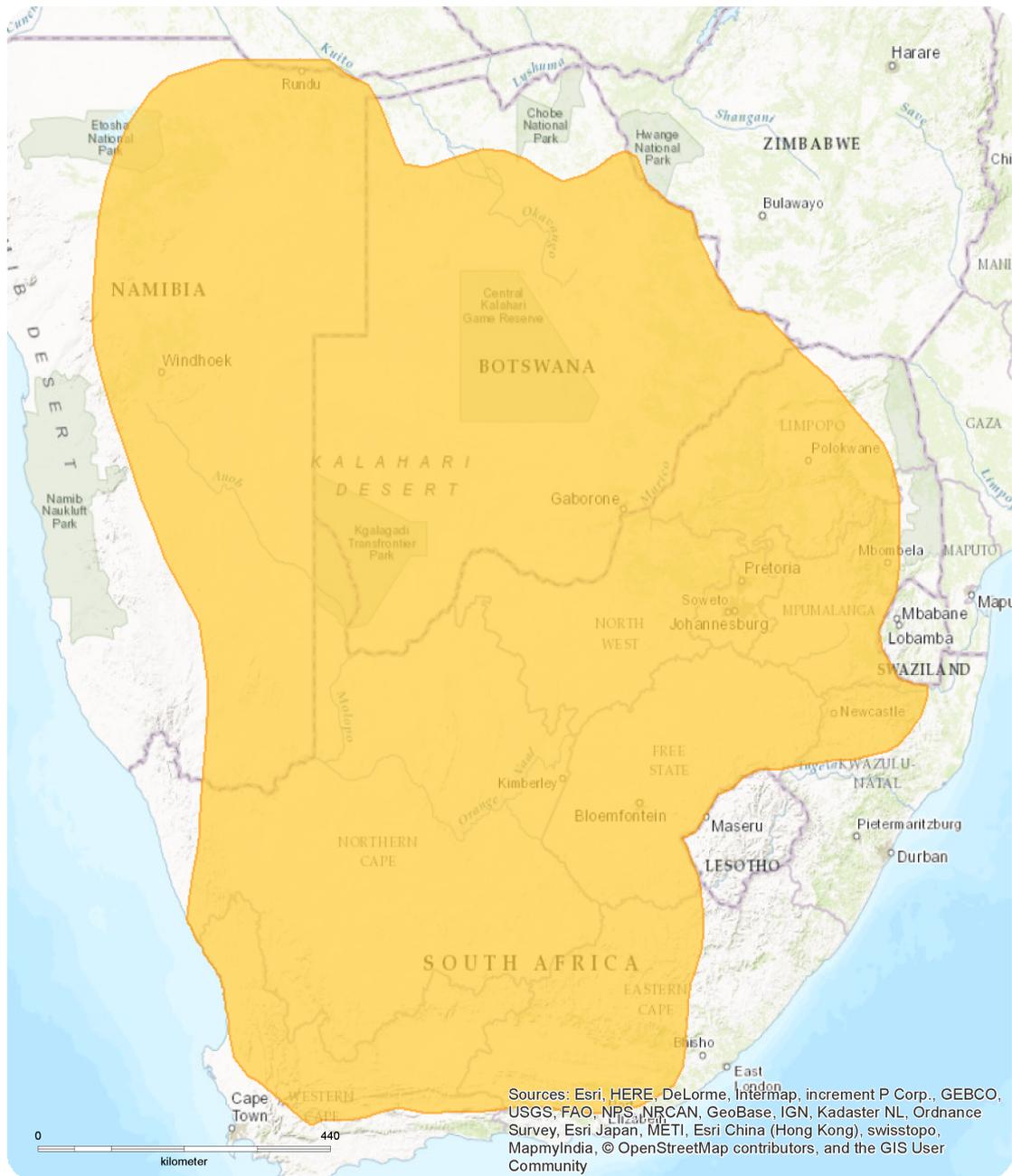
For further information about this species, see [Supplementary Material](#).

Country Occurrence:

Native: Botswana; Namibia; South Africa

Distribution Map

Felis nigripes



Range
 Extant (resident)

Compiled by:
 IUCN (International Union for Conservation of Nature)

NE DD LC NT VU EN CR EW EX
VULNERABLE



The boundaries and names shown and the designations used on this map do not imply any official endorsement, acceptance or opinion by IUCN.



Population

The Black-footed Cat is naturally rare compared to the other small cats of southern Africa (Sliwa 2013). Camera trapping for this species is particularly difficult due to secretive behaviour and small size. For example, in over 790 records, only one was from a camera trap (B. Wilson unpubl. data). Black-footed Cats move quickly and do not habitually use game tracks or roads like other animals. Since 2006, there has been extensive effort to establish the historical and current distribution of the species (Wilson 2016). Prior to 2000, there are only 251 specimen records including fossil specimens were available for the species. Since then, more than 545 records have been collected with an emphasis on locality data have been recorded. It is now clear that the species has been previously under-sampled. Throughout its entire range there are only c. 692 verifiable locality records which can be reliably mapped (Wilson 2016). As such, it is difficult to determine density, and thus a population estimate, for this species. High-density estimates come from two study sites at Benfontein and Nuwejaarsfontein in the Northern Cape province of South Africa with over 17,000 fixes and 1,600 hours of observation of radio-collared individuals (Sliwa 2004, Sliwa *et al.* 2010): For Benfontein, between 1998 and 1999, density (based on radio-collared individuals) was estimated at 0.17 cats / km² but only 0.08 km² between 2005 and 2014. For Nuwejaarsfontein, density was estimated at 0.06 cats / km² from 2009-2014 (Sliwa 2004, Sliwa *et al.*, 2014). However, these two sites may represent exceptionally high densities due to favourable climate and human management, and low-quality habitat densities are probably much lower (Sliwa 2013). Thus, we suspect that densities of 0.03 / km² represent more realistic higher densities across larger scales and represent viable subpopulations in the long-term (B. Wilson and A. Sliwa unpubl. data).

Using these density estimates, population size was calculated by converting kernel densities based on verified records (both historical and recent) to high (0.03 cats / km²), medium (0.02 cats / km²) and low density (0.01 cats / km²) isopleths in ArcGIS across the entire range of the species in the assessment region. The population sizes from the density bands were then summed to produce an overall population estimate. The best estimate yielded an estimated 13,867 individuals within the assessment region, of which 9,707 are mature (assuming a 70% mature population structure, Table 1). These estimates were calculated from the range-wide heat map (Figure 1 in Supporting Material). See Supporting Material attachment also for more details on methodology.

Additionally, no subpopulation is suspected to have more than 1,000 mature individuals. However, the definition of a subpopulation for this species needs further work depending on dispersal rates and distances, connectivity and genetic subpopulation structure, although small home range sizes of the species – minimum estimate for females 7.1–8.6 km² (Sliwa 2004, Kamler *et al.* 2015) – may suggest small subpopulation sizes. Unpublished data suggest dispersal distance so 20 km (A. Sliwa unpubl. data), and we suspect that clusters within 50 km of each other and distances of 100 km apart would separate subpopulations. This would mean a cluster within an area of 1,963 km² or 2,500 km² would yield subpopulation sizes of 334 and 425 individuals (using 0.17 cats / km²) respectively.

These estimates of course suffer from lack of consistent search effort and thus density zones may be confounded by field surveys that differ in methodology and single records may represent substantially higher density areas, reflecting the lack of field surveys conducted in the region. As such, population estimates are likely to be underestimates. This may especially be the case for the global estimate, as areas outside South Africa may be significantly under-sampled, although it is likely that these areas exhibit lower densities anyway (M. Küsters, pers. comm. for Namibia). Given that the South African core

of the range is fairly well-sampled, the population estimate is likely to be more robust and the analysis represents a replicable first-step methodology that can be improved with further field surveys and ecological studies. It should also be noted that estimates of population sizes are sensitive to the relative size of the high-density clusters, thus a more conservative estimate would yield a lower population size, while a less conservative estimate would yield a larger population size. For example increasing the high-density isopleth to cover 70% of the records (up from 50%), yields a global population estimate of 16,853 individuals (11,797 mature). We also note that the density estimates used for the isopleths are precautionary and replicated studies in different regions should be conducted to properly calibrate the density bands.

There is a higher density in the central part of South Africa, along a North-South axis with decreasing frequency of records either West or East of this region and northwards in the range (Figure 1 in Supporting Material).

A decline is suspected over the general range, with only some central areas indicating stable subpopulations. However, it is difficult to demonstrate decline in a species that is so hard to census. Preliminary evidence for inferring a continuing decline comes from the long-term study area Benfontein in the Northern Cape province of South Africa, where the density in years 1998–1999 was 0.17 cats / km² (Sliwa 2004), and over the past 10 years (2005–2015) was only 0.08 cats / km², which is documented in field reports (for example, Sliwa *et al.* 2014). Local subpopulations may also be low or even absent in areas where Black-backed Jackals and Caracal are abundant due to interspecific competition, including intraguild predation (but see Kamler *et al.* 2015), which may be especially true of juveniles. About 50% of all radio collared cats are lost to larger predators (Black-footed Cat Working Group unpubl. data). The Black-footed Cat is naturally rare compared to the other small cats of southern Africa (Sliwa 2013). Camera trapping for this species is particularly difficult due to secretive behaviour and small size. For example, in over 790 records, only one was from a camera trap (B. Wilson unpubl. data). Black-footed Cats move quickly and do not habitually use game tracks or roads like other animals. Since 2006, there has been extensive effort to establish the historical and current distribution of the species (Wilson 2016). Prior to 2000, there are only 251 specimen records including fossil specimens were available for the species. Since then, more than 545 records have been collected with an emphasis on locality data have been recorded. It is now clear that the species has been previously under-sampled. Throughout its entire range there are only *c.* 692 verifiable locality records which can be reliably mapped (Wilson 2016). As such, it is difficult to determine density, and thus a population estimate, for this species. High-density estimates come from two study sites at Benfontein and Nuwejaarsfontein in the Northern Cape province of South Africa with over 17,000 fixes and 1,600 hours of observation of radio-collared individuals (Sliwa 2004, Sliwa *et al.* 2010): For Benfontein, between 1998 and 1999, density (based on radio-collared individuals) was estimated at 0.17 cats / km² but only 0.08 km² between 2005 and 2014. For Nuwejaarsfontein, density was estimated at 0.06 cats / km² from 2009–2014 (Sliwa 2004, Sliwa *et al.* 2014). However, these two sites may represent exceptionally high densities due to favourable climate and human management, and low-quality habitat densities are probably much lower (Sliwa 2013). Thus, we suspect that densities of 0.03 / km² represent more realistic higher densities across larger scales and represent viable subpopulations in the long-term (B. Wilson and A. Sliwa unpubl. data).

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For further information about this species, see [Supplementary Material](#).

Current Population Trend: Decreasing

Habitat and Ecology (see Appendix for additional information)

The Black-footed Cat is one of the world's smallest cats, with females weighing an average of 1.3 kg and males larger at 1.93 kg (Sliwa 2013). The conspecific and more common African Wildcat (*Felis silvestris*) is considerably larger (females - 3.9 kg, males - 5.1 kg) (Sliwa *et al.* 2010). Unlike most cat species, these cats are predominantly ground-dwellers and will not readily take to trees. They lead a solitary existence except when with kittens or during brief mating periods. Black-footed Cats are extremely secretive in nature. They are strictly crepuscular and nocturnal and are active throughout the night, even hunting at temperatures of -8° C (Olbricht and Sliwa 1997). During the day, the cats make use of dens. The species prefers hollowed out abandoned termite mounds when available (especially for the kittens), but will use dens dug by other animals such as Springhares, Ground Squirrels (*Xerus inauris*) and Aardvark (*Orycteropus afer*). It is a specialist of open, short grass areas with an abundance of small rodents and ground-roosting birds. It inhabits dry, open savannah, grasslands and Karoo semi-desert with sparse shrub and tree cover and a mean annual rainfall of between 100 and 500 mm at altitudes up to 2,000 m above sea level. It is not found in the driest and sandiest parts of the Namib and Kalahari Deserts (Sliwa 2013).

Black-footed Cats mate year round but with a distinct season from late winter (August) over the summer months up to March. Up to two litters a year may be produced, with one to four kittens (normally two) born after 63–68 day gestation inside a Springhare burrow or hollow termitarium (Olbricht and Sliwa 1997, Skinner and Chimimba 2005). Births are timed to coincide with rains and food availability. Kittens are independent after 3–4 months, but remain within the range of their mother for extended periods (Sliwa 2013). Whilst they are reported to live up to 16 years in captive situations, life expectancy in the wild is about five years (Black-footed Cat Working Group unpubl. data), although two monitored individuals lived at least seven years (Sliwa *et al.* 2014).

As with most small cat species, Black-footed Cats are obligate carnivores. During a 6-year field study on the game farm in central South Africa, 1,725 prey items were observed consumed by 17 free-ranging habituated individuals (Sliwa 2006). Average prey size was 24.1 g. Eight males fed on significantly larger prey (27.9 g) than 9 females (20.8 g). Fifty-four prey species were classified by their average mass into eight different size classes, three for mammals, three for birds, one for amphibians/reptiles, and one for invertebrates. Small mammals (5–40 g) constituted the most important prey class (39%) of total prey biomass followed by larger mammals (> 100 g, 17%) and small birds (< 40 g, 16%). Mammals and birds pooled comprised 72% and 26% of total prey biomass, respectively, whereas invertebrates and amphibians/reptiles combined constituted just 2% of total prey mass consumed. Heterotherm prey items were unavailable during winter, when larger birds and mammals (> 100 g) were mainly consumed. Small rodents like the Large-eared Mouse (*Malacothrix typica*), captured 595 times by both sexes, were particularly important during the reproductive season for females with kittens. Males showed less variation between prey size classes consumed among climatic seasons. This sex-specific difference in prey size consumption may help to reduce intra-specific competition (Sliwa 2006). In terms of interspecific competition, Sliwa *et al.* (2010) found that Black-footed Cats captured smaller prey on average than African wildcats, although both captured approximately the same number (12-13) of prey animals per night.

Of 17 radio-collared Black-footed Cats (7 males, 10 females) studied at game farm at Benfontein Game Farm, Northern Cape Province from 1997 to 1998, the home ranges of adult resident males averaged 16.1–20.7 km² while those of females were 8.6–10 km², where male home range overlapped with females' by 60–67% (Sliwa 2004). Despite this overlap, all individuals hunt solitarily. Similarly, annual home range sizes of black-footed cats were 7.1 km² for an adult female, and 15.6 and 21.3 km² for two adult males monitored at Benfontein Game Farm, Northern Cape Province from 2006 to 2008 (Kamler *et al.* 2015). Since range size is dependent on available prey resources, in more arid regions these home ranges can be considerably larger. Both sexes spray mark, particularly during mating season when they are deployed in proportion to intensity of use and may play a role in social spacing (Molteno *et al.* 1998, Sliwa *et al.* 2010). Adults travel an average of 8.42±2.09 km per night – more distance than the African Wildcat (5.1±3.4 km per night) despite their smaller size (Sliwa *et al.* 2010).

Systems: Terrestrial

Use and Trade

The Black-footed Cat is accidentally killed in indiscriminate trapping, hunting (rifle and dogs) and poisoning events aimed at other damage-causing carnivores. However, as a protected species these incidents are never reported for fear of persecution (Wilson 2016). At least one specimen record reported to B. Wilson was of a Khoisan man in the Kalahari wearing a skin as part of a loincloth. He indicated that he obtained the skin from a roadkill from the neighbouring Botswana area. Similarly, there are anecdotal reports of skins in households in the central Karoo (M. Drouilly pers. obs. 2014). Also, one flat skin was obtained from a sheep guard close to Biesjiesfontein in the Victoria West area in 2012, likely killed by his hunting dogs (A. Sliwa pers. obs. 2012).

Applications have been made for legal hunting permits in the Northern Cape and the Eastern Cape provinces of South Africa, but have never been granted. However, several South Africa taxidermists have acknowledged having mounted hunted animals (Wilson 2016), indicating that there is some interest in the hunting industry for the species.

In the 1970s, there was a demand for the species by overseas zoos and export permits were granted for cats to be caught and exported from the Eastern Cape Province. During further investigations, it was revealed that many of these cats actually came from the then-Cape Province (now part of the Northern Cape Province) (Olbricht and Sliwa 1997). More recently, it has become an acknowledged fact that this species does not thrive in captivity and the demand for wild-caught individuals has diminished considerably (Sliwa and Schürer 2006). Zoos now maintain and exchange animals between institutions. To increase genetic diversity in these captive populations, *in vitro* fertilisation attempts have been made using oocytes of a captive females and semen collected from a wild-caught male during annual field research trips conducted by the Black-footed Cat Working Group (Herrick *et al.* 2010), but without generating a viable embryo.

Whilst even predator-proof fencing is not an effective barrier for black-footed cats, the effects of wildlife ranching are currently unknown and further research is required to conclusively determine if this land-use practice differs from other farming practices. Since larger carnivores are often introduced and managed, the presence of these is likely to have a negative effect on Black-footed Cats due to intraguild predation. This is perhaps the reason why this species does not occur in formally protected wildlife

areas like South Africa's Kgalagadi Transfrontier Park and Kruger National Park but may be reported in peripheral areas. Effectively, large areas of intensive wildlife ranching could amplify the island habitat effect that already prevents movements between subpopulations, further threatening the species. This hypothesis should be tested.

Threats (see Appendix for additional information)

Following 22 years of research effort by the Black-footed Cat Working Group, the threats to the species have become more apparent (Wilson 2016). Additional and previously unknown threats including, but not limited to, intraguild predation, diseases, declining Springhare populations and unsuitable farming practices have now been realised. All of these suggest that the species is becoming increasingly threatened. New distribution data clearly indicate that the majority of the distribution occurs outside of formally protected areas (Figure 1 in Supporting Material). Indeed, the majority of protected areas are suspected to be too small to adequately conserve a viable subpopulation. Essentially, this means the conservation of the species relies on the cooperation of private landowners and managers, particularly in large conservancy areas. However, whilst the geographical distribution of the species may be greater than previously documented, the actual occurrence of the species is highly fragmented and patchy within this area (Wilson 2016), which may have resulted in the creation of island subpopulations resulting in limited dispersal opportunities and restricting genetic exchange between subpopulations. Habitat loss or changes have previously been considered the most severe threat to the species. Habitat degradation that results in the loss of prey base is a serious threat, but changing agricultural practices may, in some instances, actually benefit the species by providing artificially high rodent populations for prey and fewer apex carnivores to compete with.

Perhaps the most serious long-term threat for Black-footed Cats is the loss of key resources, such as den sites and prey, from anthropogenic disturbance or habitat degradation (for example from overgrazing). They are unable to create or maintain their own dens or burrows and rely on those made by other species. Thus, the localised removal of a sympatric species, Springhare or ground squirrels with whom they have a commensal (inquilistic) relationship, may be detrimental to their continued existence in a region (B. Wilson unpubl data., Olbricht and Sliwa 1987, Sliwa 2013). Springhares are often considered as a problem or damage-causing species requiring some control measures by farmers. Although a rodent, Springhares are long-lived with a slow reproductive rate and they do not recover easily from a severe reduction in numbers. In Botswana, the unregulated subsistence hunting of the Springhares for bushmeat has resulted in the eradication of the species in some regions (Butynski 1973, 2013), and with them in all likelihood the Black-footed Cats (Wilson 2016). Bushmeat hunting may be increasing in both scope and scale within southern African savannas (Lindsey *et al.* 2013)

The impact of mesopredators may be increasing across South African rangelands (Avenant and du Plessis 2008). In general, numbers of Black-footed Cats and other larger carnivores are negatively related due to intraguild predation. Annually, the BFCWG loses about 50% of all radio-collared cats to larger predators (BFCWG unpubl. data). The BFCWG believes that the most vulnerable individuals (kittens and subadults – below 1 kg) are the more likely victims of predation but since these individuals are difficult to monitor (too small to fit a radio collar) the actual rate of loss is unknown. Similarly, during a study over 2006–2008 on Benfontein Farm, Northern Cape Province, two Black-footed Cats were killed by predation, at least one was from Black-Backed Jackals (Kamler *et al.* 2015, Wilson 2016) and another by a Caracal (Wilson 2016). Thus, although Black-footed Cats can co-exist with Black-Backed Jackals by using burrows during the day (see above for synergistic interaction) and also taking refuge in them at

night during danger (A. Sliwa pers. obs.), and by partitioning activity and diets (Kamler *et al.* 2015), increasing Black-backed Jackal abundance caused by anthropogenic disturbance and loss of apex predators is likely to increase Black-footed Cat mortality. The BFCWG also has evidence of cats killed by traditional herding dogs and the popularity of Anatolian shepherd dogs with sheep farmers is potentially a new emerging threat (Sliwa *et al.* 2014, Wilson 2016).

Black-footed Cats are also lost through indirect persecution, such as accidental poisonings (for example locust spraying, predator control lures/baits) and general predator persecution throughout most of their range in South Africa (Nowell and Jackson 1996, Sliwa 2013). Recently, there has been an increased interest for this species in the trophy industry as witnessed by permit applications and requests made to taxidermists (Wilson 2015).

The extent of road mortality on cat subpopulations is not known. The incident rate recorded in the Endangered Wildlife Trust road collision database is limited to a few records (W. Collinson unpubl. data). However, only 3% out of 790 locality records were road collision casualties (Wilson 2016).

Although an inherited trait, and previously thought to be limited only to inbred captive populations, Black-footed Cats show a high prevalence for AA-amyloidosis. (Olbricht and Sliwa 1987 and Terio *et al.* 2008). This is a disease characterised by fibrillar protein depositions in many organs as a result of chronic inflammatory processes usually culminating in renal failure. About 70% of the documented deaths of captive cats internationally are as a result of this disease. However, the presence of amyloid in free-ranging subpopulations was detected by Terio *et al.* (2008) from samples provided by the BFCWG. This provides additional evidence for a species predilection and supports the existence of a possible familial type of amyloidosis in the species. Habitat fragmentation and subpopulation isolation can only exacerbate this disease at subpopulation levels, whilst at the same time, the disease is a major reason why currently global captive breeding programmes are not self-sustainable (A.Sliwa pers. comm.). As wild subpopulations become genetically isolated, reduced genetic variability threatens population viability by increasing susceptibility to disease and reducing reproductive fitness. An additional consequence of habitat fragmentation and population isolation is increased contact with other carnivores and the pathogens they carry. Because Black-footed Cats share their territory, prey base, and infectious disease susceptibility with many small carnivores, and even domestic dogs and cats, this provides numerous opportunities for disease transmission (Lamberski *et al.* 2009).

Black-footed Cats are also vulnerable to natural disasters such as flooding of dens and den collapses (Sliwa *et al.* 2009). The long-term effects of climate change cannot be overlooked and may lead to changes in range, changes in timing of breeding events, increases in severe weather such as flooding and droughts, as well as increased disease patterns or risks of the spread of pathogens from parasites.

Fortunately, unlike the African Wildcat, this species does not hybridize easily with other cat species. The only confirmed hybrid cases (Black-footed Cats and domestic cats) were under captive conditions (Leyhausen 1979). None have been recorded from the wild (A. Sliwa and B. Wilson pers. obs.).

Current habitat trend: Previously believed to be restricted mostly to panveld and short grass areas, Black-footed Cats occupy a wide range of open arid and semi-arid habitats where they favour any vegetation cover that is low and not too dense, where they have even been sporadically recorded on fallow agricultural fields and in extremely overgrazed areas (Wilson 2016). They are therefore not

restricted by habitat throughout most of their distribution in southern Africa. However, overgrazing from livestock farms leads to bush encroachment which reduces the habitat suitability for their normal prey items. The species is highly adaptable and reports of individuals utilising open agricultural areas suggests that the cats may respond to seasonal fluctuations of rodent populations associated with sowing and harvesting activities. However, given the unpredictable nature of these events, and associated risks due to the proximity to humans and their domestic carnivores, the benefit to resident cats is uncertain. Also there is no research as to how these human-dominated landscapes are used by Black-footed cats and whether these specific records are due to the fact that they are exposed and highly frequented by human observers (A. Sliwa pers. obs.).

For further information about this species, see [Supplementary Material](#).

Conservation Actions (see Appendix for additional information)

Black-footed Cat presence in formally protected areas remains low to non-existent, particularly in those large enough to maintain subpopulations, for example, Kgalagadi Transfrontier Park. It is unclear in how many protected areas they occur. However, the major Karoo protected areas – Karoo, Mountain Zebra and Addo Elephant National Parks – may each protect a small but not self-sustaining population. Hunting of this species is banned in South Africa and Botswana and it is protected across most of its range excluding Namibia and Zimbabwe (Nowell and Jackson 1996). Although the Black-footed cat has been recorded at least marginally in all of the South African provinces, the effectiveness of local protection measures remains in question.

Key interventions for the species include:

- Judicious management of larger predators and mesopredators: this is a holistic approach that includes only controlling true problem animals, ensuring that fields are not overgrazed or overstocked so as to sustain natural small mammal prey, and reintroducing or tolerating apex predators to roam and exert top down influences on mesopredators. The effect should be to reduce unnaturally high mesopredator density. Improved sheep-farming practices (for example, synchronised breeding events, kraaling at night, and shepherd systems, lethal control of only proven problem mesopredators) should also be trialled.
- The establishment of large conservancy areas to create viable Black-footed Cat subpopulations and facilitate ecological separation between Black-footed Cats and larger carnivores (Kamler *et al.* 2015). The fragmentation of suitable habitats and potential isolation of subpopulations makes the formation or maintenance of dispersal corridors important in the prevention of inbreeding and prevalence of inherited diseases such as AA-amyloidosis. Despite its small size, individuals have very large home ranges, and to conserve subpopulations and create corridors, the emphasis should be on the establishment of large conservancy areas with suitable conditions for the species. This is particularly important in areas where the prospects of a formally protected area are unlikely.
- Similarly, conservancies and private lands with low apex predator density can be targeted as possible sites for Black-footed Cat stewardship.
- Human activities that lead to habitat degradation and the loss of prey species need to be addressed, particularly in the Karoo region which is likely to be the remaining stronghold region for the species.. This should also be achieved by creating awareness to the presence and needs of the species among landowners to reduce accidental persecution, whilst providing information about the special needs of Black-footed Cats that would enable them to be actively involved in the protection of the species.

- This may also include generally raising public awareness of the cryptic species and encouraging citizen scientists to submit distribution records through the promotion of citizen science platforms. This has been done previously with the use of posters created by the BFCWG requesting the public to report sightings of the species, the bulk of the data having been used to establish a more accurate geographical distribution of the species (Wilson 2016).

- Other interventions can involve applying stiffer legal penalties to people involved in deliberate persecution of the species or illegally keeping or trading with the species.

In the long-term, the creation of a Biodiversity Management Plan for the species as an interim or pre-emptive conservation measure should be investigated which could be linked to the already existing international and national *ex situ* management plans. Currently there is no consistent and self-sustaining breeding and survival of cats in South African facilities and some only maintain their stocks by receiving rescued/confiscated individuals from the wild. We suggested the establishment of a national breeding studbook for Black-footed Cats, which would then allow a better overview on the stocks, which could then also feed to the international studbook, maintained by Wuppertal Zoo in Germany since 1991.

Recommendations for land managers and practitioners:

Currently, there are no conservation plans for Black-footed Cats and the urgency to create such plans is undermined by the paucity of data at a national level. It is anticipated the numbers will decrease over the next 20 year period, but during this period, available data should give a clear picture as to the areas of range that are most affected, and the best possible interventions needed.

- Currently, at an international level, due to its already low numbers, it is one of the species listed in the American Association of Zoos and Aquariums Species Survival Plan program developed in 1981. However, the as-yet undetermined subspecies status (*Felis n. nigripes* and *F. n. thomasi*) may undermine and place in jeopardy the international holdings and *ex situ* management strategies for the species as a whole. A number of zoo have captive individuals and an international stud book is maintained for the species. Success in captive conditions is fraught by failure of individuals to thrive due to their highly specialised needs and the effects of inbreeding and/or AA-amyloidosis. Thus, *ex situ* conservation efforts are not recommended.

- Translocation of individuals without the monitoring of the released cats to determine survival rates is not advocated or advised as displaced individuals may suffer a high mortality rate. Systematic monitoring in areas identified as under-sampled should be established to improve population estimates and scan for stewardship sites.

- The presence/absence of the species in formally protected areas must be ascertained.

Research priorities:

The Black-footed Cat has been extensively studied for more than 20 years near the Kimberley area, along the Free State-Northern Cape border. The Black-footed Cat Working Group focuses on the ecology, reproductive biology, geographical range, habitat preferences, health and conservation of the species. This provided information about the diet (Sliwa 2006, Sliwa *et al.* 2010), home range size and social organization (Sliwa 2004), ecological relationships between the species and other sympatric carnivores (Kamler *et al.* 2015). More recently, the BFCWG extended this study to include farms south of De Aar, Northern Cape Province in a different habitat type with different farming practices in place. However, there is little information for elsewhere within its range and the following are considered research

priorities:

Fine-scale distributional studies across the distributional range. This will hopefully lead to more accurate subpopulation estimates. Long-term monitoring of subpopulation trends are also needed throughout the species' geographic range, particularly in ecologically distinct areas and under varying farming practices. Kitten mortality and survival rates also need to be quantified.

- Similarly, studies on changes in density across a spectrum of habitat quality are needed to refine conservation plans and subpopulation estimates. Fine-scale determination on what habitat characteristics and prey populations are required for female Black-footed Cats to successfully raise their kittens is also needed.

The impacts and extent of persecution (both direct and indirect) and the efficacy of education and awareness programmes targeted at landowners.

Genetic investigation into the subspecies status is needed as the results may have conservation implications.

- Investigation into causes and extent of AA-amyloidosis in wild populations.
- The effects of Black-backed Jackals and Caracals, and possibly other apex carnivores, need to be quantified.
- The degree of inquilism and dependence on Springhares burrow systems for refuge, and thus long-term survival of cats following the removal of Springhare subpopulations, needs to be determined.
- Studies into the dispersal abilities and survival of subadult Black-footed Cats in different habitats. Effects of electric fences on local movements and dispersal patterns must be understood to assess the effects of long-term geographical isolation on subpopulation structure. This will enable us to define and delineate subpopulations more accurately.
- Monitoring of the success of re-introduced individuals into new areas with/without other individuals present.
- The range and impact of transmittable diseases from sympatric carnivores on Black-footed Cats.
- The numbers of Black-footed Cats being removed for the trophy industry.

Other research projects include:

- WAZA Conservation Project 06016 - Cologne Zoo(Germany), McGregor Museum (Kimberley, South Africa), San Diego Zoo Safari Park (USA), Wuppertal Zoo (Germany) - <http://www.waza.org/en/site/conservation/waza-conservation-projects/overview/blackfooted-cat-research>
- Distribution and Conservation Status of the Black-Footed Cat *Felis nigripes* in Namibia http://www.rufford.org/projects/martina_kusters. Martina Küsters, bfcacat@mail.com or kusters.m@hotmail.com

Encouraged citizen actions:

Report sightings (live or dead) to BFCWG – bfc.sightings@gmail.com or via <http://black-footed-cat.wild-cat.org/contact>

- Create conservancies, particularly in the Karoo region

Credits

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External Resources

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Appendix

Habitats

(<http://www.iucnredlist.org/technical-documents/classification-schemes>)

Habitat	Season	Suitability	Major Importance?
2. Savanna -> 2.1. Savanna - Dry	-	Suitable	-
4. Grassland -> 4.5. Grassland - Subtropical/Tropical Dry	-	Suitable	-
8. Desert -> 8.1. Desert - Hot	-	Suitable	-

Threats

(<http://www.iucnredlist.org/technical-documents/classification-schemes>)

Threat	Timing	Scope	Severity	Impact Score
11. Climate change & severe weather -> 11.1. Habitat shifting & alteration	Ongoing	-	-	-
	Stresses:	1. Ecosystem stresses -> 1.2. Ecosystem degradation 2. Species Stresses -> 2.1. Species mortality		
2. Agriculture & aquaculture -> 2.1. Annual & perennial non-timber crops -> 2.1.3. Agro-industry farming	Ongoing	-	-	-
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 1. Ecosystem stresses -> 1.2. Ecosystem degradation		
2. Agriculture & aquaculture -> 2.3. Livestock farming & ranching -> 2.3.1. Nomadic grazing	Ongoing	-	-	-
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 1. Ecosystem stresses -> 1.2. Ecosystem degradation		
2. Agriculture & aquaculture -> 2.3. Livestock farming & ranching -> 2.3.2. Small-holder grazing, ranching or farming	Ongoing	-	-	-
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 1. Ecosystem stresses -> 1.2. Ecosystem degradation		
2. Agriculture & aquaculture -> 2.3. Livestock farming & ranching -> 2.3.3. Agro-industry grazing, ranching or farming	Ongoing	-	-	-
	Stresses:	1. Ecosystem stresses -> 1.1. Ecosystem conversion 1. Ecosystem stresses -> 1.2. Ecosystem degradation		
4. Transportation & service corridors -> 4.1. Roads & railroads	Ongoing	-	-	-
	Stresses:	2. Species Stresses -> 2.1. Species mortality		
5. Biological resource use -> 5.1. Hunting & trapping terrestrial animals -> 5.1.1. Intentional use (species is the target)	Ongoing	-	-	-
	Stresses:	2. Species Stresses -> 2.1. Species mortality		

5. Biological resource use -> 5.1. Hunting & trapping terrestrial animals -> 5.1.2. Unintentional effects (species is not the target)	Ongoing	-	-	-
	Stresses:	2. Species Stresses -> 2.1. Species mortality		
5. Biological resource use -> 5.1. Hunting & trapping terrestrial animals -> 5.1.3. Persecution/control	Ongoing	-	-	-
	Stresses:	2. Species Stresses -> 2.1. Species mortality		
8. Invasive and other problematic species, genes & diseases -> 8.2. Problematic native species/diseases -> 8.2.1. Unspecified species	Ongoing	-	-	-
	Stresses:	2. Species Stresses -> 2.1. Species mortality		
8. Invasive and other problematic species, genes & diseases -> 8.2. Problematic native species/diseases -> 8.2.2. Named species (Canis familiaris)	Ongoing	-	-	-
	Stresses:	2. Species Stresses -> 2.1. Species mortality 2. Species Stresses -> 2.2. Species disturbance		

Conservation Actions in Place

(<http://www.iucnredlist.org/technical-documents/classification-schemes>)

Conservation Actions in Place
In-Place Species Management
Subject to ex-situ conservation: Yes
In-Place Education
Included in international legislation: Yes
Subject to any international management/trade controls: Yes

Conservation Actions Needed

(<http://www.iucnredlist.org/technical-documents/classification-schemes>)

Conservation Actions Needed
2. Land/water management -> 2.1. Site/area management
2. Land/water management -> 2.3. Habitat & natural process restoration
3. Species management -> 3.1. Species management -> 3.1.1. Harvest management
4. Education & awareness -> 4.3. Awareness & communications
5. Law & policy -> 5.3. Private sector standards & codes
5. Law & policy -> 5.4. Compliance and enforcement -> 5.4.2. National level

Research Needed

(<http://www.iucnredlist.org/technical-documents/classification-schemes>)

Research Needed
1. Research -> 1.2. Population size, distribution & trends
1. Research -> 1.3. Life history & ecology
1. Research -> 1.5. Threats
3. Monitoring -> 3.1. Population trends

Additional Data Fields

Population
Number of mature individuals: 9707
Continuing decline of mature individuals: Yes
Extreme fluctuations: No
Population severely fragmented: No
All individuals in one subpopulation: No

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