

Crocuta crocuta – Spotted Hyaena



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Regional Red List status (2016)	Near Threatened C2a(ii)*†‡
National Red List status (2004)	Near Threatened C2a(ii)
Reasons for change	No change
Global Red List status (2015)	Least Concern
TOPS listing (NEMBA) (2007)	Protected
CITES listing	None
Endemic	No

*Watch-list Data †Watch-list Threat ‡Conservation Dependent

There is a magic about hyaenas which can only be understood by those of us who have watched them, for some time. There is now a growing band of us, who came to the African bush with all our prejudices, with all that "common knowledge" about hyaenas which proved so totally wrong, and who just fell for the spell of animals which were so totally different (H. Kruuk cited in Mills 1990, p. xiii) .

Assessment Rationale

The estimated minimum population size ranges from 7,687–8,369 individuals in ten protected areas across the assessment region (estimated primarily through call-up surveys; counts conducted between 2008 and 2014), which yields a total estimated mature population size of 4,228–4,603 individuals (assuming a 55% mature population structure). This total is likely to be an underestimate as not all subpopulation data from protected areas (statutory and private) are available or known. The largest subpopulations occur in Kruger National Park (KNP) (6,998–7,680 individuals; 2015 count) and Kgalagadi Transfrontier Park (KTP) (375 individuals – 80 on the South African side; 2009 count). Thus, in KNP alone, there are at least an estimated 3,849–4,224 mature individuals in 2015, which is estimated to be a genuine increase from 2005 (1,722–1,961 mature individuals) due to increasing prey biomass. However, once further data have been generated, population trend should be measured over three generations (c. 17 years) on a national level. Additionally, reintroductions throughout their former range, especially into privately protected areas, in South Africa (for example, in the Eastern Cape) are expanding the area of occupancy and increasing the national population size. The previous assessment in 2004 estimated population size as 3,138 individuals (1,725 mature individuals). The population thus appears to have been stable over the past decade at > 1,500 mature individuals but inconsistent surveys and lack of long-term subpopulation trends hampers this conclusion. Additionally, at least two major subpopulations in KwaZulu-Natal have exhibited net declines over the past seven to 12 years of 40–68%. Thus, we list as Near Threatened C2a(ii), under a precautionary purview, as there is a continuing decline in at least some protected areas (and possibly outside protected areas too) and the proportion of mature individuals in one subpopulation (KNP) ranges from 91–95% (but is likely to be slightly less as not all subpopulation data are available). More comprehensive, accurate and long-term estimates of subpopulation sizes and trends are needed. This species should be reassessed once such data are available.

Localised threats include persecution, poaching for the traditional medicine trade and trophy hunting (an emerging threat), which may be causing declines in some subpopulations, particularly in KwaZulu-Natal Province. Such threats should be monitored and quantified. Similarly, we urge further collation of long-term subpopulation data, especially outside protected areas, to quantify population trends more accurately. The success of the transfrontier parks has ensured that the population is stable. However, the majority of their range is fragmented and the rest of the population (besides KNP and KTP) exists in small, isolated subpopulations. Thus, the population overall remains conservation dependent and we urge the development of a Biodiversity Management Plan (BMP) and associated metapopulation strategy. Interventions to combat snaring and

Taxonomy

Crocuta crocuta (Erxleben 1834)

ANIMALIA - CHORDATA - MAMMALIA - CARNIVORA -
HYAENIDAE - *Crocuta - crocuta*

Common names: Spotted Hyaena, Laughing Hyaena (English), Gevlekte Hiëna (Afrikaans), Ipsi Enamabala (Ndebele), Impisi (Ndebele, Xhosa, Zulu), Phiri (Sepedi, Sesotho, Setswana), Sentawana, Leliritshwana (Sesotho), Phiri-thamaga, Leholo, Masonokwane (Setswana), Isandawane, Ingcuka-cheya (Xhosa)

Taxonomic status: Species

Taxonomic notes: None

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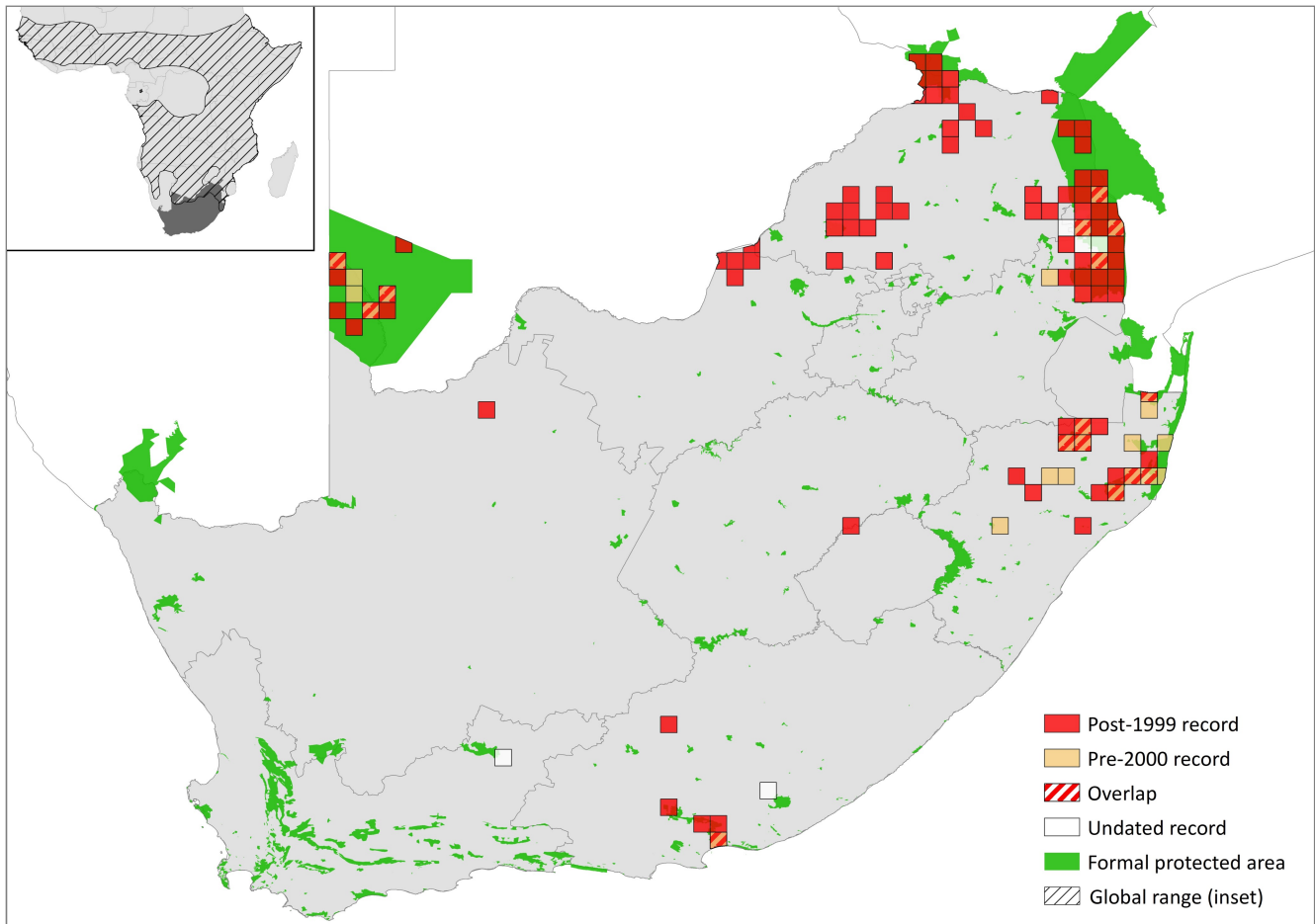


Figure 1. Distribution records for Spotted Hyaena (*Crocuta crocuta*) within the assessment region

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	Extant	Native
Zimbabwe	Extant	Native

unsustainable persecution or trophy hunting, combined with continued reintroduction into private protected areas, are recommended.

Regional population effects: There is dispersal between the assessment region and neighbouring countries, particularly across KTP, Greater Limpopo Transfrontier Park (GLTP) and Greater Mapungubwe Transfrontier Conservation Area (GMTFCA). However, the number of immigrants is not suspected to be enough to significantly enhance the population.

Distribution

Throughout the continent, Spotted Hyaenas have a wide distribution in regions south of the Sahara, but it has, however, shrunk considerably as a consequence of human disturbance (Skinner & Chimimba 2005). In Swaziland, they occur in the lowveld at Mlawula and Hlane

National Parks (Skinner & Chimimba 2005). There is no confirmed evidence of their occurrence in Lesotho.

Presently, within the assessment region, the species is largely confined to protected areas. The free-roaming range extends patchily across the lowveld of Mpumalanga and Limpopo provinces (including KNP), and into the Limpopo valley, where they occur in the GMTFCA, and other reserves, such as De Beers Venetia Limpopo Nature Reserve (Venetia), Vhembe, and surrounding farms. In the North West Province they were reintroduced onto Madikwe Game Reserve where some residents were already present (Hofmeyr 1997), and they occur naturally outside the park in the Dwarsberg range (Power 2014), where they were absent in the 1970s from this area (Rautenbach 1982), perhaps having dispersed from Botswana (Power 2014). Vagrants from Botswana occasionally enter the country across the Molopo fossil riverbed in western North West Province (Power 2014), and the Northern Cape Province (Stuart 1981), while they are resident in KTP (Mills 1990; Skinner & Chimimba 2005). There have also been recent sightings of a free-roaming clan in the Waterberg, Limpopo Province (F. Dalerum and C. Jordaan pers. comm. 2015).

In northern KwaZulu-Natal Province, they occur in the larger game reserves (Deane 1962; Whateley & Brooks 1978; Whateley 1981): Mkhuze Game Reserve, Hluhluwe-iMfolozi Park (HiP), Ndumo Game Reserve, Ithala Nature Reserve and Tembe Elephant Park. In the Eastern Cape Province, they have been reintroduced into the Greater Addo Elephant National Park and Pumba Reserve (Hayward et al. 2007a, 2007b). The reintroduction was done to restore a historically extirpated population (Stuart

1981; Hayward et al. 2007b). In general, this species has been reintroduced for ecotourism purposes across most provinces, with most reintroductions being in the Eastern Cape (Figure 1).

Population

The total global population is between 27,000 and 47,000 individuals (Bohm & Höner 2015). Most subpopulations in protected areas in southern Africa are considered to be stable, whereas many populations in eastern and western Africa, even in protected areas, are considered to be declining, mostly due to incidental snaring and poisoning (Hofer et al. 1996; Hofer & Mills 1998a). The encounter rate of these carnivores in some areas is extremely low due to dense vegetation and their nocturnal behaviour, which can make estimating population size difficult.

Within the assessment region, we estimate a current (2008–2015 counts) population size of 7,687–8,369 individuals in ten protected areas (Table 2). Frank (1986a) calculated the mean composition of clans as 16.7 adult males, 22 adult females, 13.7 subadults and 18 cubs. This yields a total estimated mature population size of 4,228–4,603 individuals using a 55% mature population structure. However, this may be an underestimate of mature individuals as two clans in KNP have an average of 89% (range: 69–100%) and 73% (range: 63–100%) individuals > 14 months (assuming a c. 12 month age of maturity) during 31 and 15 months of monitoring (L. Belton pers. comm. 2016). Using 89% as the mature population structure yields a mature population of 6,841–7532 individuals. Additionally, the mature population size is an underestimate as 1) data were not available for some protected areas (either statutory or private) containing Spotted Hyaena subpopulations; and 2) most estimates were call-up rather than capture-recapture surveys. Estimating subpopulation size through capture-recapture methods (using camera traps) may be a more effective survey method in smaller areas than call-ups. For example, the subpopulation in Phinda Private Game Reserve, where the known subpopulation is 27 adult hyaenas, was estimated as 24 ± 5.6 individuals using capture-recapture compared to 19 ± 5 individuals using call-up surveys (C. Hootan unpubl. data; 2012 count). The corollary of this finding is that call-up surveys may thus underestimate subpopulation size and the total population of Spotted Hyaenas may be larger than currently

estimated. However, Ferreira and Funston (2016) show that a calibrated call-up survey increases the precision of estimates and adjusts for non-response similarly to distance sampling. The previous assessment estimated a population size of 3,138 (Friedmann & Daly 2004), which yields a mature population size of at least 1,569 (using a 50% mature population structure). Thus, we infer the national population to have been stable at above 1,500 mature individuals over the past decade. However, the KwaZulu-Natal subpopulations are showing localised declines (see below).

The two major subpopulations of Spotted Hyaena within the assessment region exist in KNP and KTP. Using call-up surveys, Mills et al. (2001) estimated Spotted Hyaena abundance in KNP as 2,668 individuals (surveys conducted between 1984 and 1989). Similarly, using call-up surveys, Ferreira et al. (2010, 2013) estimated the subpopulation to range from 2,000 to 5,340 individuals with a most likely size of 3,667 (3,443–3,891) individuals in 2008 (Ferreira & Funston 2016). This was a slight increase from the 2005/2006 count of 3,348 (3,131–3,566) individuals (Ferreira & Funston 2016). Friedmann and Daly (2004) stated the KNP subpopulation as being 2,500 individuals while Bohm and Höner (2015) quote it as ranging between 1,300 and 3,900 individuals. The most recent and accurate estimate is 7,339 (6,998–7,680) individuals (S. Ferreira unpubl. data) in 2015. This is thought to be a genuine increase (along with an increase in Lion *Panthera leo* numbers) between 2005 and 2015 as the same methodology was used, and is correlated with an increase in prey biomass (Ferreira & Funston 2016; S. Ferreira pers. comm. 2016). The KNP subpopulation does not appear to be threatened but could decline through the outbreak of diseases and/or climatic changes (Ferreira & Funston 2016). The subpopulation on the South African side of KTP is inferred to have remained stable at c. 80 adults since 1984 (Mill 1990), while an estimate for all of KTP is c. 375 individuals (2009 count; Ferreira et al. 2013). Kruger National Park holds the majority of mature individuals within the assessment region, ranging from 91% to 95% of the total population (using the KNP subpopulation range and including all of the KTP subpopulation or the South African side only).

In KwaZulu-Natal Province, the subpopulations appear to be exhibiting mixed trends. In HiP, while a call-up survey in 2003 and 2004 revealed a subpopulation size of 327 and 331 individuals respectively (J. Graf unpubl. data),

Table 2. Summary of population size estimates for Spotted Hyaena (*Crocuta crocuta*) within South Africa

Province	Subpopulation	Estimate	Year	Survey type	Reference
Limpopo	Kruger National Park	6,998–7,680	2015	Call-up	S. Ferreira unpubl. data
Northern Cape	Kgalagadi Transfrontier Park	375	2009	Ranger experience	Funston 2001; Ferreira et al. 2013
Eastern Cape	Addo Elephant National Park	14	2010	Ranger experience	Ferreira et al. 2013
KwaZulu-Natal	Phinda Private Game Reserve	46	2014	Capture-recapture	A. Hunnicutt unpubl. data
KwaZulu-Natal	Mkhuze Game Reserve	56	2015	Capture-recapture	A. Hunnicutt unpubl. data
KwaZulu-Natal	Hluhluwe-iMfolozi Park	108	2015	Call-up	D. Druce unpubl. data
Mpumalanga	Andover Nature Reserve	8	2014	Call-up	G. Camacho unpubl. data
Mpumalanga	Mthethomusha Nature Reserve	8	2014	Call-up	G. Camacho unpubl. data
Mpumalanga	Manyeleti Game Reserve	32	2014	Call-up	G. Camacho unpubl. data
North West	Madikwe Game Reserve	23	2015	Call-up	Nel 2015
Total		7,687–8,369			

repeat surveys (using the same methods) in 2010, 2013 and 2015 estimated 301, 126 and 108 individuals respectively (D. Druce unpubl. data), which indicates a 68% decline over 12 years. The decline could be real or spurious (hyaenas not responding to the call-ups), but is suspected to be genuine (D. Druce pers. comm. 2016). Population declines were also seen in Mkhuzi Game Reserve with density estimates from capture-recapture data decreasing from 12.1 individuals per 100 km² in 2008 to 7.2 individuals per 100 km² in 2015 (A. Hunnicutt unpubl. data), which represents a 40% decline over seven years. Conversely, the subpopulation at Phinda Private Game Reserve has been shown to be increasing between 2007 and 2014 (using capture-recapture surveys) as subpopulation estimates for 2007, 2009, 2011, 2012 and 2014 are 11, 18, 30, 24 and 46 respectively, although this may be due to dispersal into the reserve from other areas (A. Hunnicutt unpubl. data). In Ndumo Game Reserve, seven individuals have been positively identified, of which three were cubs (L. Lerm unpubl. data; 2010 survey). There are currently thought to be no Spotted Hyaenas on Tswalu Kalahari Private Game Reserve (C. Kraft pers. comm. 2016), but plans are in motion to reintroduce animals in the future (D. MacFadyen pers. comm. 2016). There is a subpopulation on Venetia Limpopo Nature Reserve, but numbers are uncertain (D. MacFadyen pers. comm. 2016). Subpopulation trends should be estimated over three generations, where generation length has been calculated as 13.8 years (Pacifici et al. 2013), which yields a 41.5 year three generation period; or 5.7 years (Bohm & Höner 2015), which yields a 17-year three-generation period. We accept the latter estimate.

Groups outside protected areas in the Limpopo and North West provinces are probably stable too with the potential to be naturally re-colonised by emigrants from protected areas or immigration from Botswana. For example, Power (2014) noted the existence of a free-roaming group on the periphery of a reserve in the Dwaarsberg hills, which are either escapees from Madikwe Game Reserve or immigrants from Botswana. Recently, free-roaming individuals have been sighted in the Waterberg, Limpopo, the first time in 20 years since a Spotted Hyaena was seen in the area (F. Dalerum & C. Jordaan pers. comm. 2015).

Current population trend: Increasing but with localised declines.

Continuing decline in mature individuals: No overall, but localised declines.

Number of mature individuals in population: 4,228–4,603

Number of mature individuals in largest subpopulation: 3,849–4,224

Number of subpopulations: At least 10

Severely fragmented: No. Most subpopulations are fenced adjacent to the Kgalagadi and Greater Limpopo Transfrontier Parks.

Habitats and Ecology

Although the Spotted Hyaena is predominantly a savannah species, it has been found to occur in most habitat types including semi-desert, open woodland and dense dry woodlands (Skinner & Chimimba 2005). In many parts of its range, it occurs in close association with human habitation.

Population densities based on systematic censuses vary substantially, from 0.006–1.7 individual(s) / km² across Africa (Frank et al. 1995; Hofer & Mills 1998a, 1998b). Spotted Hyaenas are slow breeders that repopulate areas gradually (Henschel 1986), which was demonstrated when hyaenas were culled from certain areas in KNP (Smuts 1979). Spotted Hyaenas societies are more complex than other carnivore species. They are social animals which live in multi-generational social groups called clans which can vary in size. In the Serengeti, clan sizes can be as large as 47 individuals (Skinner & Chimimba 2005); while in the nearby Masai Mara, clan sizes could reach as high as 79 (Watts & Holekamp 2009). Clan sizes range from 9 to 18 individuals in the lowveld of Limpopo and Mpumalanga (Henschel 1986; Henschel & Skinner 1987), and in KNP densities can be 0.02–0.2 individual / km² (Mills et al. 2001). In Kwazulu-Natal, clan sizes are c. 14, in HiP with densities of 0.36 individuals / km² (Whateley 1981); and in Mkhuzi, clan sizes are 6–7, and densities are at 0.13 individual / km² (Skinner et al. 1992). In arid areas, such as KTP, the mean clan sizes are 8 (range 3–12), and densities lower at 0.9 individual / 100 km² (Mills 1984a, 1990). Capture-recapture surveys have estimated a density of 8.8 hyaenas / 100 km² in Phinda Private Game Reserve, KwaZulu-Natal Province (2014 survey; A. Hunnicutt unpubl. data) and 6.7 hyaenas / 100 km² in Mkhuzi Game Reserve, KwaZulu-Natal Province (A. Hunnicutt unpubl. data; 2015 survey). The variation in clan sizes could reflect the variation in the prevailing ecological conditions, particularly with respect to Lion populations and prey densities. Spotted Hyaena clans are composed of multiple adult females, their immature offspring, and immigrant males (Watts & Holekamp 2009). The clan is led by a dominant female called the matriarch and generally in the clan, females dominate even the males (Frank 1986b; Watts & Holekamp 2009). Sexual dimorphism is evident as females are larger and heavier than males and even have the resemblance of male external genitalia. Generally, females will remain with their natal clan while most males will emigrate from their natal clans after they become reproductively mature, usually occurring from 2–5 years of age (Holekamp et al. 2012). The mating system is highly polygynous and only the behaviourally dominant male mates, though all other resident males regularly court females (Frank 1986b). The species is a non-seasonal breeder but exhibits a peak in reproduction in the late summer (Skinner & Chimimba 2005). Females generally have litters of one or two cubs (Holekamp et al. 2012). Cubs remain in the clan's den for 9–14 months and are generally weaned when they are 12–18 months, later than most other carnivores (Holekamp et al. 2012).

While it was previously thought that Spotted Hyaenas were typically scavengers, studies show that they are actually efficient and active predators (Hayward 2006). A meta-analysis study by Hayward (2006) on the dietary preferences of the Spotted Hyaena found that the species prefer prey species within a body mass range of 56–182 kg – similar to that of Lions – revealing a 69% overlap in preferred prey. Results from Hayward (2006) illustrate the flexible and unselective nature of Spotted Hyaena predation; this characteristic is likely the reason for the species' success, despite a large degree of overlap with Lions. Kudu (*Tragelaphus strepsiceros*), Blue Wildebeest (*Connochaetes taurinus*), Red Hartebeest (*Alcelaphus buselaphus caama*), Waterbuck (*Kobus ellipsiprymnus*) and Buffalo (*Syncerus caffer*) are common prey items (Hayward 2006). In the woodlands of the KNP, about half

their diet is obtained from kills they make (Mills & Biggs 1993), while elsewhere, in KTP for example, over 60% their diet is comprised of their own kills, of which this comprises 73% of the meat eaten (Mills 1984b). Spotted Hyaenas do also frequently steal kills from other carnivores such as Wild Dogs (*Lycaon pictus*) (Gorman et al. 1998), Cheetah and Brown Hyaena (*Parahyaena brunnea*) (Mills 1990), as well as Leopards (*Panthera pardus*) (Mills & Biggs 1993), and thus influence their persistence.

Ecosystem and cultural services: Spotted Hyaenas have been referred to as keystone predators (Holekamp 2006; Trinkel 2009). As Spotted Hyaenas are typically cursorial predators, they tend to select prey that are weak, injured or sick. This supposedly increases the health of prey populations in an ecosystem. Generally, Spotted Hyaenas can survive in ecosystems in which most larger predators cannot; if Spotted Hyaenas were to disappear from an area, it indicates that a system has been severely degraded (Holekamp 2006; Trinkel 2009).

They minimise the spread of disease by devouring carcasses quickly (*sensu* Butler & du Toit 2002; Ogada et al. 2012), and they have been said to be important in reducing the prevalence of anthrax in KNP to which they are apparently not susceptible (Pienaar 1969).

They feature extensively in African folklore, as they are associated with witchcraft, and are often viewed as the preferred mode of transport for witches. They are also thought to be shape shifters, to rob graves for bodies, and steal livestock. Folklore has ascribed them to be “hermaphroditic” since the time of Aristotle, due to the masculinised genitalia in the females (Neaves et al. 1980; van Jaarsveld & Skinner 1987; Frank 1996), which is a by-product of high levels of circulating testosterone (Racey & Skinner 1979; van Jaarsveld & Skinner 1991), needed to socially dominate other clan members (Mills 1990; Frank 1996).

The whooping call of this species is distinctive (Skinner & Chimimba 2005), and a depiction of a classic African evening, and its haunting call is appealing to visitors in parks and game reserves.

Use and Trade

In Nigeria, Spotted Hyaenas have been found in traditional medicines (Sodeinde & Soewu 1999). In Guinea-Bissau, Spotted Hyaena skins were found for sale in markets (Sá et al. 2012). Within the assessment region, this species is illegally hunted and persecuted outside protected areas as a damage causing animal, and is occasionally



controlled by the state authorities. It is also in high demand in traditional medicine (tails, bones, fur, glands, and organs), especially as it is strongly associated with witchcraft (Bohm & Höner 2015). Spotted Hyaenas are easily caught in snares either deliberately or incidentally. In Mpumalanga, many animals outside formally protected areas have been in contact with snares (G. Camacho unpubl. data).

It occasionally occurs on game farms and wildlife ranches: based on telephonic questionnaires, for the North West Province it has a prevalence of 1.4% (N = 214 farms), but the distribution is highly localised (Power 2014), while in the Limpopo valley it is higher at 13% (N = 115 farms), with the majority of reporting for this species being in the Alldays–Pont Drift area, adjacent the Mapungubwe area (Endangered Wildlife Trust unpubl. data). However, this species is not tolerated for the most part on managed game ranches due its impact on high-value game species.

Threats

While they are well protected in some conservation areas, subpopulations outside protected areas are subject to human persecution through shooting, trapping and poisoning. Such animals are often captured and kept illegally and subsequent escapees can cause problems (C. Kraft pers. comm. 2016). Similarly, in areas adjacent to protected areas, human-wildlife conflict and associated persecution may threaten local subpopulations (Wittemyer et al. 2008). Additionally, due to the high prevalence of snares in protected areas, it is likely that Spotted Hyaenas are caught as bycatch in snares that are set for bushmeat. This is an important cause of adult mortality in the Serengeti, where snares kill around 400 adult Spotted Hyaenas each year and are responsible for more than half

Table 3. Use and trade summary for the Spotted Hyaena (*Crocuta crocuta*)

Category	Applicable?	Rationale	Proportion of total harvest	Trend
Subsistence use	No	-	-	-
Commercial use	Yes	Sold at muthi markets as traditional medicine. Used for commercial trophy hunting.	All	Unknown
Harvest from wild population	Yes	Sold at muthi markets as traditional medicine. Used for commercial trophy hunting.	All	Unknown
Harvest from ranched population	No	-	-	-
Harvest from captive population	No	-	-	-

Table 4. Possible net effects of wildlife ranching on the Spotted Hyaena (*Crocuta crocuta*) and subsequent management recommendations

Net effect	Negative
Data quality	Suspected
Rationale	Persecuted for damage to high-value game.
Management recommendation	Holistic management techniques to reduce game loss and translocation to a protected areas.

of all adult mortality (Hofer et al. 1996). In KwaZulu-Natal Province, the Ndumo subpopulation is similarly susceptible to poaching where an individual was caught in a snare in 2010 (L. Lerm unpubl. data). In Mkhuze Game Reserve, KwaZulu-Natal Province in 2015, 18.3% of all Spotted Hyaenas caught on camera trap surveys were found to have neck snares or neck snare wounds (A. Hunnicutt unpubl. data). Snares have a severe impact on this species as it has a keen sense of smell and is often bycatch in areas where snares are set for antelope.

The largest threat the Phinda Private Game Reserve subpopulation is trophy hunting. Hunting areas around Phinda are suspected of having shifted to taking hyaena trophies due to increased regulation on Leopard hunting (A. Hunnicutt pers. obs. 2015). The issuing of trophy hunting permits for Spotted Hyaena is currently being done at unsustainable rates, without consultation of any population data to calculate a sustainable harvest. In 2014, over 11% of Phinda's subpopulation was harvested for trophies having been baited to neighbouring hunting farms. Mkhuze's subpopulation may be supplementing Phinda and could explain the increasing population trend there, but with high turnover of individuals (A. Hunnicutt unpubl. data).

Current habitat trend: Stable. The savannah biome is well protected and the current area of occupancy is

expanding through private protected areas. However, its habitat is fragmented due to past agricultural and human settlement expansion. A further threat is posed by the decline of wildlife prey base due to habitat loss caused by increased human settlements (and thus increased bushmeat poaching) and overgrazing by livestock. This is probably a low, localised threat in South Africa, as most prey populations are well managed on reserves.

Conservation

Spotted Hyaenas are conserved in a number of protected areas across their southern African range (Skinner & Chimimba 2005), where, in South Africa, KNP and KTP are the most important. A large number of medium sized-game reserves have subpopulations in five provinces in South Africa. Conservation of Spotted Hyaenas should focus on expanding protected areas, especially through transfrontier areas and/or conservation corridors (for example, in northern KwaZulu-Natal; Smith et al. 2008), and creating a managed metapopulation in smaller protected areas. Where the species is found outside of protected areas (or in regions where they occur on the boundaries of protected areas), conflict mitigation measures should be explored to encourage landowners and communities to protect game/livestock rather than persecute predators, such as through the use of livestock

Table 5. Threats to the Spotted Hyaena (*Crocuta crocuta*) 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	5.1.2 Hunting & Collecting Terrestrial Animals: incidental mortality from snaring during bushmeat hunting.	Hofer et al. 1996	Empirical	Local	Increasing with human settlement expansion, but unknown impact on overall population.
2	5.1.3 Persecution/Control: to protect livestock and high-value game.	-	Anecdotal	-	Possibly increasing with wildlife ranching expansion.
3	5.1.1 Hunting & Collecting Terrestrial Animals: direct hunting for traditional medicine or trophies.	-	Anecdotal	-	Localised, but possibly increasing in relation to reduction in Leopard hunting permits.
4	2.3.3 Agro-industry Grazing, Ranching or Farming: historical habitat loss. Current stresses 1.2 Ecosystem Degradation, 1.3 Indirect Ecosystem Effects and 2.3.5 Inbreeding: ecosystem degradation and fragmentation, leading to loss of prey base and possible inbreeding.	-	Anecdotal	-	Stable
5	1.1 Housing & Urban Areas: historical habitat loss. Current stresses 1.2 Ecosystem Degradation, 1.3 Indirect Ecosystem Effects and 2.3.5 Inbreeding: ecosystem degradation and fragmentation, leading to loss of prey base and possible inbreeding.	-	Anecdotal	-	Stable

Table 6. Conservation interventions for the Spotted Hyaena (*Crocuta crocuta*) 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	1.1 Site/Area Protection: protected area expansion and creation of conservation corridors.	-	Anecdotal	-	-	SANParks
2	3.3.1 Reintroduction: further translocation and reintroduction under a metapopulation plan.	Hayward et al. 2007a,b	Empirical	Regional	Reasonable success, but more work to be done.	SANParks
3	2.1 Site/Area Management: site-specific conflict mitigation measures, including the use of livestock guarding dogs.	Rust et al. 2013 McManus et al. 2014	Indirect Indirect	Local Local	Livestock depredation rates reduced.	Carnivore Conservation Programme, Endangered Wildlife Trust
4	4.3 Awareness & Communications: public awareness to reduce persecution and traditional medicine use.	-	Anecdotal	-	-	-

guarding dogs (Rust et al. 2013; McManus et al. 2015). Private game farms and protected areas should be encouraged to form conservancies and create areas large enough to sustain large subpopulations to enhance the resilience of the population overall. Public education campaigns should be continued to dispel the myriad myths about this species and to curb their use in traditional medicine, as well as to discourage landowners and communities from shooting/snaring Spotted Hyaenas. Conservation authorities should work with stakeholders to capture 'perceived' problem individuals and simulate dispersals to protected areas where they are needed (for example, reserves in North West Province; Power 2014; and Tswalu Kalahari Reserve in Northern Cape Province).

Recommendations for land managers and practitioners:

- Conduct snare removal on private land.
- Implement conflict mitigation measures to protect livestock/game and deter predators.
- Develop a Biodiversity Management Plan and metapopulation strategy to ensure that reintroductions and translocations contribute to Spotted Hyaena conservation and genetic diversity. From a tourism point of view, their distinctive calls are an added draw-card to any given area.

Research priorities:

- Comprehensively determine national population size and distribution of free-roaming Spotted Hyaenas, protected subpopulations and occupancy on wildlife ranches.
- Quantify the loss of Spotted Hyaenas to snares, persecution and trophy hunting and determine subpopulation trends.
- Determine the empirical impact of Spotted Hyaenas to livestock/game loss and generate evidence for the effectiveness of interventions.

Encouraged citizen actions:

- Contribute to citizen science projects within protected areas (by reporting sightings locations and pride numbers), and report sighting data on

virtual museum platforms (for example, iSpot and MammalMAP) outside of protected areas (although care must be taken to not include captive animals occurring in predator camps, safari parks, zoos).

- Do not purchase Spotted Hyaena products.
- Landowners should drop fences to form conservancies and reintroduce hyaenas as a tourism draw card.

Data Sources and Quality

Table 7. Information and interpretation qualifiers for the Spotted Hyaena (*Crocuta crocuta*) assessment

Data sources	Field study (literature, unpublished)
Data quality (max)	Estimated
Data quality (min)	Inferred
Uncertainty resolution	Confidence intervals/best estimate
Risk tolerance	Precautionary

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