# *Parahyaena brunnea* – Brown Hyaena


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| Regional Red List status (2016) | Near Threatened C2a(i)+D1* |
|---|---|
| National Red List status (2004) | Near Threatened C |
| Reasons for change | No change |
| Global Red List status (2015) | Near Threatened C1 |
| TOPS listing (NEMBA) (2007) | Protected |
| CITES listing | None |
| Endemic | No |

*Watch-list Data

This species is endemic to southern Africa and there are estimated to be > 10,000 mature individuals across its range, with direct and indirect persecution being the most severe threats (Wiesel 2015). More research, however, is needed to calculate population size and trend more accurately.

## Taxonomy

*Parahyaena brunnea* (Thunberg 1820)

ANIMALIA - CHORDATA - MAMMALIA - CARNIVORA - HYAENIDAE - *Parahyaena* - *brunnea*

**Synonyms:** *Hyaena brunnea* (Thunberg 1820)

**Common names:** Brown Hyaena (English), Bruinhiëna, Strandjut, Strandwolf (Afrikaans), Impisi, Ipisi enzotho (Ndebele), Sephiribjôkwane, Phiribjôkwane (Sepedi), Phiribjokwane, Phiri, Thamahane (Sesotho), Lefiritshwana, Mosonokwane, Mosonolokwane, Phiri, Phiri êntshonyana, Phiritshwana, Sethenekwane, Setinikwana (Tswana), Imphisi (Swati), Mhisi, Mhisana (Tsonga), Tshivhingwi (Venda), Ingqawane, Inchuka (Xhosa), Isidawana (Zulu)

**Taxonomic status:** Species

**Taxonomic notes:** Although previously classified under the genus *Hyaena* (e.g. Jenks & Werdelin 1998), Koepfli et al. (2006) placed this species in its own genus *Parahyaena* (also see Wozencraft 1993). The sister taxon is the Striped Hyaena (*Hyaena hyaena*) with which it last shared a common ancestor roughly 4.2 mya (Koepfli et al. 2006). The clade containing Brown and Striped Hyaenas last shared a common ancestor with the Spotted Hyaena (*Crocuta crocuta*) roughly 8.6 mya (Koepfli et al. 2006).

## Assessment Rationale

The Brown Hyaena is widespread within the assessment region, but it is absent from Lesotho and Swaziland. It faces multiple threats across unprotected areas, especially in regions dominated by livestock and game ranching. The species is difficult to census due to it occurring at low density and also due to its nocturnal and secretive nature. The South African population in 1998 was estimated to be 1,700 with a range of 800 to 2,200 individuals. Recent studies have provided local density estimates that vary geographically and in relation to protection status. Such variation in density limits our ability to extrapolate an overall density, and further density estimates are required from under-studied parts of the Brown Hyaena's geographic range to provide a robust overall population estimate for South Africa. Additionally, researchers have added some more detailed population estimates to areas of their current distribution that were previously unstudied (particularly Limpopo, North West and Eastern Cape provinces) and shown that relatively high densities occur in these regions and that range expansions have occurred. These more recent studies would suggest that the estimated South African population size of 1,700 is likely now to be an underestimate.

Despite the evidence of locally stable and increasing populations, the species does face persistent threats of direct and indirect persecution within the assessment region. Quantifying the level of local Brown Hyaena persecution in relation to demographic rates is essential information required for future population assessments. We currently have no evidence that the persecution levels (direct and indirect) are causing subpopulations to decline, but localised declines and/or extinctions are possible—especially given the synergistic threats of incidental snaring, illegal hunting and poisoning. Although the range of this species may be expanding and does not qualify for severely fragmented, it is likely that there are fewer than 10,000 mature individuals, with a continuing decline in mature individuals outside protected areas. Thus, we retain the Near Threatened C2a(i)+D1 listing, in line with the global listing, under a precautionary purview. However, we note that once further field studies produce more robust population size and trend estimates, this species will need reassessment as it is likely to be Least Concern.

**Regional population effects**: Movements between Namibia, Botswana, Zimbabwe and South Africa are all possible in both directions. However, it is unknown whether immigration is significant enough to rescue isolated subpopulations within South Africa—particularly those located in the Western and Eastern Cape provinces.

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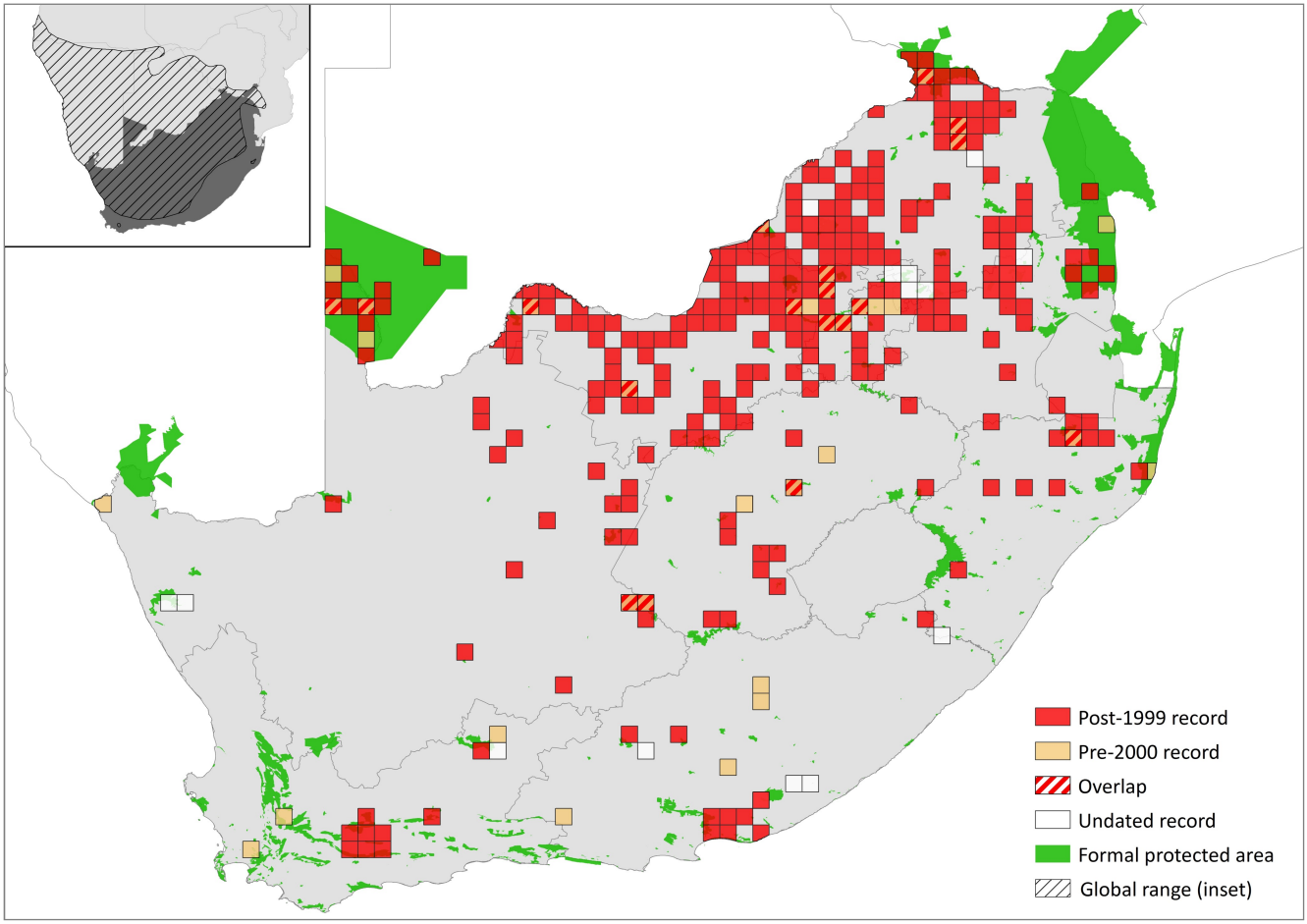


**Figure 1. Distribution records for Brown Hyaena (*Parahyaena brunnea*) within the assessment region**

**Table 1. Countries of occurrence within southern Africa**

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

# Distribution

The Brown Hyaena is endemic to southern Africa except for a marginal extension into the arid parts of southwestern Angola. It mainly occurs in the arid countries of Namibia, Botswana, South Africa and Zimbabwe. Information for the species in Angola and countries to the north of the Chobe River is lacking.

In South Africa, the Brown Hyaena's distribution has diminished significantly since the 18th century when animals were recorded as far south as South Africa's Western Cape (Stuart et al. 1985; Hofer & Mills 1998a; Mills 2013). Today, this species remains widespread in South Africa (Figure 1), with high levels of occupancy recorded in the northwest of South Africa. For example, Thorn et al. (2011) estimated that Brown Hyaena's extent of occurrence in North West Province has increased by 45%, from 90,598 km$^2$ in 2000 to 131,523 km$^2$ in 2010. The species also appears to have high levels of occupancy in Limpopo, Gauteng and Mpumalanga provinces (Richmond-Coggan 2014). Further evidence of range expansion can be seen in the Western Cape (Gansbaai and Bredasdorp) where it was previously believed to be extirpated (Hofer & Mills 1998a), so it may be recolonising some of these areas. The Western Cape hosts a small subpopulation in the Little Karoo: in Sanbona Wildlife Reserve, Anysberg Nature Reserve and surrounding farmland. It is possible that these records are vagrant individuals from this isolated population.

The species was deemed as practically extinct in the Free State (Hofer & Mills 1998a). However, these findings are contradictory to the results of Richmond-Coggan (2014) that showed low levels of occupancy throughout the Free State. Whether the species is increasing here or was previously under-recorded is unknown. Similarly, in KwaZulu-Natal, no resident populations were discovered in earlier assessments due to the reported high levels of shooting and trapping (Hofer & Mills 1998a). However, Richmond-Coggan (2014) is in agreement with Friedmann and Daly (2004) and has identified a greater chance of presence in the northern half of the province compared with the south. There is also evidence of Brown Hyaena presence on the boundary between the KwaZulu-Natal and the Eastern Cape (Friedmann & Daly 2004; Richmond-Coggan 2014). However, it is possible that these sightings are from game ranches that have reintroduced individuals to attract ecotourists and thus not representative of free-roaming recolonisation.

Brown Hyaenas have also been reintroduced into a number of small reserves in the Eastern Cape. There have

been sightings of Brown Hyaenas outside of reintroduction areas and these are presumably animals that have escaped from the enclosed reserves. Data on these animals are lacking so we are not sure whether these are vagrant animals or whether some individuals are actually starting to recolonise the farm areas. Such reintroductions may be facilitating the recolonisation of the Brown Hyaena's historical range in South Africa.

# Population

The total global population size has been estimated as being between 4,365–10,111 mature individuals (Wiesel 2015), with Botswana having the largest population (an estimated 3,173–4,048 animals); followed by South Africa (800–2,200); and Namibia (566–2,440) (Stein et al. 2010). Population estimates for Zimbabwe, Angola and Mozambique are unknown. In South Africa, a population of 1,700 (800–2,200) is estimated (Hofer & Mills 1998b), and is now likely to be an underestimate based on recent local population densities (Table 2) and increased extent of occurrence.

Quantitative population trends for two sites in North West Province, Pilanesberg National Park and a nearby private game reserve, suggests that these local subpopulations have been stable between 2005 and 2013 (Richmond-Coggan 2014; Yarnell et al. 2013, 2015). Also, as mentioned previously, in North West Province a 45% increase in the extent of occurrence has been estimated over a 10-year period (Thorn et al. 2011). It is also clear that Brown Hyaena densities are highest in protected areas compared to neighbouring unprotected rangelands (Thorn et al. 2010; Richmond-Coggan 2014; Yarnell et al. 2015). Brown Hyaena densities appear relatively higher in Limpopo and North West provinces, compared to the Kgalagadi National Park (Mills 1990; Thorn et al. 2010; Yarnell et al. 2013) (Table 1). However, the highest densities have recently been estimated by Welch and Parker (2016) who found a density of 14–19 individuals / 100 km$^2$ on Kwandwe Private Game Reserve (Eastern Cape). Such a high density was attributed to the high density of mammalian predators in the reserve and the abundant scavenging opportunities afforded to Brown Hyaena by such predators. If these trends are true for the wider population, then it would be fair to say that the population is likely to be stable. However, we must acknowledge that there is no data on Brown Hyaena population sizes or trends for more than 50% of its South African distribution. Thus, there is a large degree of uncertainty.

Brown Hyaenas are typically able to penetrate most game fences by utilising holes dug by other mammals (Richmond-Coggan 2014) and as such habitat fragmentation in areas of cattle or game ranching is lessened. Some protected areas, such as Pilanesberg National Park and Madikwe Game Reserve, have impenetrable game fences and the Brown Hyaena subpopulations within these reserves are potentially at risk from inbreeding depression, as estimates suggest subpopulations of less than 40 individuals in each area. Brown Hyaena in the rangelands of North West Province typically have a range of about 100 km$^2$ and do move through game fences (R. Yarnell unpubl. data). Other isolated subpopulations, such as in the Little Karoo (Anysberg–Sanbona and surrounding farmland) are small with only 16 adult individuals being identified from camera trap photographs. Private protected areas also contribute to Brown Hyaena conservation. For example, Tswalu and Khamab private reserves (Northern Cape and North West, respectively) are important due to their size and location.

Other causes of fragmentation include urbanisation or land given to arable production which Brown Hyaena rarely frequent. Therefore, the level of fragmentation across the Brown Hyaena distribution is low overall in the majority of areas (Limpopo and North West provinces) where they currently exist. Subpopulation structure is difficult to determine for this species as not much is known about connectivity between regions and thus gene flow. However, it is unlikely that there is natural dispersal to the Cape or coastal regions. Based on our limited knowledge of geographic range and connectivity, we define the following five subpopulations: northwestern (Limpopo, Gauteng, Mpumalanga and North West provinces); the central interior (eastern Northern Cape and Free State); Klein Karoo in the Western Cape; the Eastern Cape reserves and farmland matrix; and KwaZulu-Natal.

The conversion from livestock farming to wildlife ranching may be beneficial to Brown Hyaena in terms of habitat conservation. However, where impenetrable fences are erected to protect valuable and rare game species, connectivity may be compromised. Kent and Hill (2013) found that estimated densities of Brown Hyaenas were higher on farms used for livestock production than on those used for game farming in Botswana, suggesting that the species can tolerate land-use change where reliable alternative food resources exist. Similarly, K. Williams (unpubl. data) suggests that most Brown Hyaena sightings on farms occur on those with a mixture of cattle and game. Thus, livestock ranches and mixed wildlife/ livestock areas could be improving habitat suitability and connectivity.

**Current population trend:** Stable in protected areas but possibly decline outside.

**Table 2. Density estimates of Brown Hyaenas (*Parahyaena brunnea*) within the assessment region**

| Density estimate (individuals / 100 km$^2$) | Confidence interval | Conservation area/province | Authors |
|---|---|---|---|
| 1.8 | - | Kgalagadi National Park | Mills 1990 |
| 2.8 | 2.6–5.2 | Pilanesberg National Park, North West Province (camera trapping) | Thorn et al. 2009 |
| 6 | 2.5–14.1 | Pilanesberg National Park, North West Province (distance sampling) | Yarnell et al. 2013 |
| 2 | 2–4 | Mankwe Wildlife Reserve, North West Province (camera trapping) | Yarnell et al. 2013 |
| 14 | 14–18 | Kwandwe Game Reserve, Eastern Cape (camera trapping) | Welch & Parker 2016 |
| 19 | 15–34 | Kwandwe Game Reserve, Eastern Cape (camera trapping) | Welch & Parker 2016 |

**Continuing decline in mature individuals:** No

**Number of mature individuals in population:** 800–2,200

**Number of mature individuals in largest subpopulation:** Unknown

**Number of subpopulations:** It is not currently possible to precisely determine the extent or number of subpopulations (but see above).

**Severely fragmented:** No, due to good dispersal abilities and large distributional range.

# Habitats and Ecology

The Brown Hyaena is widespread across southern Africa and is found in the following habitat types: desert areas with annual rainfall less than 100 mm (particularly along the Skeleton Coast), semi-desert, open scrub and open woodland savannah with a maximum rainfall up to about 700 mm. It shows an ability to survive close to urban areas (Kuhn 2014). It requires some type of cover in which to lie up during the day. For this it favours rocky, mountainous areas with bush cover in the bushveld areas of South Africa (Skinner 1976). In the Kgalagadi Transfrontier Park, it has been shown to be primarily a scavenger consuming a wide range of vertebrate remains, which is supplemented by wild fruits, insects, birds' eggs and the occasional small animal which is killed; and its impact on domestic livestock is usually small (Mills 1998; Maude 2005). Brown Hyaenas occupy a range of ranching land, but typically avoid agricultural and heavily urbanised habitats (Thorn et al. 2011).

Brown Hyaenas compete with Spotted Hyaenas (Mills & Funston 2003). Management practices have favoured the Spotted Hyaena in the Kruger National Park, leading to the Brown Hyaena being excluded as a breeding species (Mills 1990). However, in the Kgalagadi Transfrontier Park it was found that although the Brown Hyaena outnumbers the Spotted Hyaena by a ratio of about 2:1, in areas well frequented by Spotted Hyaenas, for example around dens, Brown Hyaenas were less often sighted (Mills 1990).

Although 65% of Brown Hyaenas live in mixed sex clans (Mills 1983) of 4–14 individuals (Mills 1982), they are solitary foragers who spend much of their time alone (Owens & Owens 1996; Skinner & Chimimba 2005). A clan is generally composed of one dominant male and a dominant unrelated female (Knowles et al. 2009), several additional females, natal male adults, subadults and cubs (Mills 1982; Owens & Owens 1996).

**Ecosystem and cultural services:** As a mammalian scavenger, the Brown Hyaena plays a key role in the ecosystem by cleaning up carrion. This service can prevent the spread of diseases and assist other scavengers or decomposers to meet their feeding requirements. Many farmers, especially on hunting farms, make use of this service by leaving carcasses and offal in the veld for Brown Hyaenas and other scavengers to clear.

Brown Hyaenas are also competitors with mesocarnivores such as Black-backed Jackals (*Canis mesomelas*) that can cause economic losses to farmers and thus Brown Hyaenas may help to alleviate such losses.

As one of the few widely distributed large carnivores left in South Africa, Brown Hyaenas can be considered charismatic and are used to educate children about the natural world and conservation as evidenced by the Earthwatch Brown Hyaena Project.

The Brown Hyaena features in local stories and songs in northern Limpopo; however, these cultural connections are significantly more prominent with older people, which suggests that many of this species' cultural links may phase out with the younger generation. Frequently, the hyaena is portrayed in local folklore as a character who is ignorant, easily fooled or connected with witchcraft.

# Use and Trade

Although less coveted for the traditional medicine market than Spotted Hyaenas (Hofer & Mills 1998b), both glands and organs are utilised from specimens taken opportunistically, for example, as roadkill.

This species is persecuted as a damage-causing animal, but despite potentially high levels of persecution, it still persists across a large proportion of South Africa, and a change in landowner attitudes towards the species would certainly enhance its population persistence.

Brown Hyaenas are not commonly hunted for trophies but with a permit, it is possible. Trophy hunting Brown Hyaenas is mainly of interest to hunters who are specifically aiming to collect a wide variety of species and will consequently target less commonly hunted species. The Brown Hyaena is protected under the US Endangered Species Act (ESA) and, therefore, it is unlawful to import this species as a trophy into the United States, which may account for the low popularity in trophy hunting Brown Hyaena by American clients.

**Table 3. Use and trade summary for the Brown Hyaena (*Parahyaena brunnea*)**

| Category | Applicable? | Rationale | Proportion of total harvest | Trend |
|---|---|---|---|---|
| Subsistence use | No | - | - | - |
| Commercial use | Yes | Traded for medicinal use and ceremonies. Limited trophy hunting. | Majority | Unknown |
| Harvest from wild population | Yes | Traditional medicine trade. | Majority | Unknown |
| Harvest from ranched population | Yes | Some game ranches capture and sell Brown Hyaena to other ranches. Limited trophy hunting. | Minority | Unknown |
| Harvest from captive population | No | - | - | - |

**Table 4. Possible net effects of wildlife ranching on the Brown Hyaena (*Parahyaena brunnea*) and subsequent management recommendations**

| | |
|---|---|
| Net effect | Positive |
| Data quality | Inferred |
| Rationale | Brown Hyaenas are expected to perform well on wildlife ranches, game farms and large isolated areas, provided persecution is limited. |
| Management recommendation | Removal of snares and greater tolerance by ranchers is likely to greatly benefit Brown Hyaena. |

The effects of wildlife ranching are currently unknown and further research is required to determine the impacts of wildlife ranching on ranched species and non-ranched or associated species. However, we have observed that Brown Hyaenas can do well on game/wildlife farms, if the property is lightly managed. For example, if supplementary feeding is set at a vulture restaurant Brown Hyaenas are likely to increase in local density (Yarnell et al. 2015). Ranches may also provide important pathways for dispersal. However, management recommendations should focus more on reducing persecution.

# Threats

Most Brown Hyaenas in the northwest of South Africa, and assumedly across the country, live on private land outside of protected areas where they may come into conflict with humans. They are often shot, poisoned, trapped, snared and hunted with dogs in an attempt to reduce livestock predation events (Mills 1998). St John et al. (2011) and Thorn et al. (2012) showed that poisoning, shooting and hunting of Brown Hyaenas frequently occurs in Limpopo and North West provinces, but with relatively fewer ranchers killing Brown Hyaena compared to Leopard (*Panthera pardus*), Black-backed Jackal and Caracal (*Caracal caracal*). In North West Province, one out of four collared animals on unprotected rangelands was shot. In the same study area, three individuals have been caught in snares (R.W. Yarnell unpubl. data) in five years (Photo 1). The large number of snares used in northern South Africa for bushmeat is a cause for concern, making it increasingly likely that snaring and other illegal persecution by humans is a major cause of unrecorded mortality that is likely to suppress Brown Hyaena population numbers. However, it is unknown whether such levels of persecution are having a tangible impact on populations, and further research is needed in this area.

If future landowners maintain similar attitudes towards Brown Hyaenas then it is likely that these threats will persist. The threats are ongoing and it is unknown whether they are likely to increase or cease in the future. A study by Thorn et al. (2012) showed that 42 interviewees reported killing a total of three Brown Hyaenas in the year preceding the interview, equating to an overall destruction rate of 0.1 Brown Hyaena / 100 km$^2$, leading to an extrapolation of an annual provincial removal of 55 Brown Hyaenas / year. Only 10 out of 96 interviewees living in and around the Soutpansberg Mountains, Limpopo Province, reported having livestock or game losses caused by Brown Hyaenas. The majority of these respondents did not respond with lethal measures. In this area, conflict with Leopards was much more problematic and this may have deferred the focus away from Brown Hyaenas (K. Williams unpubl. data).

Brown Hyaenas are often killed on roads, although the severity of this to populations is not always known. However, in a study of roadkill by Collinson et al. (2015) in northern Limpopo Province along paved and unpaved roads (sampling distance was 14,400 km over 120 days split by season: 40 days of sampling in each season from October 2011 to July 2012), two Brown Hyaena carcasses were detected.

Small isolated subpopulations in reserves surrounded by predator-proof fencing may be at risk of inbreeding depression impacting the populations and some management to maintain genetically diverse populations is recommended.

**Current habitat trend:** Stable. No decline in area, extent and/or quality of habitat. Wildlife and livestock ranching may be generally improving veld condition and connectivity for this species or conserving land that would otherwise be overgrazed by livestock.

# Conservation

Brown Hyaenas occur in a number of large conservation areas, including Kgalagadi Transfrontier Park (South Africa and Botswana), Kruger National Park and Pilanesberg National Park. Additionally, they are often recorded outside protected areas (Thorn et al. 2011; Richmond-Coggan, 2014).

Legal protection is in place for the Brown Hyaena making it illegal to kill the species without a permit. However, most killing occurs without a permit (St John et al. 2011). Educational campaigns should thus be conducted to educate landowners and farmers that Brown Hyaenas are predominantly scavengers and that they do not pose a threat to humans. They are shy and elusive and usually do not prey on large animals. The threat that Brown Hyaenas

**Photo 1. Brown Hyaena caught in a snare that was set at a Warthog (*Phacocoerus africanus*) passageway under a perimeter fence. The image shows the Brown Hyaena being immobilised via a dart gun to allow snare removal and the animal was successfully released once the anaesthetic had worn off (Richard W. Yarnell). Secunda industrial site, Mpumalanga Province (W. Matthews).**

**Table 5. Threats to the Brown Hyaena (*Parahyaena brunnea*) 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 | *5.1.3 Persecution/Control*: illegal lethal control of putative damage-causing Brown Hyaenas. | St John et al. 2011 | Attitudinal | Regional | Increasing—increase in the breeding of rare/expensive game, leading to increased hostility towards large carnivores. |
| | | Thorn et al. 2011 | Empirical | Regional | |
| | | Thorn et al. 2012 | Attitudinal | Regional | |
| | | Richmond-Coggan 2014 | Attitudinal | National | |
| 2 | *5.1.2 Hunting & Collecting Terrestrial Animals*: incidental snaring. | R.W. Yarnell unpubl. data | Anecdotal | Local | Increasing—snaring rates increasing in many protected areas. |
| 3 | *1.1. Housing & Urban Areas:* human settlement expansion causing habitat loss. Current stress *1.3 Indirect Ecosystem Effects*: habitat fragmentation. | Thorn et al. 2011 | Empirical | Regional | Unknown—increased development/ human population growth potentially offset spread of game ranching (though many of these areas are unsuitable for Brown Hyaena due to some hostile landowners). |
| 4 | *7.3 Other Ecosystem Modifications*: predator-proof fences isolating populations. | R.W. Yarnell unpubl. data | Anecdotal | Local | Unknown, but theory suggests small and isolated populations such as enclosed national parks and private reserves would benefit from genetic management. |
| 5 | *4.1 Roads & Railroads*: road collisions. | Collinson 2013 | Empirical | National | Increasing with new road construction. |
| | | R.W. Yarnell unpubl. data | Anecdotal | Local | |

pose to livestock remains uncertain and misinforming farmers may go against the desired outcomes. Holistic management methods, such as the use of livestock guarding dogs, should also be encouraged.

Maude (2005) and Mills (1990) showed that hunting is unspecialised and opportunistic, making it possible for Brown Hyaenas to show different hunting habits in different environments and under different constraints: for example, where vegetation structure allows predator ambush and where natural food source is scarce. Using the Problem Animal Control Registers from the Kweneng District of Botswana, dated between 2000 and 2001, Schiess-Meier et al. (2007) showed that 12% (269 heads) of all livestock losses were attributed to Brown Hyaenas. The latter could be over-estimated due to the Brown Hyaena scavenging presence at carcasses.

Landowners should also be encouraged to form conservancies to enhance the rangelands and provide a safe contiguous area for Brown Hyaena populations to thrive. Landowners should conduct regular snare sweeps and improve anti-poaching measures on their properties. Initiating a widespread anti-snaring programme and improving education on the negative effects snaring has on non-target animals is also necessary.

Reintroductions, however, are not encouraged as a conservation tool as they are not needed and may divert conservation resources away from priority conservation measures. In some cases translocations of problem Brown Hyaenas have occurred but these are isolated examples which are prone to failure due to the social characteristics and territorial nature of the species (see discussion in Weise et al. 2015). However, a number of small reserves in the Eastern Cape have reintroduced Brown Hyaenas and their subpopulations are doing well (C. Bissett unpubl. data). If any translocations or reintroductions are proposed, they should follow the IUCN guidelines for translocation and reintroduction of species (IUCN 2013) and seek expert guidance and government approval. The subpopulations should also be closely monitored.

**Recommendations for land managers and practitioners:**

- Consult and follow the guidelines of the 1998 Hyaena Conservation Action Plan (Mills & Hofer 1998).
- Monitoring only occurs at a few study sites. A national monitoring programme would be welcomed. Most effective large-scale monitoring would involve sign-based (e.g. from scat) occupancy field surveys or landowner questionnaires.
- With the use of citizen science, and technologies such as camera traps, a multi-species carnivore monitoring programme could easily be initiated in South Africa.

**Research priorities:**

- Accurate population or occupancy assessments throughout the majority of the species range—particularly in unprotected rangelands.
- Accurate data on persecution rates and influence on population growth rates/population persistence.
- Effects of management regimes on private subpopulations.
- Assess the hunting abilities of the Brown Hyaena and the risk posed to small stock, especially in systems where natural food sources are scarce and

**Table 6. Conservation interventions for the Brown Hyaena (*Parahyaena brunnea*) 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 | *2.1 Site/Area Management*: site-specific conflict mitigation measures, including the use of livestock guarding dogs. | Rust et al. 2013<br><br>McManus et al. 2015 | Indirect<br><br>Indirect | Local<br><br>Local | Livestock depredation rates reduced. | - |
| 2 | *5.4 Compliance & Enforcement*: increased site security/law enforcement in protected areas to combat snaring. | - | Anecdotal | - | - | North West Provincial Government Operations |
| 3 | *4.3 Awareness & Communications*: educating landowners of the efficacy and efficiency of holistic management. | - | Anecdotal | - | - | Primate and Predator Project |

the vegetation structure/landscape allows predator ambush.

- Genetic studies, especially on small enclosed reserves (to determine the level of inbreeding) as well as across the species' range (to determine movement between populations).

**Encouraged citizen actions:**

- Report sightings of free-roaming individuals outside protected areas on virtual museum platforms (for example, iSpot and MammalMAP).
- Do not set out poison or snares on properties. Remove all snares encountered.

# Data Sources and Quality

**Table 7: Information and interpretation qualifiers for the Brown Hyaena (*Parahyaena brunnea*) assessment**

| | |
|---|---|
| Data sources | Field study (literature, unpublished), indirect information (literature, expert knowledge) |
| Data quality (max) | Estimated |
| Data quality (min) | Suspected |
| Uncertainty resolution | 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.*