Hippotragus niger niger – Sable Antelope

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Regional Red List status (2016)	**Vulnerable A1ab+C2a(i)+D1*†**
National Red List status (2004)	Vulnerable C1+C2a(i)
Reasons for change	No change
Global Red List status (2008)	Least Concern
TOPS listing (NEMBA)	None
CITES listing	None
Endemic	Edge of range

*Watch-list Threat †Conservation Dependent

Sable Antelope are grazers of perennial grasses and are found mainly in medium to tall grasslands. However, these intact grasslands are highly threatened in South Africa and only 10% are well protected (Driver et al. 2012).

Taxonomy

Hippotragus niger niger (Harris 1838)

ANIMALIA - CHORDATA - MAMMALIA - CETARTIODACTYLA - BOVIDAE - *Hippotragus* - *niger* - *niger*

Common names: Sable Antelope (English), Swartwitpens (Afrikaans), Ngwaladi, Ingwalathi, Umtjwayeli (Ndebele), Kgama (Sesotho), Kwalatê, Kukurugu, Pôtôkwane (Setswana), Impalampala, Ngwarati (Swati), Mhalamhala (Tsonga), Phalaphala (Venda), Iliza (Xhosa), Impalampala (Zulu)

Taxonomic status: Subspecies

Taxonomic notes: Four subspecies are usually recognised: *H. n. niger*, *H. n. kirkii*, *H. n. roosevelti* and the isolated Giant Sable (*H. n. variani*) from Angola. As for many other antelope species, the validity and precise distribution of most of the described subspecies are uncertain. An extensive study of the geographical genetic structure of *Hippotragus niger* identified three genetic subdivisions representing a Kenya and east Tanzania clade (*H. n. roosevelti*), a west Tanzania clade (*H. n. kirkii*), and a southern African clade (*H. n. niger*) (Pitra et al. 2002), which corroborated the findings of Matthee and Robinson (1999) that delineated a genetic barrier between the east and southern African (Angola, Zambia and Malawi southwards) clades, thus cautioning against translocations between the two areas.

Assessment Rationale

The Sable Antelope is a charismatic species on the edge of its range within the assessment region. The current free-roaming population within the natural distribution range is estimated at 681 individuals, of which 409–477 are mature. There is a continuing decline in at least three major subpopulations and the largest subpopulation is estimated as 385 (231–270 mature; 2012 count) individuals in Kruger National Park (KNP). For 10 subpopulations within the natural distribution range, for which we have long term data, there has been an overall decline by an estimated 65% over three generations (1991–2015), primarily due to the decline in KNP. Further long-term datasets are needed to calculate historical population trends more accurately. Given that the decline in KNP is largely understood, and that the threat has been removed and the subpopulation is now stable, we list Sable Antelope as Vulnerable A1ab. However, habitat deterioration is probable in the future due to habitat degradation from mismanagement and climate change, thus we infer and project a continuing decline in mature individuals at the subpopulation level. Sable Antelope is thus also listed as Vulnerable under C2a(i) and D1. This species may qualify for Endangered under C1 if research projects show that the number of mature individuals will decrease by 20% over the next 14 years (two generations' time) or C2a(i) if the number of mature individuals in KNP is shown to be below 250.

The population estimate does not include formally and privately protected areas outside the natural distribution range. If it is argued that such subpopulations are the result of benign introductions and exist in similar habitat to the natural range, the total number of mature individuals is 643–857. Additionally, there is an estimated 6,995 individuals existing on private game farms and ranches within and outside the natural distribution range. However, only 2–10% of these individuals may be considered wild (at least 68% existing in breeding camps or exclosures) and thus the total that could be currently eligible for the Red List ranges from 84–490 mature individuals, thus bringing the total estimate of the wild and free roaming population to 818–1,346 mature individuals. Surveys should identify further private subpopulations that qualify for inclusion in the Red List and that may contribute to downlisting the species in future. Key interventions should focus on correct habitat management for the species (for example, de-stocking competing herbivores, reducing artificially high predator numbers, and fire management), increasing overall habitat available within the natural distribution and developing a national metapopulation

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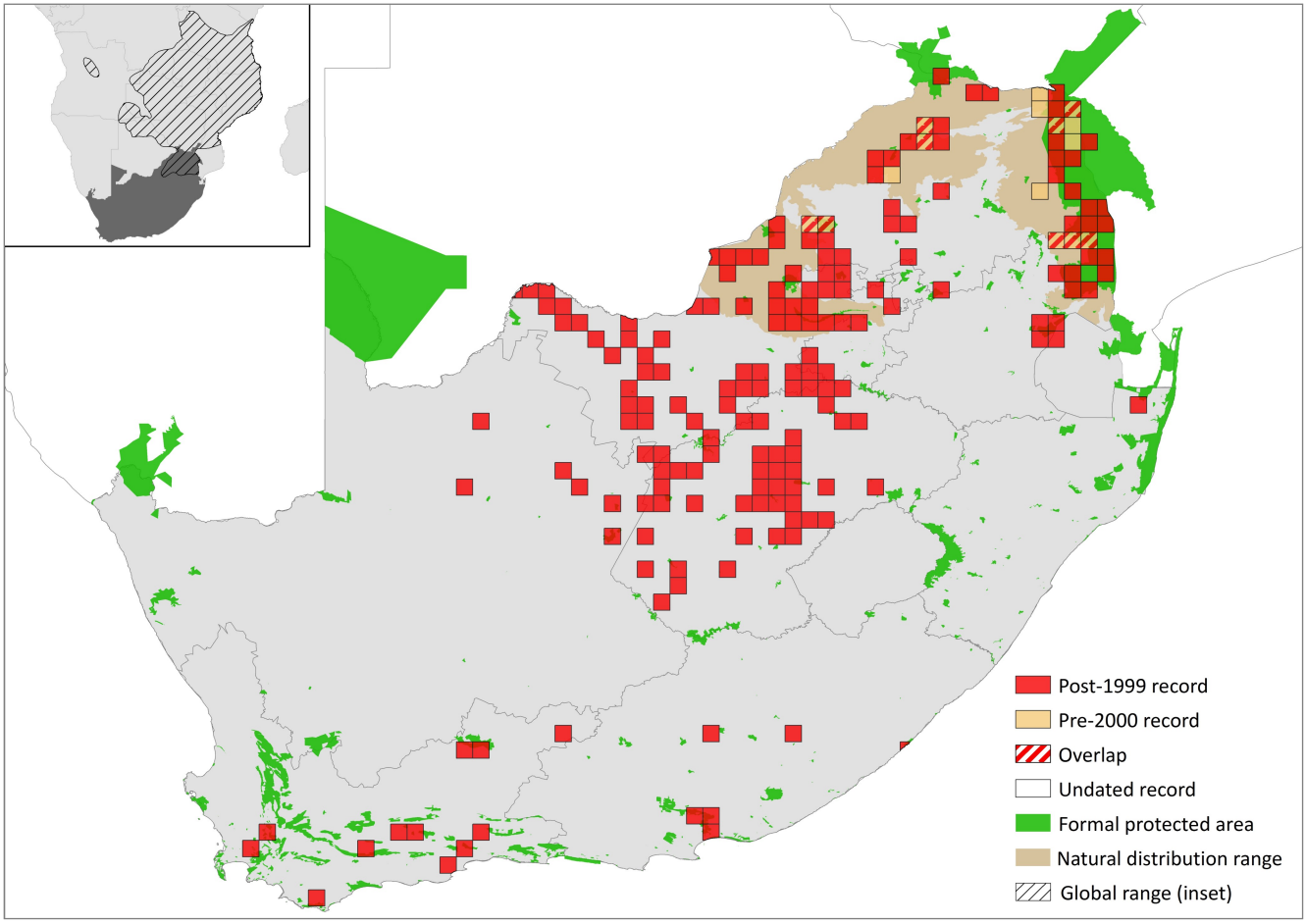

Figure 1. Distribution records for Sable Antelope (*Hippotragus niger niger*) within the assessment region

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	Introduced
Zimbabwe	Extant	Native

plan for sustaining the genetic diversity and resilience of the species. Conservationists should facilitate the formation of conservancies and incentivise the establishment of free-roaming private subpopulations over captive-bred animals.

Regional population effects: Although the range of this species is on the edge of the assessment region, its range is not continuous. Private and state subpopulations are isolated since they are surrounded by fences. The only dispersal routes that might exist are between KNP, Zimbabwe and Mozambique (the Great Limpopo Transfrontier Park). However, based on the small subpopulation size in KNP, immigration appears to be negligible and there is no confirmation that it actually takes place. Thus, although the regional population is not expected to be a sink for the global population, there is unlikely to be a rescue effect from immigration so the Vulnerable listing remains.

Distribution

The Sable Antelope occurs in savannah woodlands in southeastern Africa, with an isolated population (Giant Sable, *H. n. variani*) in Angola. However, Estes (2013) notes that they are associated with the well-watered Miombo woodland zone and some botanists argue that South Africa historically contained Miombo along the northern Limpopo, of which patches still exist (Saidi & Tshipala-Ramatshimbila 2006). It is speculated that natural subpopulations in those areas might be remnants of historical Miombo conditions.

In southern Africa, Sable Antelope occur in Zimbabwe, northeastern Botswana, scattered subpopulations in Mozambique, the northeastern part of the Caprivi Strip in Namibia, and South Africa (Skinner & Chimimba 2005; Table 1, Figure 1). Interestingly, the type specimen was collected and described by Harris (1838) in the Magaliesberg, North West Province (and this is probably why it adorns the province's coat of arms; Power 2014), which is considered the southwestern limit of the historical distribution, while the southeastern limit is the Crocodile and Komati Rivers (Skinner & Chimimba 2005). Sable Antelope have been eliminated from large parts of their former range by bushmeat hunting, habitat loss to agricultural expansion, habitat degradation (for example, bush encroachment) and competition with other grazers, including livestock (Skinner & Chimimba 2005).

Within the assessment region, Sable Antelope naturally occur in the Lowveld of eastern Mpumalanga, northern Limpopo, and west into the North West Province (Figure 1). They have been reintroduced patchily into

many areas of their former range. However, they have also been widely introduced to both formally protected and private areas outside the historical range, such that there are extra-limital subpopulations in the Northern Cape, Western Cape, Eastern Cape, Free State, and KwaZulu-Natal provinces. For example, 10 individuals were introduced to Karkloof Nature Reserve, KwaZulu-Natal in 1986 (Skinner & Chimimba 2005); as well as being introduced to Sandveld, Willem Pretorius and Koppies Dam Nature Reserves in the Free State Province, Rooipoort and Tswalu Kalahari Reserves and Mokala National Park in the Northern Cape Province. Additionally, they have been introduced into the Mkhaya Game Reserve in Swaziland (Skinner & Chimimba 2005).

The natural distribution (Figure 1) is used as a guideline for including subpopulations in this assessment and excludes the 'mixed bushveld' areas where some subpopulations are performing well. The underlying geology at Loskop Dam Nature Reserve is the same as for Limpopo's Waterberg (Waterberg Sandstone) and is thus included within the assessment. Further analysis of habitats is required to justify extra-limital subpopulations for inclusion in the assessment.

Population

Sable Antelope occur at low densities compared to other ungulates of similar size in semi-arid savannahs (Owen-Smith 2008), ranging from an estimated density of 4 individuals / km^2 in the Matetsi area of Zimbabwe (Wilson & Hirst 1977), and 3 individuals / km^2 in Matopo National Park, Zimbabwe (Grobler 1973) to a density not exceeding 0.5 animals / km^2 within the KNP (Chirima et al. 2013).

Within the assessment region, total mature population size (60–70% mature population structure) ranges from 409 to 857 depending on whether we include formally protected areas outside of the natural distribution range (Figure 1) but in potentially suitable habitat (Table 2). Although there are many more Sable Antelope existing on private game reserves and wildlife ranches around the country, at least 68% of subpopulations are kept in breeding camps or enclosures and thus do not qualify as wild subpopulations (based on a sample of 76 private properties, Endangered Wildlife Trust unpubl. data). Subpopulations dependent on direct intervention are not considered wild if they would go extinct within 10 years without intensive management (IUCN Standards and Petitions Subcomittee 2014). As such, a preliminary analysis of the wildness of private subpopulations indicated that only 2–10% of the subpopulations assessed may be considered wild (M. Child unpubl. data) adding 84–490 mature individuals to the total that could be currently eligible for the Red List. This would bring the total estimate of the wild and free roaming population to 818–1,346 mature individuals.

Sable Antelope numbers in KNP crashed from an estimated 2,240 in 1986 to 1,232 in 1993 and again dropped to *c.* 507 in 1999 (Grant & Van der Walt 2000; Grant et al. 2002). Over the period 1991–2015, there has been an estimated decline in KNP of 71% (from 1,365 to *c.* 400 individuals); and an overall decline, based on 10 protected areas within the natural distribution range, of 65% (1,952 to 675 individuals). However, the KNP subpopulation has appeared to stabilise between 2004 and 2012: estimated at 400 in 2004 (Friedmann & Daly 2004), and 385 individuals in 2012 (Ferreira et al. 2013). The initial decline has been attributed to deteriorating habitat quality and increased predation pressure following

Table 2. Subpopulation numbers of Sable Antelope (*Hippotragus niger niger*) aggregated by province between 2013 and 2014

Province*	Type	Inside natural distribution range	No. of reserves / properties	Subpopulation total	Mature 60%	Mature 70%
Limpopo	Formally protected	Yes	6	528	350	409
Mpumalanga	Formally protected	Yes	1	50	30	35
North West	Formally protected	Yes	3	103	62	72
North West	Private	Yes	1	40	24	28
Limpopo	Wildlife ranches	Yes	31	2,123	1,274	1,486
North West	Wildlife ranches	Yes	78	1,854	1,112	1,298
Free State	Formally protected	No	3	360	216	252
Northern Cape	Formally protected	No	1	31	19	22
Eastern Cape	Private	No	4	162	97	113
Northern Cape	Private	No	3	112	67	78
Western Cape	Private	No	1	3	2	2
Eastern Cape	Wildlife ranches	No	10	313	188	219
Free State	Wildlife ranches	No	75	1410	846	987
Northern Cape	Wildlife ranches	No	12	978	587	685
Total (L, M, NW)	Formally protected		10	681	409	477
Total (L, M, NW, NC, FS)	Formally protected		14	1,072	643	750
Total (L, M, NW, NC, FS)	Formally & privately protected		16	1,224	734	857
Total (nationwide)	Private and ranches		215	6,995	4,197	4,897

*FS – Free State, L – Limpopo, M – Mpumalanga, NC – Northern Cape, NW – North West

artificial water point installation (Harrington et al. 1999). More recently, Owen-Smith et al. (2012) proposed that the reason behind the lack of current population recovery is a combination of reduced herd size (and thus increased vulnerability) and allee effect (lowered probability of finding mates). A recent study in KNP found no differences in habitat features between the areas where herds still persist and areas from which herds have disappeared, suggesting that deteriorating habitat conditions are not the primary reason for Sable Antelope decline (Asner et al. 2015).

Some formally protected subpopulations have become locally extinct. For example, a subpopulation in Songimvelo Nature Reserve, Mpumalanga, numbering 12 individuals in 2003, became locally extinct in 2011 and the population of Sable Antelope in Madikwe Game Reserve went locally extinct in 2009. Interestingly, the extra-limital subpopulations in the Free State provincial nature reserves are all performing well (increased from 139 to 294 individuals from 2004–2013; average annual growth rate from 2006–2013 was 21%), possibly because climate change and fire suppression are creating favourable savannah systems (E. Schulze pers. comm. 2015). Similarly, the subpopulation on Mokala National Park is growing (having increased from 10 to 31 individuals from 2008 to 2012), but it is extra-limital and thus not included in this assessment. Additionally, there are three subpopulations on privately protected areas in the Northern Cape Province that are growing, but are kept isolated from predators and receive supplementary feeding on a daily basis (D. MacFadyen & C. Kraft pers. comm. 2015). These subpopulations therefor do not comply with the criteria for inclusion in the assessment (IUCN Standards and Petitions Subcommittee 2014). However, including such extra-limital subpopulations to the population trend estimate lowers the net reduction to 44% over three generations.

Overall, total Sable Antelope numbers are increasing due to new entrants in the Sable Antelope game ranching business but these subpopulations do not necessarily add conservation value. Although declines in nature reserves could possibly be reversed through supplementation from captive stock, careful consideration must be given to ensuring enough genetic diversity to maintain a viable subspecies, as the private subpopulations might be either genetically contaminated with other subspecies or ecotypes, artificially selected for horn length or ecologically naïve because of their captive-bred nature (*sensu* Jule et al. 2008). Further survey work and ground-truthing is needed to identify private subpopulations that can enhance the resilience of the overall wild population.

Detailed population structure data are only available for Kgaswane Mountain Reserve (North West Province), where the most recent (2014) composition is reported as (F. Parrini unpubl. data):

- Adult males: 20%
- Adult females: 40%
- Subadult males: 12%
- Subadult females: 2%
- Juveniles born last year: 10%
- Calves born current year: 16%

Thus, the mature proportion of the population is estimated to be between 61–63% (depending on whether one considers the subadult female as mature, since being > 2 years they could be reproducing in theory). This value is relatively low, but we need to keep in mind that it is an estimate based on only one subpopulation and the Kgaswane Mountain Reserve subpopulation may still be growing from the low of 34 they had left after removals in 2004. Further subpopulation structures should be analyzed. Thus, we use a higher estimate of 70% as the upper bound of the estimate. Generation length is estimated to be between 8.4 years (Pacifici et al. 2013) and 9 years (C. Birss unpubl. data), which yields a three generation window of 25–27 years.

Current population trend: Decreasing (overall)

Continuing decline in mature individuals: Yes. Based on historical declines and continuing decline in half of the subpopulations. Ongoing loss of suitable habitat and poaching is also projected and suspected to cause a continuing decline of mature individuals.

Number of mature individuals in population: 409–1,346

Number of mature individuals in largest subpopulation: The largest subpopulation is KNP (231–270 mature individuals in 2012). Every other eligible subpopulation contains fewer than 50 mature individuals.

Number of subpopulations: 13 (formally protected). Subpopulations are defined as any fenced area, as there is little exchange between these areas and no natural dispersal. Many more subpopulations exist on private protected areas and wildlife ranches.

Severely fragmented: Yes. Sable Antelope exist in isolated reserves (besides KNP and the surrounding transfrontier space, where the population has been declining since the mid 1980s) and so relies on translocations to sustain gene flow. There is little contact between separate subpopulations as they occur in fenced areas and thus there is little genetic exchange between the different parks. In Kgaswane Mountain Reserve, for example, new individuals have not been introduced since the first reintroduction of 12 individuals in 1967. However, they have been sold to private reserves at least once. This highlights the potential problem of inbreeding.

Habitats and Ecology

The Sable Antelope is an “edge” species that frequents the woodland/grassland ecotone. They are selective feeders with a preference for fresh growth grasses (40–140 mm) and are dependent on drinking water, travelling to water at 2–4 days intervals (Cain et al. 2012). Burns that provide green re-growth and/or vleis are key resource areas in the dry season (Parrini & Owen-Smith 2010). *Panicum maximum* is a key resource grass species in certain areas; *Themeda triandra* is a highly sought after species too (Parrini 2006). However, they show a broad dietary acceptance for other grass species such as *Brachiaria nigropedata, Heteropogon contortus, Digitaria* spp. and *Eragrostis* spp. in the Matobos National Park in Zimbabwe (Grobler 1981). *Chrysopogon serrulatus* is the main dietary item in Pilanesberg National Park (Magome et al. 2008). Tall stemmy species like *Hyperthelia dissoluta* was commonly eaten in the Percy Fyfe Reserve (Wilson & Hirst 1977), the Kgaswane Mountain Reserve (Parrini 2006) and in the Okavango Delta region in Botswana (Hensman et al. 2012). However, at Loskop Dam Nature Reserve they utilize tall stemmy species like *Hyperthelia dissoluta* only in recently burned areas and seldom in the mature form. Sable Antelope have been observed to

Table 3. Mean annual home range size (MCP 100%) reported for different areas in past Sable Antelope (*Hippotragus niger niger*) studies. The data refers to protected areas in South Africa, unless otherwise specified.

Study area	Study	Home range (km²)
Kruger National Park	Owen-Smith & Cain (2007) Macandza (2009)	65–118 39.1
Okavango Delta, Botswana	Hensman et al. (2014)	38.5–61.5
Pilanesberg National Park	Magome (1991)	27.3
Sandveld Nature Reserve	Jooste (2000)	24.7
Kgaswane Mountain Reserve (former Rustenburg Nature Reserve)	Parrini (2006) Wilson & Hirst (1977)	15.6–19.1 17.7
Shimba Hills Game Reserve, Kenya	Sekulic (1981)	10–24
Loskop Dam Nature Reserve	Wilson & Hirst (1977)	9.2
Percy Five Nature Reserve	Wilson & Hirst (1977)	7.5

browse at times during the dry season (Hensman et al. 2012).

The use of burning practices early in the dry season can provide green grass regrowth used by Sable Antelope (Sekulic 1981; Magome et al. 2008; Parrini & Owen-Smith 2010) when the grass regrowth is at least 50 mm (Grobler 1981). Additionally, potential competition with other grazers is a concern in some areas like the KNP where the occurrence of Sable Antelope seems to be restricted by the presence of more abundant grazers, either directly or indirectly through the presence of common predators (Chirima et al. 2013). This then forces Sable Antelope into areas with restricted availability of food (Owen-Smith et al. 2013).

Sable Antelope occur in herds of 10–30 with temporary aggregations of up to ~ 200 (Skinner & Chimimba 2005). There is little dimorphism in body size (Owen-Smith 1988) and females and juveniles form herds, while subadult males are often associated with these herds and rarely form bachelor groups (Estes 1991; Parrini 2006). Mature males are believed to be territorial (Estes 1991), however observations in the Kgaswane Mountain Reserve seem to suggest that at times an adult male attaches itself to a herd of females even outside its territory (Parrini 2006). Home range size estimates range from as little as 7.5 km² in the Percy Fyfe Nature Reserve, Limpopo (Wilson & Hirst 1977), to 118 km² in KNP (Owen-Smith & Cain 2007) (Table 3).

Ecosystem and cultural services: Sable Antelope are charismatic with high demand amongst trophy hunters.

Use and Trade

Sable Antelope are a highly utilised species within the assessment region (Table 4). It is a sought after hunting trophy, and thus the private sector mostly keep the species in intensive systems to ensure adequate genetic management and disease control. For example, there are numerous intensive breeding locations on private properties in the Limpopo and North West provinces (and across other provinces). These captive-bred subpopulations are mostly used commercially for sale at game auctions or trophy hunting, and have little contact with the wild populations. Controlled utilisation (for example, trophy hunting) is thus not expected to negatively impact the species. However, there is concern that, given the declining trend of many formally protected subpopulations, captive-bred stock will increasingly be used to augment and reintroduce Sable Antelope subpopulations, which may ultimately weaken the adaptive potential of Sable Antelope in the assessment region through ecological naïvety and hybridisation (*sensu* Jule et al. 2008, Table 5). Captive breeding (with associated veterinary care) also reduces the disease resistance of subpopulations. Average camp size for Sable Antelope (taking the maximum when a range is given) is 2.2 ± 3.6 km² (N = 50 properties, A. Taylor, unpubl. data).

Poorly considered translocations may expose animals to unsuitable habitats and/or mix pure *H. niger niger* genes with other subspecies or ecotypes which could possibly result in outbreeding depression (Arnold 1992). Anthropogenic hybridisation may occur due to fostered changes in the abundance and distribution of the species on private properties (Rhymer & Simberloff 1996; Allendorf et al. 2001). Thus far, hybridisation between subspecies of Sable Antelope has not been reported, however it is suspected because extensive translocations of wildlife throughout South Africa is threatening the genetic integrity of a number of ungulate taxa such as the Blue and Black Wildebeest (*Connochaetes taurinus* and *C. gnou*) (Grobler et al. 2011), Black-faced and Common Impala (*Aepyceros melampus petersi* and *A. m. melampus*) (Green & Rothstein 1998), Grevy's and Plains Zebra (*Equus grevyi* and *E. quagga*) (Cordingley et al. 2009) and Bontebok and Blesbok (*Damaliscus pygargus pygargus* and *D. p. phillipsi*) (Loyd & David 2008). The consequences of anthropogenic hybridisation include: reduced fertility in


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Table 4. Use and trade summary for the Sable Antelope (*Hippotragus niger niger*)

Category	Applicable?	Rationale	Proportion of total harvest	Trend
Subsistence use	Yes	Poaching for bushmeat.	Low	Stable
Commercial use	Yes	Recreational and trophy hunting. Local, national and international.	Majority	Increasing
Harvest from wild population	Yes	The offtake from the wild population may increase as Sable Antelope become rarer in the wild and thus increase in economic value.	Low	Stable
Harvest from ranched population	Yes	Subpopulations on private land mainly used for trophy hunting.	Low	Increasing
Harvest from captive population	Yes	The offtake from captive populations may increase as Sable Antelope become rarer in the wild and thus increase in economic value.	Majority, but difficult to estimate. Some game ranches are in production while others are still building subpopulations or establishing new subpopulations.	Increasing

the rare taxon, and genetic swamping or assimilation (Levin et al. 1996). To have viable and resilient population for the future, conservation management strategies must preserve the genetic integrity and diversity in local subpopulations. Management plans on game farms must be in place and should include measures to prevent the risk of hybridisation between closely related subspecies.

Threats

The broad-scale threats to Sable Antelope in the assessment region are climate change and habitat loss, while at regional and local scales it is poor habitat management and translocations into areas unsuitable for the subspecies (Table 6). Poaching and incidental snaring is a threat in some areas (Nel 2015). An emerging threat may be the risk of contaminating the subspecies with genes from outside the region (facilitated by the captive-bred private subpopulations).

1. **Climate change:** ongoing; predicted to have increasing effects in the future. Consequences are subpopulation decline as a result of the decline in suitable habitat within fenced areas, as suitable habitat shifts and dispersal of the animals is constrained by fences. The subpopulation in KNP declined following droughts (Owen-Smith & Mills 2006). Conditions in Africa are predicted to get progressively hotter and drier with the proportion of arid and semi-arid lands likely to increase by 5–8% by 2080 (Boko et al. 2007).
2. **Poor habitat management:** ongoing; as land fragmentation and anthropogenic impacts (such as livestock ranching, incorrect fire management, hyper-dispersed water point distribution) become more widespread, poor land management practices are predicted to have increasingly negative impacts on Sable Antelope in the future. However, these could be counteracted by ensuring the conservation of habitat in current areas of occurrence, and the observation that livestock ranching is declining in provinces like Limpopo as land is increasingly converted to game ranching. Livestock ranching may, therefore, not be a severe threat in the future. Studies show that hyper-dispersal of artificial water points leads to both inflated interspecific grazing competition and predation (Owen-Smith 1996; Harrington et al. 1999; Grant & van der Walt 2000), and these factors may synergise. The Sable Antelope is a low-density species that may be outcompeted by more abundant species depressing grass height through their own grazing (Macandza et al. 2012). Without careful management of competing species numbers, this could be an ongoing problem. Predation is an indirect threat, mediated by an increase in the abundance of high-density species in the same areas as Sable Antelope, which attract more predators to those areas (Owen-Smith & Mills 2006). Sable Antelope have a high dietary tolerance, but might be restricted to areas with low availability of nutritious food types by the presence of more abundant species and hence increased predation risk in more suitable areas. Sable Antelope went locally

Table 5. Possible net effects of wildlife ranching on the Sable Antelope (*Hippotragus niger niger*) and subsequent management recommendations

Net effect	Negative
Data quality	Suspected
Rationale	Intensively managed/captive-bred Sable Antelope are not often used for reintroduction to wild systems for commercial reasons. They also may not be fit for reintroduction to wild systems due to problems associated with captive breeding, hybridisation and artificial selection. Worryingly, breeders may be buying individuals from the wild to place into captive breeding projects.
Management recommendation	Provide market incentives to create conservancies and establish free-roaming Sable Antelope herds on private properties.

Table 6. Threats to the Sable Antelope (*Hippotragus niger niger*) 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	*11.1 Habitat Shifting & Alteration* and *11.2 Droughts*: global climate change causing habitat loss and loss of quality.	Boko et al. 2007	Simulated	Continental	Increasing
		Owen-Smith & Mills 2006	Empirical	Local	None given
2	*7.1 Fire & Fire Suppression* and *7.2 Dams & Water Management/ Use*: poor habitat management (includes grazing competition and predation from artificially increased predator, herbivore or livestock densities).	Harrington et al. 1999	Empirical	Local	Stable (KNP Sable Antelope subpopulation stable)
		Owen-Smith & Mills 2006	Indirect	Local	Stable (KNP Sable Antelope subpopulation stable)
		Macandza et al. 2012	Indirect	Local	Increasing (suspected) based on increase in game species across the country
3	*12.1 Other Threat*: poorly planned translocations leading to inbreeding, genetic drift or allee effect.	Basson 1991	Indirect	Regional	Increasing (suspected based on current data)
		Grobler & van der Bank 1996	Indirect	Regional	Increasing (suspected based on current data)
		Owen-Smith et al. 2012	Indirect	Local	Stable (KNP Sable Antelope subpopulation stable)

extinct in Madikwe Game Reserve in 2009 due to a combination of grazing competition, high predation rates (specifically Spotted Hyaenas, *Crocuta crocuta*, preying on calves), and a deterioration in habitat quality due to bush encroachment (P. Nel, pers. comm. 2015). These individuals were reintroduced from captive-bred stock and perhaps were also ecologically naïve.

3. **Translocations:** poorly planned translocations can lead to the animals being exposed to unsuitable habitat (Basson 1991; Owen-Smith 2003). The solution is to perform proper habitat viability assessments before considering a translocation to a new area. Additionally, while a typical herd is 10–30 individuals (Skinner & Chimimba 2005), extensive translocation has led to the fragmentation of subpopulations into small herds and consequent loss of genetic variability (Skinner & Chimimba 2005). In Zimbabwe, 35% of 136 ranches had fewer than 50 individuals and 20% had fewer than 10 (Du Toit 1992 cited in Skinner & Chimimba 2005). Similarly, in South Africa, 78% of sampled subpopulations had fewer than 20 individuals and 43% fewer than 10 (Basson 1991). Similarly more recent survey data indicate that 29% of all properties contain herds of fewer than 10 individuals and 55% of properties have herds of fewer than 30 individuals (N = 76 properties, A. Taylor, unpubl. data). Grobler and van der Bank (1994) warned that calf mortality in Mpumalanga and Limpopo provinces might be the result of inbreeding. Owen-Smith et al. (2012) also report a potential allee effect (a positive density dependence below a certain threshold that inhibits population recovery) in KNP, caused by currently low herd sizes and thus difficulty in finding mates, risk of inbreeding, and reduced security in numbers when facing predators.

Current habitat trend: Declining. Anecdotal evidence suggests change in the Lowveld since the early 1900s through bush encroachment but there is little evidence that recent change in habitat quality and structure in KNP could explain Sable Antelope decline (Owen-Smith et al. 2012, Asner et al. 2015).

Conservation

Although Sable Antelope are not widely distributed within the assessment region, they occur in several important protected areas: KNP (largest subpopulation), Loskop Dam Nature Reserve, Borakalalo Nature Reserve, Kgaswane Nature Reserve and Wonderkop Nature Reserve (increasing or stable subpopulations). Mokala National Park, Sandveld, Willem Pretorius, Koppies Dam, Tswalu Kalahari Reserve, and Rooipoort Nature Reserve, while falling outside the natural distribution range, contain important source pools for reintroduction. Studies are needed to identify where protected area expansion should focus to mitigate the effects of climate change on Sable Antelope population persistence. The Mpumalanga Biodiversity Sector Plan (MBSP) considered climate change with habitat fragmentation; and corridors were identified by including connectivity between natural habitats.

Correct habitat management is the most important current intervention for Sable Antelope (Table 7). In some areas (for example, Kgaswane Mountain Reserve) there is active management of potential competing species to minimize grazing competition consequences (Nel 2000). At Loskop Dam Nature Reserve, the limits on impala and wildebeest numbers, combined with correct fire management, have worked well for Sable Antelope and other selective tall-medium grass grazers (Tsessebe, *Damaliscus lunatus lunatus*; Oribi, *Ourebia ourebi ourebi*; and Common Reedbuck, *Redunca arundinum*). As a comparison, the Songimvelo Nature Reserve subpopulation (which was founded in 1997/98 with 21 animals from Loskop Dam Nature Reserve) became locally extinct in 2011 due to grazing competition from livestock. Livestock were added to the system due to a land claim (J. Eksteen pers. comm. 2014) and numbered around 1,500 in 2008, which pushed

Table 7. Conservation interventions for the Sable Antelope (*Hippotragus niger niger*) 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*: habitat management: use fire to create palatable breeding grasses and/or minimise grazing competition; do not create unnaturally high predator numbers; maintain fences to prevent escapees.	Nel 2000 Parrini & Owen-Smith 2010	Empirical Field study, empirical	Regional Local	Subpopulation increasing When burnt areas had sufficient green regrowth Sable Antelope foraged there; their nutritional status was well above years with no green regrowth available.	Mpumalanga Parks and Tourism Agency; Limpopo Department of Economic Development, Environment and Tourism; North West Parks and Tourism Board
2	*3.3 Species Reintroduction*: reintroduce social units into areas of suitable size and habitat inside natural distribution range.	-	Anecdotal	-	-	Mpumalanga Parks and Tourism Agency; Limpopo Department of Economic Development, Environment and Tourism

the Sable Antelope from savannah into higher-lying sourveld areas. Sable Antelope numbers started dropping and the Mpumalanga Tourism and Parks Agency (MPTA) removed the remaining group. In the same period, Loskop Dam Nature Reserve was managed with conservative stocking of impala and Blue Wildebeest, and no water points were established in a large area that was added to the reserve for the benefit of selective tall grass grazers. Sable Antelope and Tsessebe make use of this area. Fire can also be used in some areas to alleviate the nutritional stress during the otherwise food-limiting dry season (Parrini & Owen-Smith 2010). Loskop Dam Nature Reserve managers have been able to implement planned fires in most years (J. Eksteen, pers. comm. 2014). Additionally, as most areas are fenced, it is also important that fences are regularly monitored to avoid unkempt fences that facilitate the disappearance of individuals.

Carefully planned and coordinated translocations are crucial. Translocations to areas believed to be suitable (for example, in Pilanesberg National Park, Magome et al. 2010; and Madikwe Game Reserve), were not always successful. It is important, when planning translocations, not only to release in areas that occur within the natural distribution range, but to precede the introduction event with a habitat suitability study that focuses on dry season resources, which is the limiting period. It is also important to prioritise translocations to areas free of predators. Reintroducing wild herds or social units, rather than individuals or captive-bred stock, is also recommended to avoid introduction of different ecotypes or ecological naïve individuals. Translocations and reintroductions of suspected hybrid subpopulations into formally protected areas should be avoided and monitored.

Recommendations for land managers and practitioners:

- Sable Antelope translocations and reintroduction need to be managed more effectively at a national scale: herds must be introduced into protected areas that have suitable habitat, habitat management and fire regimes; that do not overstock predators or other large herbivores; and that are large enough for seasonal movements and key resource regeneration. A biodiversity management plan, together with a scientifically-informed translocation policy, will mitigate potential inbreeding and hybridisation concerns in free-roaming Sable Antelope herds.
- Monitoring subpopulations needs to become systematic. One of the North West Province subpopulations (Kgaswane Mountain Reserve) is monitored regularly by the field rangers who keep track of total numbers and age/sex classes. This same subpopulation is also monitored in terms of areas occupied and resources utilised as individuals in the herds have GPS collars that enable researchers to remotely monitor the herd locations. Similar monitoring systems should be established.
- The relationship between the public and private sector must also be re-evaluated: if the private sector is to contribute to Sable Antelope conservation, they must either stock free-roaming herds on conservancies or properties large enough to need light management only, or provide captive-bred stock that are from the correct ecotype for the region and that are not mixed with subspecies from outside the region.
- The Wildlife Group of the SA Veterinary Council published a booklet on Sable Antelope as a game ranch animal about 20 years ago. This should be revised and updated for managers.

Research priorities: A series of research projects on Sable Antelope decline, resource use and population dynamics are ongoing in the Centre for African Ecology at the University of the Witwatersrand. Quite a large number of publications have been produced in the last few years targeting different aspects of Sable Antelope ecology from home range selection within landscapes to foraging at plant species level. The findings so far seem to suggest that one cause alone cannot be held responsible for the observed decline in numbers within South African protected areas and that different areas might be influenced by different constraining factors. Further projects focusing on population dynamics and small scale behavioural decisions, and how they affect landscape utilisation, patterns and potential climate change effects, are still underway; to ensure that these projects can become part of a long-term research plan to further investigate still poorly understood threats, continual logistical support is needed both from private and state owned reserves.

Other research priorities include:

- Getting an accurate indication of numbers of free roaming herds on private lands. Understanding the pros and cons of using captive-bred individuals to reintroduce and supplement subpopulations should be studied further.
- A genetic test should be developed that can detect possible hybrid animals. Thus far, genetic studies on the geographical structure of Sable Antelope in Africa have focused solely on mitochondrial DNA (mtDNA). Therefore, management decisions which affect the survival of the species are currently being made based on these published results. However, more extensive sampling and the inclusion of additional markers in the form of nuclear DNA is necessary to identify geographically distinct populations. In addition, identification of hybridisation would only be possible with the identification of a suitable panel of nuclear markers. Research with the inclusion of both types of markers would thus provide a better understanding of genetic diversity and population structure from which conservation decisions can be evaluated.
- Long-term dataset collation for all formally protected areas to accurately calculate past and potential future declines. A revised population viability analysis for the subpopulation in KNP should be performed to determine whether this species qualifies for Endangered under C1 or C2a(i).
- Climate modelling for potential protected area expansion to benefit Sable Antelope.

Encouraged citizen actions:

- For private landowners, dropping fences and forming conservancies, and switching from intensive management to light management, to create herds of wild and free-roaming Sable Antelope within the natural distribution range would be a huge conservation benefit.

Data Sources and Quality

Table 8. Information and interpretation qualifiers for the Sable Antelope (*Hippotragus niger niger*) assessment

Data sources	Census (unpublished); Field Study (literature and unpublished); Indirect information (literature)
Data quality (max)	Observed
Data quality (min)	Estimated
Uncertainty resolution	Maximum/minimum values
Risk tolerance	Evidentiary

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