Antidorcas marsupialis – Springbok


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Regional Red List status (2016)	Least Concern*
National Red List status (2004)	Least Concern
Reasons for change	No change
Global Red List status (2008)	Least Concern
TOPS listing (NEMBA)	None
CITES listing	None
Endemic	No

*Watch-list Threat

The species name *marsupialis* (*cf*. marsupials) refers to the small, bag-like "pronk" on the back of the Springbok, which is flared open when "pronking" or stotting, displaying the snow white hair and with a very distinct smell derived from a gland.

Taxonomy

Antidorcas marsupialis (Zimmerman 1780)

ANIMALIA - CHORDATA - MAMMALIA - CETARTIODACTYLA - BOVIDAE - *Antidorcas - marsupialis*

Common names: Springbok (Afrikaans and English), Springbuck (English), Tshephe (Sotho), Ibhadi (Xhosa), Insephe (Zulu)

Taxonomic status: Species

Taxonomic notes: Meester et al. (1986) listed three subspecies: *A. m. marsupialis* from the southern part of the range; *A. m. hofmeyri* from Botswana, Namibia and the Northern Cape; and *A. m. angolensis* from Angola. While the subspecies distinction is debated, morphometric data reveal a difference in size between Springbok occurring on either sides of the Orange and Vaal Rivers, which is evidence for maintaining subspecies status (Peters & Brink 1992). Further taxonomic research is thus needed to determine the status of two distinct ecotypes from the north (Kalahari region) and the south (Karoo region).

Assessment Rationale

Springbok are listed as Least Concern due to their widespread distribution within the assessment region, a current (2013–2015) estimated mature population size of 76,446–77,545 animals (formally protected areas alone contain 46,115–47,214 mature individuals in 48 subpopulations) and because the overall population is estimated to have increased by 8–27% over the past three generations (1994–2015). However, local or regional declines are occurring, most notable of which is the subpopulation in Karoo National Park, which has declined by 63% between 1994 and 2015 (2,163 to 794 animals). This was precipitated by a large cull in 2000 with a continuing decline thereafter. The causes of such declines are unclear, but may involve environmental stresses (such as extended wet periods) and degradation (from excessive livestock overgrazing), Allee effects, mesopredator pressure and poaching (localised contexts) – the relevance or severity of such threats varying by area. Overall, imprudent translocation of locally-adapted ecotypes (Kalahari versus Karoo) and the emerging threat of selective breeding for rare colour variants (where the "regular" Springbok ewes are simply treated as surrogate uteri) may cause maladaptive traits, which could prove detrimental to the species in the face of climate change. Such threats should be managed through improving connectivity between habitats and regions to allow for greater dispersal and gene flow, as well as the development of a scientifically-informed national translocation policy. It is also recommended that this species could be used sustainably for game-meat production as part of wildlife-based rural economies, where subpopulations are performing adequately. Predicted habitat changes due to climate change could increase the importance of Springbok in producing protein off arid rangelands. This species is a national symbol of South Africa and must continue to be conserved as an abundant and resilient population.

Regional population effects: There is dispersal across the South African, Namibian and Botswanan borders, especially within Kgalagadi and Richtersveld Transfrontier Parks. There are very few other free-roaming subpopulations in the assessment region. The majority of the population is kept on private land within the natural distribution of the species.

Distribution

The Springbok's distribution is mainly confined to southern Africa, except for a narrow extension into south western Angola, where it inhabits the South West Arid Zone and adjacent dry savanna of south and south western Africa. It still occurs very widely within its historical range, but in Angola it survives in greatly reduced numbers (East 1999; Skinner 2013). It does not occur in Swaziland and became Extinct in Lesotho from overhunting (Lynch 1994).

In South Africa, the Springbok was almost exterminated over much of its natural range in the Free State, the former

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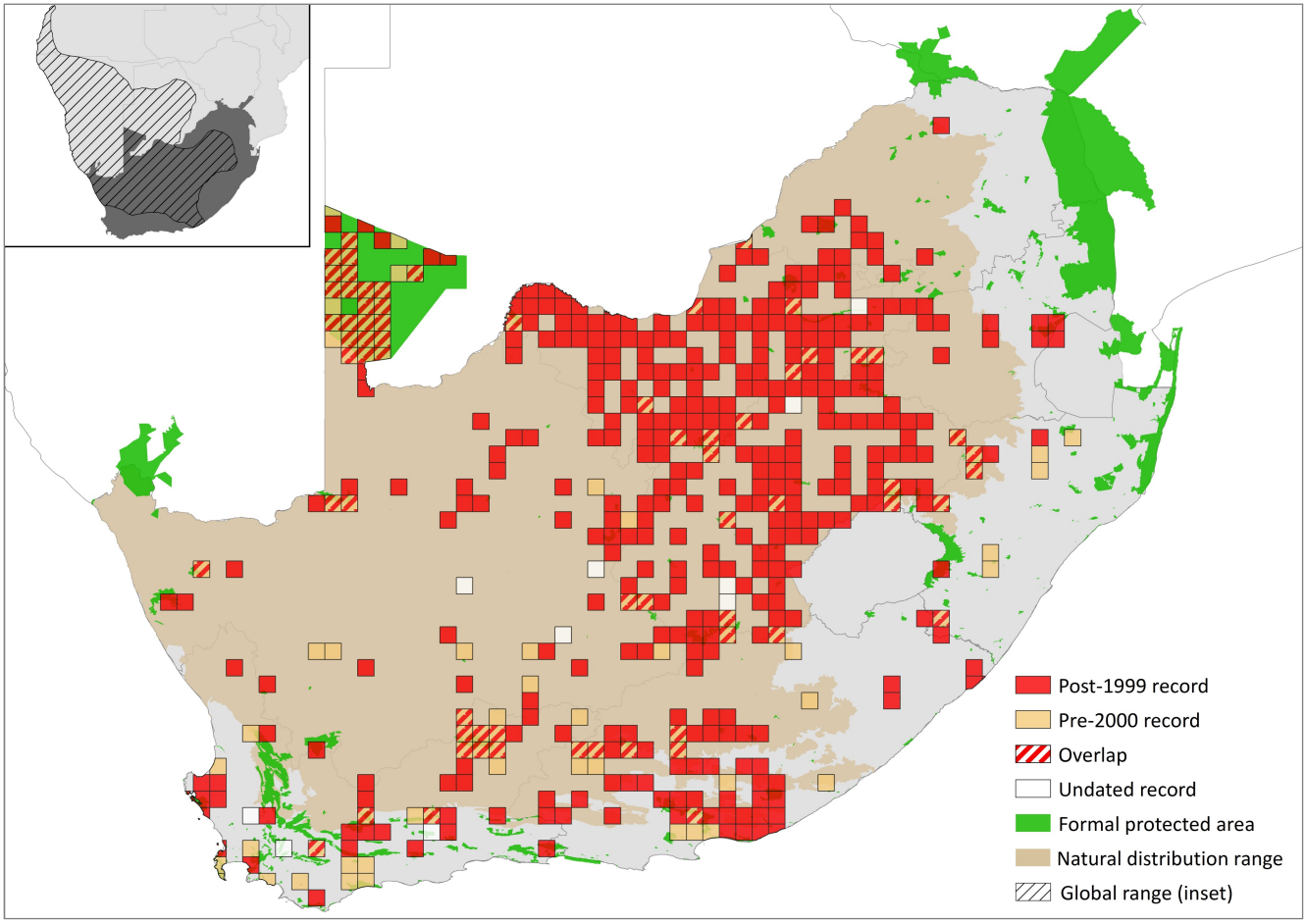

Figure 1. Distribution records for Springbok (*Antidorcas marsupialis*) within the assessment region

Table 1. Countries of occurrence within southern Africa

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

Transvaal and, to a large extent, in the former Cape Province, during the 19th century as a result of hunting, rinderpest and farm fences blocking their migratory routes. However, the species has subsequently been reintroduced widely to private land and protected areas throughout its former range and beyond. The largest numbers occur on private game farms, mainly in the Highveld of the Free State and Gauteng provinces, as well as the Karoo and Kalahari thornveld of the Western, Eastern and Northern Cape provinces. In the North West Province, they occur throughout the southern and western arid and open areas, where a free-roaming herd occurs, and may be expanding, between the western Kalahari, near Terra Firma, and the Highveld grasslands further south east (Power 2014). They thus currently occur in all provinces, especially in larger protected areas and many private lands in central and western South Africa (Figure 1). The majority of subpopulations held on private land are still within the natural distribution of the species. However, smaller, introduced populations occur widely in extralimital areas, such as on private land in parts of KwaZulu-Natal and the northern bushveld (Mpumalanga and Limpopo provinces) (East 1999). Such introductions have made it difficult to determine natural distribution range of the species (Skinner & Louw 1996; Cain et al. 2004).

Recently, Feely (2014) documented historical records recorded by the English artist, Thomas Baines, for Springbok occurring in the northeastern part of the Eastern Cape in 1848 (on the edge of the natural range displayed in Figure 1). Similarly, there is still a relict population of the former eastern Transvaal Springbok population on the farm Blair Athol near Amsterdam surviving since it was first surveyed in the late 1800s (J. Anderson, pers. comm. 2014).

Population

Skinner (2013) estimated the total population size for Springbok in southern Africa at *c.* 2,000,000–2,500,000 animals, with approximately 60% of the population occurring on privately-owned land (East 1999). For provinces where fairly comprehensive estimates of the private Springbok population are available (Free State and North West), we estimate a higher proportion of the population on private land: 76–89% (Table 2). Specifically for South Africa, Skinner (2013) estimated 75,000 in the Free State, 75,000 in the former Transvaal provinces, 1,000,000 in the Karoo and about 100,000 in the Cape provinces outside of the Karoo. However, these are most likely overestimates based on current (2013–15) observed game count data in South Africa (Table 2). For example, we estimate only 42,731 animals in Free State and

109,209–110,778 in total across the country (Table 2). As the private sector data is incomplete in most provinces, this figure is likely to be an underestimate. Given that the proportion of mature individuals in a herd is typically 70–73% (C. Anderson unpubl. data), we infer a total mature population of at least 76,446–77,545 animals. The largest subpopulation occurs on the South African side of Kgalagadi Transfrontier Park, where Springbok numbers were 1,935 (wet season count) and 2,217 (dry season count) in 2012 (Ferreira et al. 2016). While the number of cross-border Springbok dropped dramatically in the late 1980s, they have stabilised since with no dramatic declines being recorded in recent years. It is unclear why there was a dramatic decline. It is possible that human-induced factors such as fences, roads and cattle post development were responsible for this decline (Mills & Mills 2013).

Chelsmford Nature Reserve in KwaZulu-Natal falls within the natural distribution range (Figure 1) and thus is included in the population estimate. While no formally protected subpopulations exist in Limpopo, some private subpopulations do (Table 2). It is unclear whether these are extralimital as property coordinates are not available. They are currently included in the population estimate. Similarly, for Mpumalanga, while one private nature reserve is known to fall within the natural range, the other is not (due to missing coordinates) but is included in Table 2 for now. For formally protected areas, while we include Nooitgedachtdam Dam Nature Reserve (as it is on the border of the natural range) we exclude Songimvelo Nature Reserve as it falls significantly outside the natural range. In both Limpopo and Mpumalanga provinces (as well as the Cape provinces), the numbers of private subpopulations are likely to be significantly more extensive than the sample displayed in Table 2 but no comprehensive data are available at present. Further collation of such data is important. However, not all private subpopulations will count towards the wild population if they are intensively and/or captive managed. Further research is required to determine which private subpopulations are eligible.

Generation length has been estimated as seven years (Pacifici et al. 2013), making the three generation window 21 years (1994–2015). Based on 30 formally protected areas from across the natural range of Springbok with adequate long-term data available, we estimate a net 8–27% national increase in population size over three generations (14,927 to 16,542 animals). It is well-known that Springbok experience population fluctuations. Thus, further long-term datasets should be made available to estimate population trend more accurately. There are also worrying examples of local subpopulation declines across its range, the largest of which has been seen in Karoo National Park, having declined from 2,163 to 794 animals between 1994 and 2015 (Gaylard et al. 2016). Reasons for the decline are largely unknown but may include Allee effects following a crash after intense culling in 2000 (of *c.* 50% of the subpopulation) and subsequent park expansion. Subpopulations also show mixed success in the North West Province. For example, at Bloemhof Dam Nature Reserve, numbers have increased from 479 in 1999 to 1,202 in 2015, but have declined in Molopo Nature Reserve recently by 14% between 2014 and 2015, contrary to expected as the veld was dominated by short grass especially around the pans (Nel 2015). They have declined especially in Mafikeng Nature Reserve from 738 in 1999 to 108 in 2015.

Recent subpopulation declines (since 2009) have also been recorded in parts of the Free State (E. Schulze unpubl. data), North West (Nel 2015) (especially on communal lands, Buijs 2010) and Northern Cape (M. Smit unpubl. data) provinces, possibly due to predation, habitat changes and disease. For example, the decline in

Table 2. Summary of population size estimates for Springbok (*Antidorcas marsupialis*) within the natural distribution range. Note the Northern Cape formally protected area estimate varies considerably based on the wet / dry season count in the South African side of the Kgalagadi Transfrontier Park (Ferreira et al. 2016).

Province	Type	Number of reserves/ properties	Count year	Population estimate
Eastern Cape	Formally protected	8	2013–2015	9,165
Eastern Cape	Private	39	2014	4,965
Free State	Formally protected	13	2014–2015	10,445
Free State	Private	290	2014	32,286
Gauteng	Formally protected	2	2014	608
KwaZulu-Natal	Formally protected	1	2014	413
Limpopo	Private	7	2014	44
Mpumalanga	Formally protected	1	2013	158
Mpumalanga	Private	2	2014	245
North West	Formally protected	9	2015	2,958
North West	Private	231	2010–2014	23,274
Northern Cape	Formally protected	5	2013–2014	2,163–3,732
Northern Cape	Private	28	2014	18,436
Western Cape	Formally protected	8	2013–2015	2,429
Western Cape	Private	10	2013–2014	1,620
Total		**654**		**109,209–110,778**

numbers in the Kimberley area from 2009 until 2013 (5,573 to 4,855 animals), excluding the sharp spike in 2010 (6,826 animals), can be directly attributed to the higher than normal rainfall experienced during this period (C. Anderson unpubl. data), where most of the pans, which are prime habitat and feeding spots for Springbok, were inundated with water and resulted in taller grass stands. It is well known that a wet substrate and tall grass stands are not optimal habitat for Springbok (Skinner & Chimimba 2005). The occurrence of "hoof-rot" (*vrotpootjie*) was also reported on certain properties (C. Anderson unpubl. data). A rapid turnaround of this situation took place from 2014 into 2015, when the area experienced a severe dry spell, and a rapid improvement in the rate of recruitment, as well as more synchronised lambing, was experienced. Springbok in the Northern Cape normally show distinct lambing peaks in autumn (April–May) and spring (September). This was completely disrupted during the excessively wet period, which also increased the predator (jackal) impact on the herds. Another phenomenon experienced during periods of stress were the birth of more males than females (Krüger et al. 2005), as well as physical signs (limited) of foetal resorption (tiny foetuses) (examination of foetuses by C. Anderson).

Current population trend: Stable (estimates range from a net 10.8% increase to 3.1% decline over three generations)

Continuing decline in mature individuals: Local and regional declines from predation, habitat changes and disease, but inferred to be stable overall.

Number of mature individuals in population: At least 76,446–77,545

Number of mature individuals in largest subpopulation: South African side of the Kgalagadi Transfrontier Park: 1,034–4,332 individuals (Ferreira et al. 2016).

Number of subpopulations: At least 655

Severely fragmented: Yes. Most subpopulations occur in fenced protected areas or ranch lands. However, the major subpopulation occurs as a free-roaming subpopulation in the Kgalagadi Transfrontier Park.

Habitats and Ecology

The Springbok is the most abundant plains antelope in the arid lands of southern Africa and formerly occurred in huge numbers in the dry grasslands and shrublands of southwestern and southern Africa, migrating sporadically in vast herds ("trekbokken") in some of the southern parts of its range in response to rainfall and the search for verdant veld (Skinner 1993). For example, Cronwright-Schreiner (1925) observed a herd of hundreds of thousands attempting to cross the Orange River where thousands of animals drowned. These migrations or treks no longer occur, having largely been eliminated by expansion of stock farming, and associated fencing, overhunting and the rinderpest epidemic in 1896 (Skinner 1993). However, some indication of the species' former abundance can still be seen as seasonal concentrations in areas with preferred short vegetation in parts of the Kalahari that occur in central and southern Botswana (East 1999). Congregations disperse into small groups during winter (Cain et al. 2004).


Beryl Wilson

Springbok are mixed feeders (Hofmann et al. 1995), consuming both browse and grass. They prefer to utilise grass when it is young, but otherwise browse karroid vegetation which includes a variety of low shrubs and succulents (Skinner 2013). Nevertheless, they show great variation in dietary preferences across habitats, and even amongst individuals within habitats (D. Codron pers. obs.), as some individuals and even whole subpopulations consume mainly grass. Springbok occur in areas where surface water is unavailable or available only seasonally, and receive their moisture requirements from browsing on succulent karroid vegetation, by digging succulent roots, or by eating fruits such as *Solanum* spp. (Nagy & Knight 1994; Skinner & Chimimba 2005). They are often sympatric with merino sheep in the Karoo, where Springbok display a better spatial utilisation of the vegetation by being more dispersed in the landscape and less dependent on proximity of food to water points that prevent over-exploitation of the vegetation (Davies & Skinner 1986a).

Within the matrix of Kalahari sands, Springbok prefer both salt and calcareous pans (Milton et al. 1992), as well as dry riverbeds (Jackson 1997), and the males select territories to attract the attention of female herds by choosing these high-quality foraging habitats (Jackson & Skinner 1998). These high quality habitats tend to have more clay soils (aside from dry riverbeds and Kalahari sands) that are nutrient rich, and have a richer assemblage of dwarf shrubs. Such habitats are, however, localised in occurrence, and are represented by the Southern Kalahari Mekgacha and Southern Kalahari Salt Pans vegetation (Mucina & Rutherford 2006). The presence of such habitat types may thus influence Springbok spatial ecology (Power 2014). Key habitats are thus open grasslands (particularly the short grass fringes of pans), arid shrubveld (Karoo) and the mainly karroid vegetation associated with Northern Cape pans.

Ecosystem and cultural services: The Springbok is the national animal of South Africa. It also features prominently in San paintings demonstrating that they have been significant to humans for thousands of years (Eastwood et al. 2002).

Use and Trade

Springbok are hunted and traded as live animals, as well as for their horns, meat and skins (IUCN SSC Antelope Specialist Group 2008). Ranching of Springbok for subsistence and commercial venison has been common since the early 1900s (Skinner & Louw 1996). Mixed herds of Springbok and Merino sheep (*Ovis aries*) are common

Table 3. Use and trade summary for the Springbok (*Antidorcas marsupialis*)

Category	Applicable?	Rationale	Proportion of total harvest	Trend
Subsistence use	Yes	Species is used locally as a meat source.	Unknown but possibly *c*. 50%	Stable to increasing
Commercial use	Yes	Used nationally and internationally for meat, live sales and trophy hunts.	Unknown but possibly *c*. 50%	Stable to increasing
Harvest from wild population	Yes	Species is harvested for meat, trophy hunts and live sales.	Unknown but possibly *c*. 30%	Stable to increasing
Harvest from ranched population	Yes	Extensive ranching occurs. Harvested for meat, trophy hunts and live sales. Small proportion of subpopulations harvested sustainably as part of hunting packages or to control herbivore numbers.	Unknown but possibly *c*. 60%	Stable to increasing
Harvest from captive population	Yes	Species is intensively bred for colour variants and sold to other breeders.	Unknown but possibly *c*. 10%	Increasing

farming combinations in the Karoo (Davies & Skinner 1986b). The percentage of animals taken from ranched stock is unknown. Protected areas, however, manage subpopulations carefully. For example, Free State provincial reserve managers harvest approximately 15–20% of the Springbok population annually (E. Schulze unpubl. data).

Trade is suspected to be leading to an increase in the population as more ranchers breed, sell and protect Springbok. However, the intensive/selective breeding for colour variants should be discouraged as this may lead to inbreeding which affects the resilience of the overall population. Colour variants may also show maladaptive traits for increased temperature due to climate change. Hetem et al. (2009) compared the physiology of black, white and normal Springbok in the Karoo and found that the colour morphs exhibit differences in body temperature and activity consistent with differences in solar heat load: while black Springbok had lower diurnal activity in winter (having to forage less because their metabolic cost of homeothermy was lower), they were disadvantaged in hot periods. White Springbok, by contrast, were more protected from solar heat load (similar to that of the normal type in summer), but potentially less able to meet the energy cost of homeothermy in winter. Thus, energy considerations may underlie the rarity of Springbok colour morphs (Hetem et al. 2009). Maintaining genetic diversity, especially for a trait like pelage colour, rather than fixing certain traits, is thus of adaptive advantage to the Springbok population when responding to climate change (*sensu* Millien et al. 2006).

Threats

Within the assessment region, while the overall population is stable, Springbok numbers have declined in some areas. The possible causes include environmental stress (wet conditions with tall grass stands), poaching, predation and disease. This decline is probably manageable but multiple stakeholder involvement might be required. Springbok subpopulations vary in relation to climatic conditions (Skinner & Chimimba 2005), and sound land management is required to prevent degradation of pans and bush encroachment. Additionally, increased mesopredator abundance may impact some subpopulations (*sensu* Minnie et al. 2016). Poaching is a localised threat. For example, at Boskop Dam Nature Reserve in North West Province, poaching is suspected to be causing some decline due to the presence of snares (Nel 2015). Diseases may also cause subpopulation declines. For example, Springbok do not occur in woodland savannah almost certainly due to the presence of Heartwater to which they show no resistance (Neitz 1944). Hybridisation between ecotypes may constitute a threat to some subpopulations (Friedmann & Daly 2004). Game ranchers may be mixing southern (Karoo region) and northern (Kalahari region) ecotypes for sport hunting (as the latter animals are larger; Mills & Mills 2013; L. Rossouw & J.S. Brink unpubl. data). This mixing could lead to outbreeding depression due to maladaptation of the Kalahari form to the rockier substrate of southern habitats (that may increase mortality with no noticeable effect on fecundity) and increase the prevalence of disease, such as “hoof-rot”. An emerging threat to this species is the intensive and selective breeding of the species within the wildlife industry (Bezuidenhout 2012). Artificially selecting individuals to produce rare colour variants may also cause maladaptive traits (for example, Hetem et al. 2009).

Current habitat trend: Stable. The arid habitats in which this species exists are not currently threatened (Driver et al. 2012). For example, long-term surveys and repeat

Table 4. Possible net effects of wildlife ranching on the Springbok (*Antidorcas marsupialis*) and subsequent management recommendations

Net effect	Positive
Data quality	Suspected
Rationale	Wildlife ranching has increased population size.
Management recommendation	Regulate intensive and selective breeding of species to avoid inbreeding and maladaptive traits. Increase available habitat for species through conservancy formation.

Table 5. Threats to the Springbok (*Antidorcas marsupialis*) 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	*2.3.2 Small-holder Grazing, Ranching or Farming*: increased number of intensively managed subpopulations. Current stresses *2.3.1 Hybridisation* and *2.3.5 Inbreeding*: hybridisation between locally adapted ecotypes and inbreeding by selecting for colour variants.	Hetem et al. 2009	Empirical	Regional	Possibly increasing with expansion of wildlife ranching.
2	*5.1.1 Hunting & Collecting Terrestrial Animals*: poaching for bushmeat.	Nel 2015	Empirical	Local	Possibly increasing with human settlement expansion.
3	*8.1.2 Invasive Non-Native/Alien Species/ Diseases*: periodic epidemics from rinderpest, heartwater, hoof-rot and anthrax.	Neitz 1944	Review	National	Stable
4	*8.2.2 Problematic Native Species/Diseases*: increased predation rates from high mesocarnivore abundance.	-	Anecdotal	-	Possibly increasing through poor carnivore management.

photographic analyses by Masubelele et al. (2014) showed that grass cover increased and dwarf shrub cover decreased between 1962 and 2009 at the majority of eight localities along an ecotone between the Nama Karoo and Grassland biomes, possibly due to a general decrease in stocking densities and the rise of conservation-friendly management practices. Additionally, increased temperature through climate change could increase the importance of Springbok in producing protein off arid rangelands. However, more research is required to determine the effects of climate change on the Springbok population, as both environmental conditions and vegetation degradation can alter behaviour (Stapelberg et al. 2008).

Conservation

Springbok are well represented in protected areas throughout their range, the largest being Kgalagadi Transfrontier Park between Botswana and South Africa. Springbok are also abundant in private lands in South Africa, where they are actively managed. Springbok are amongst the most valued species in the expanding game ranching industry in southern Africa due to the excellent quality of their venison (Hoffman et al. 2007; Skinner 2013). However, it is crucial that artificially selected individuals do not enter the national or provincial parks systems. Thus, appropriate legislation and a translocation and management plan should be developed and enforced to restrict movement from private ranches into formally protected areas (which is already in place for SANParks and many provincial conservation authorities). Land managers should also be incentivised to drop internal fences to form conservancies, which may allow Springbok subpopulations greater movement to conserved key habitat patches.

Recommendations for land managers and practitioners:

- Management and translocation plans should be developed to restrict movement and dispersal of privately-owned Springbok, which may contain hybridised individuals or colour variants, into formally protected areas.
- Greater government subsidies should be made available for infrastructure to enhance the use of Springbok as a key species in building sustainable wildlife-based economies. Springbok meat is very lean with fat content not exceeding 4% (Skinner & Louw 1996). Optimal annual cropping rate is 30% of the animals; however, in years with high rainfall, cropping rate may be increased to 40% (Skinner & Louw 1996).

Research priorities:

- Determine the causes of local declines in populations in the Kgalagadi Transfrontier Park and other provincial and national parks.
- Undertake taxonomic research to determine the status of two suspected subspecies or ecotypes pertaining to the north (Kalahari) and south (Karoo).

Table 6. Conservation interventions for the Springbok (*Antidorcas marsupialis*) 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	*5.2 Policies & Regulations*: prevention of hybridisation, inbreeding and extra-limital introduction through translocation regulation at provincial and national level.	-	Anecdotal	-	Unknown	None
2	*1.1 Site/Area Protection*: by dropping internal fences to form conservancies and conservation corridors to improve habitat	-	Anecdotal	-	Unknown	Private landowners

- Assess the potential of Springbok to become a source of sustainable, low-fat protein.
- Quantify the extent and impacts of hybrids and artificially-bred colour variants.
- Understand the impact of predators on the population dynamics of this species.
- Determine the effect of global warming on Springbok population dynamics.
- Determine the impact of mesopredators on the population dynamics of this species.

Encouraged citizen actions:

- Report sightings on virtual museum platforms (for example, iSpot and MammalMAP) outside of protected areas.
- Create conservancies to sustain wild and free-roaming herds of Springbok and other species.

Data Sources and Quality

Table 7. Information and interpretation qualifiers for the Springbok (*Antidorcas marsupialis*) assessment

Data sources	Census (unpublished), field study (unpublished)
Data quality (max)	Observed
Data quality (min)	Estimated
Uncertainty resolution	Total count / best estimate
Risk tolerance	Evidentiary

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