Raphicerus campestris – Steenbok

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

*Watch-list Threat

As displayed by their stable widespread distribution, Steenbok are generally resilient to high hunting pressure and habitat alteration, resulting from expanding development, and are frequently present along the margins of developing areas and within cultivated regions (Skinner & Chimimba 2005). However, local declines should be monitored.

Taxonomy

Raphicerus campestris (Thunberg 1811)

ANIMALIA - CHORDATA - MAMMALIA - CETARTIODACTYLA - BOVIDAE - *Raphicerus* - *campestris*

Synonyms: *Antilope campestris* (Thunberg 1811), *acuticornis, bourquii, capensis, capricornis, cunenensis, fulvorubescens, grayi, hoamibensis, horstockii, ibex, kelleni, natalensis, neumanni, pallida, pediotragus, rupestris, steinhardti, stigmatus, subulata, tragulus, ugabensis, zukowskyi, zuluensis*

Common names: Steenbok (English, Afrikaans), Steinbuck (English), Ingina, Iqina (Ndebele), Iqhina (Ndebele, Zulu), Pudubudu (Sepedi), Phudufudu (Sepedi, Setswana), Thiane (Sesotho), Phuduhudu (Setswana), Mhene (Shona), Lingcina (Swati), Phuluvhulu (Venda), Xipene (Tsonga), Itshabanqa (Xhosa)

Taxonomic status: Species

Taxonomic notes: Although various subspecies have been suggested, for example Ansell (1972) recorded eight and Meester et al. (1986) listed five subspecies south of the Sahara Desert, the validity of these subspecies remains questionable. Two commonly accepted subspecies include *Raphicerus campestris campestris* from southern Africa and *R. c. neumanni* from East Africa (Kingdon 1997; du Toit 2013). Taxonomic revision of this species is necessary (Skinner & Chimimba 2005).

Assessment Rationale

Listed as Least Concern as the Steenbok is widely distributed (and continues to be well represented in protected areas according to 2012–2013 game counts), considered to be relatively common (for example, 3.78 animals / km^2 on two small-livestock farms in the Northern Cape and Free State provinces) and no major threats have been identified within the assessment region. Although local and regional declines are suspected due to bushmeat hunting and competition with livestock outside of protected areas, especially where human densities are high, the population trend is generally stable. The effects of the conversion to wildlife ranching on this species should be monitored across the various bioregions, as Steenbok in arid and fynbos habitats may be vulnerable to increasing competition with introduced extralimital herbivores, and which may represent an emerging threat given the expansion of the wildlife ranching industry. Key interventions include the formation of conservancies and the promotion of permeable fences.

Regional population effects: There is dispersal across regions through transfrontier spaces along the northern border of South Africa (including the Kgalagadi and Greater Limpopo Transfrontier Parks). Rescue effects are considered possible.

Distribution

In Africa, this species occurs in two disjunct areas, one in East Africa, including northern and central Tanzania and into southern Kenya, and the other in southern Africa, intruding marginally into southern Angola and western Zambia (Skinner & Chimimba 2005; du Toit 2013). These regions are separated by the tall, dense Miombo woodlands of central Zambia, northern Mozambique and Malawi (du Toit 2013), and are approximately 1,000 km apart (Skinner & Chimimba 2005). Steenbok are generally absent from forested and thick woodland areas (Skinner & Chimimba 2005). In East Africa, their distribution has declined somewhat as they previously occurred in Uganda, but much of their appropriate habitat has been transformed due to agriculture (East 1999).

Recommended citation: Palmer G, Birss C, du Toit JT. 2016. A conservation assessment of *Raphicerus campestris*. In Child MF, Roxburgh L, Do Linh San E, Raimondo D, Davies-Mostert HT, editors. The Red List of Mammals of South Africa, Swaziland and Lesotho. South African National Biodiversity Institute and Endangered Wildlife Trust, South Africa.

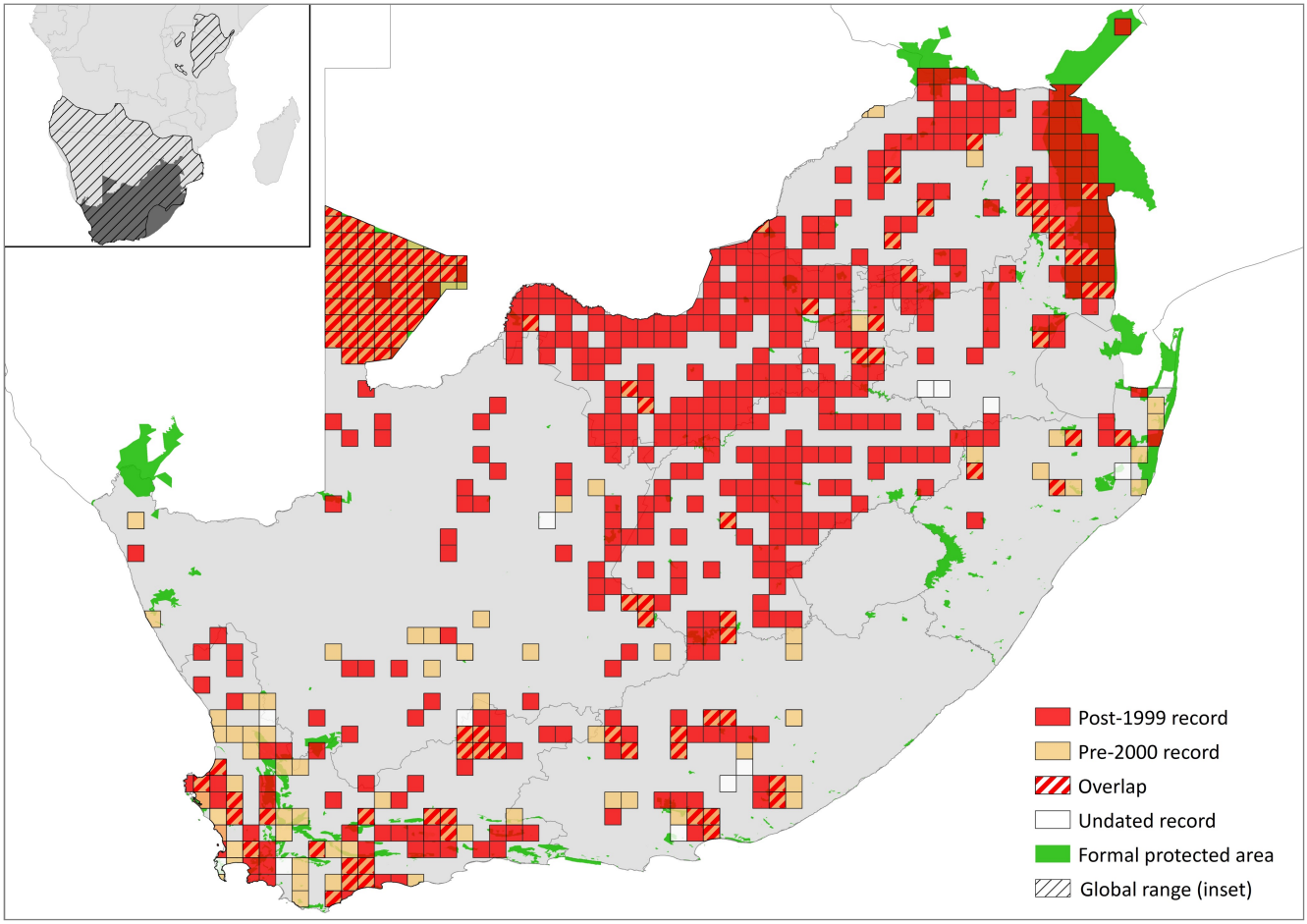

Figure 1. Distribution records for Steenbok (*Raphicerus campestris*) within the assessment region

Table 1. Countries of occurrence within southern Africa

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

The southern African distribution extends through suitable habitats southwards from southern Angola and western Zambia, across most of Namibia (with the exception of the extreme arid, coastal regions), throughout Botswana, into central and southern Zimbabwe, southern Mozambique and across most of South Africa (IUCN SSC Antelope Specialist Group 2016). Its distribution is continuous and widespread throughout South Africa with lower densities in areas without suitable cover. Within the assessment region this species is present in all provinces, throughout a number of habitat types, including grassland, savannah, shrublands and semi-desert, absent only from the southeastern forested regions of the Western Cape, Eastern Cape and KwaZulu-Natal provinces (du Toit 2013). It is likely that Steenbok once occurred in the lowlands of Lesotho, as they occur along the Caledon River in the eastern Free State (N. Avenant pers. comm. 2016), but were not recorded by Lynch (1994) and subsequent field surveys have failed to detect the species (Ambrose & Talukdar 2000; N. Avenant unpubl. data). Locals in the area have positively identified the species from memory (Sesotho name for Steenbok is Thiane), suggesting it was once present (N. Avenant pers. comm. 2016), but is probably regionally extinct due to overhunting (*sensu* Lynch 1994).

Population

A global estimated population size of 600,000 individuals was recorded by East (1999), however, this is considered an underestimate due to the constraints associated with aerial surveys. In areas where Steenbok are common, ground surveys provided density estimates of 0.3–1.0 individuals / km^2 (East 1999) and distance sampling methods produced estimates of 3.78 animals / km^2 on Benfontein Game Farm and two small-livestock farms in the eastern Northern Cape and western Free State provinces (Stenkewitz et al. 2010). Similarly, recent field surveys in the North West Province confirmed an abundant population in the Kalahari vegetation types (Power 2014). However, lower densities are expected in areas without suitable vegetation cover and reliable estimates of population density are currently unavailable across most of its range, due to the cryptic nature of this species (du Toit 2013). Within the assessment region, habitat for this species is fairly continuous and widespread, thus there is suspected to be only one major subpopulation throughout the region. The population may only be declining in certain areas due to hunting by local settlements and farmers. Overall, the population is suspected to be stable.

Current population trend: Stable

Continuing decline in mature individuals: Yes, from hunting in some areas.

Number of mature individuals in population: Unknown

Number of mature individuals in largest subpopulation: Unknown

Number of subpopulations: One major subpopulation throughout the assessment region.

Severely fragmented: No

Habitats and Ecology

Steenbok are well adapted to a range of habitat types, from semi-desert regions to mesic mountainous moorlands, including high altitude areas, such as Mt. Kenya (3,500 m asl) (du Toit 2013). They are generally absent from forests and thick woodland areas (Skinner & Chimimba 2005). Occurring commonly in the drier grasslands, shrublands and savannahs of southern Africa, this species often favours heavily grazed regions with a high concentration of forbs. These areas frequently form around water sources, although they are largely water-independent (IUCN SSC Antelope Specialist Group 2016). However, in Botswana, Steenbok are known to dig up roots, rhizomes and succulent bulbs in order to meet their water requirements in dry conditions (Haim & Skinner 1991). Well adapted to dry habitats, this species exhibits low metabolic rates and high overall minimal thermal conductance, allowing it to conserve water when exposed to high temperatures and extreme environmental conditions (Haim & Skinner 1991). Being one of the smallest ruminant browsers, and thus having high mass-specific metabolic needs, Steenbok are reliant on the year-round availability of high-quality forage resources, including geophytes, berries, flowers, green browse material, and indehiscent pods when green foliage is scarce during the dry season (du Toit 2013). In the Kruger National Park (KNP), they depend heavily on the pods of *Acacia tortilis* in dry conditions (du Toit 1993) and so their key vegetation types include thorn thickets where they find both food and shelter from predators.

Steenbok of both sexes remain within stable home ranges throughout the year. Territories in the Kuise valley of the Namib were measured as 0.58 km^2 (Cloete 1983), while in KNP the home ranges of two females were approximately 0.62 km^2 (du Toit 1990, 1993). They are generally solitary (Skinner & Chimimba 2005), but are not asocial, and are occasionally seen foraging in pairs while the female is in oestrus, or in small groups consisting of an adult male, female and her offspring (Cohen 1997). Steenbok are considered largely diurnal (Stenkewitz et al. 2010), and activity peaks in the early mornings and late afternoons in warm, summer conditions (Walther 1990; Nowak 1991; Skinner & Chimimba 2005). However, nocturnal activity is not uncommon, especially during hot, dry conditions. In fact, in KNP during the dry season, foraging activity constituted 57% of the night, while the majority of diurnal activity included resting and ruminating, and only 33% foraging (du Toit 1993). Giving birth at any time of the year and usually producing a single young, Steenbok exhibit a gestation period of about 168–173 days (Hofmeyr & Skinner 1969).

Ecosystem and cultural services: Although it remains to be investigated, Steenbok consume fruits and pods as an important component of their diet and so it is to be expected that they are significant agents of seed dispersal. Additionally, this is an important prey species for predators such as the Cheetah (*Acinonyx jubatus*) and Martial Eagle (*Polemaetus bellicosus*). They are an important component in the roll-out of the "holistic approach" to Damage Causing Animal (DCA) management through the maintenance of natural prey species.

Use and Trade

This species is used, both legally and illegally, by biltong hunters and for bushmeat respectively. Additionally, it is targeted by international trophy hunters, as one of the "Tiny 10" small antelope, but this occurs at low levels. However, there is little national or international commercial value of this species, and there is limited translocation of this species within the game industry, possibly due to its persistence in the landscape. Translocations across bioregional boundaries are actively discouraged through conservation legislation.

In parts of its range (such as mesic savannah regions), wildlife ranching and the private sector may have a positive effect on this species, as the conversion from livestock to wildlife ranches is speculated to have improved habitat conditions and decreased persecution rates. However, this is not always the case, and across much of its range, particularly within arid and fynbos regions, game farming and the introduction of competing species, particularly extralimital and exotic species, may cause local declines of Steenbok. Additionally, the establishment of game farms with high-quality impermeable fences poses a substantial threat to gene flow. Due to its abundance and low commercial value, interest in captive breeding is insignificant. This species is also considered to be density dependent and self-regulating. Land owners are encouraged to monitor

Table 2. Use and trade summary for the Steenbok (*Raphicerus campestris*)

Category	Applicable?	Rationale	Proportion of total harvest	Trend
Subsistence use	Yes	Illegal bushmeat hunting.	Unknown	Unknown
Commercial use	Yes	Trophy hunting, biltong and live sales.	Unknown	Unknown
Harvest from wild population	Yes	Trophy hunting, illegal bushmeat hunting and live sales.	Unknown	Stable
Harvest from ranched population	No	-	-	-
Harvest from captive population	No	-	-	-

Table 3. Possible net effects of wildlife ranching on the Steenbok (*Raphicerus campestris*) and subsequent management recommendations

Net effect	Positive, in parts of its range.
Data quality	Anecdotal
Rationale	Steenbok do not have a high commercial value in the wildlife ranching industry. They have not been widely introduced, due to their persistence in the landscape. Translocations are actively discouraged through conservation legislation.
Management recommendation	Steenbok have small home ranges (< 1 km^2; du Toit 1993), are either solitary or in pairs, and do not require special considerations on wildlife ranches. They are considered to be density dependent and self-regulating. Steenbok population densities vary across the landscape, depending on the type and quality of habitat. However, persistence and population density should be monitored by landowners, particularly on ranches where this species is hunted. Additionally, the level of clinal variation should be determined at a landscape scale through genetic research.

persistence, density and number of adult males when hunting off-takes are considered.

Threats

No major threats have been identified for this species, however, Steenbok are locally susceptible to predation by domestic dogs (*Canis familiaris*) and subsistence hunters who frequently capture and kill juveniles in particular (when they are found lying alone in cover) for bushmeat (Lynch 1994; du Toit 2013; IUCN SSC Antelope Specialist Group 2016). Although these threats are not suspected to cause range-wide population declines, they can result in local declines or even local extinction (for example, Lesotho).

Habitat fragmentation through the erection of impermeable fences in the development of wildlife or livestock ranches may inhibit gene flow for this species, as well as other small antelopes and similar sized animals. Additionally, overstocking and mismanagement of livestock or wildlife ranches leading to overgrazing and declines in habitat and forage quality may threaten the success of this species. The development of wildlife ranches is likely to affect local Steenbok subpopulations disparately across different bioregions. Within arid regions and the Fynbos Biome, herbivores are historically less diverse and numerous, and ecological niches are narrow (compared to savannah regions); thus the introduction of extralimital herbivores into these regions is likely to increase competition for local Steenbok populations.

Current habitat trend: Stable, although continued human settlement and habitat conversion for agriculture has caused some local decline in habitat for this species. However, in parts of the Savannah Biome, the expansion of wildlife ranching may lead to an increase in suitable habitat.

Conservation

Steenbok are widespread, and occur extensively within protected areas and private ranch lands. Injudicious translocation of this species needs to be addressed: reintroductions and translocations need to source animals from the same ecotypic range (not more than 100 km away). Habitat connectivity across different vegetation types is essential to maintain gene-flow and clinal variation

Table 4. Threats to the Steenbok (*Raphicerus campestris*) 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	*5.1.1 Hunting and Collecting Terrestrial Animals*: local declines due to illegal bushmeat hunting, especially with dogs.	Lynch 1994	Indirect	Regional	Increasing with ongoing settlement expansion. Regional extinction in Lesotho.
2	*2.3.2 Livestock Farming & Ranching:* decline in habitat quality and fragmentation due to overgrazing on both livestock and wildlife ranches. Current stresses *1.2 Ecosystem Degradation* and *1.3 Indirect Ecosystem Effects*: ecosystem degradation and fragmentation.	-	Anecdotal	-	Stable; the effect of habitat degradation varies according to the bioregion in which the livestock or wildlife ranch is situated, as well as the local land management practices.
3	*8.1.2 Invasive Non-Native/Alien Species/ Diseases*: introduction of extra-limital herbivores into arid and fynbos areas increases resource competition. Current stress *2.3.2 Interspecific Competition*.	-	Anecdotal	-	Increasing with wildlife ranching expansion.
4	*7.3 Other Ecosystem Modifications*: erection of impervious fences leading to habitat fragmentation and reduced gene flow. Current stresses *1.3 Indirect Ecosystem Effects* and *2.3.5 Inbreeding*: habitat fragmentation and inbreeding.	-	Anecdotal	-	Increasing with wildlife ranching expansion.

Table 5. Conservation interventions for the Steenbok (*Raphicerus campestris*) ranked in order of effectiveness with corresponding evidence (based on IUCN action categories, with regional context)

Rank	Intervention description	Evidence in the scientific literature	Data quality	Scale of evidence	Demonstrated impact	Current conservation projects
1	*1.1 Site/Area Protection*: conservancy formation to expand protected areas.	-	Anecdotal	-	-	-
2	*2.1 Site/Area Management*: install permeable fences on ranchlands to allow dispersal.	-	Anecdotal	-	-	-
3	*5.3 Private Sector Standards & Codes*: translocation regulation to prevent ecotype mixing.	-	Anecdotal	National	-	CapeNature's Translocation and Utilization Policy
4	*5.1.3 Law & Policy*: establish provincial hunting proclamations and bag limits.	-	Anecdotal	-	-	-

within the species. Thus, the formation of conservancies and the promotion of permeable fences is required to ensure ecologically-resilient subpopulations of Steenbok.

Monitoring numbers of Steenbok is important for the development of management strategies, investigating population dynamics, and understanding the relationships between predators and prey (Stenkewitz et al. 2010). Due to its cryptic and solitary nature, this species is not suitable for harvesting in any feasible meat-production system, and should not be promoted as a viable species in the wildlife-based rural economy as a source protein. It is likely that Steenbok harvesting would exhibit low financial feasibility and would cause counter-productive disturbance to local Steenbok subpopulations.

Recommendations for land managers and practitioners:

- Promote this species as a natural forage species for indigenous predators as part of the "holistic approach" to the management of damage-causing animals. Apply genetic conservation principles in the management of this ecotypic species.
- Where feasible and practical, ensure that fences are permeable particularly on conservancies/ stewardship sites.
- Monitor persistence through the collection of sighting records.
- Monitor population density in areas where this species is hunted.
- Determine the level of clinal variation at a landscape scale through genetic research: collect and bank genetic samples to support genetic research.

Research priorities:

- Effects of wildlife ranching on this species across various bioregions.
- Extent of habitat loss due to expanding agriculture and human settlement.
- Functional properties of Steenbok in seed dispersal.
- Investigations into the relationship between this species and other forage species and damage causing animals, relating specifically to the "holistic approach" to DCA management.
- Map the genetic composition of the southern African population in order to ensure the development of effective and informed decisions relating to reintroductions and translocations of this species.

The collection of distribution information to monitor the persistence of this species in the landscape across the Western Cape, as well as *ad hoc* information is currently being collected and stored by CapeNature. This information is used for bioregional planning and to determine data gaps in the Western Cape.

Encouraged citizen actions:

- Report sightings and roadkills on virtual museum platforms (for example, iSpot and MammalMAP), especially outside protected areas.
- Landowners should ensure that disturbance of this species and its young is kept to a minimum, particularly with regards to domestic dogs.
- Create conservancies to broaden habitat available for the species.
- Install permeable fences.
- Understand and support the concept of genetic conservation with particular regard to ecotypic species and their management.
- Report illegal hunting to provincial conservation authorities.
- Submit hunting returns (to enable higher confidences in calculating impacts of hunting and evaluating bag limit size).

Data Sources and Quality

Table 6. Information and interpretation qualifiers for the Steenbok (*Raphicerus campestris*) assessment

Data sources	Field study (literature, unpublished), indirect information (expert knowledge)
Data quality (max)	Inferred
Data quality (min)	Suspected
Uncertainty resolution	Expert consensus
Risk tolerance	Evidentiary

References

Ambrose D, Talukdar S. 2000. Biological Diversity in Lesotho. National Environment Secretariat, Maseru, Lesotho.

Ansell WFH. 1972. Family Artiodactyla. Pages 1–84 in Meester J, Setzer HW, editors. The Mammals of Africa: An Identification

Manual, Part 2. 15. Smithsonian Institution Press, Washington, DC, USA.

Cloete G. 1983. Etho-ecological aspects of the steenbok (*Raphicerus campestris* (Thunberg, 1811)) in the Namib desert, South West Africa. M.Sc. Thesis. University of the Orange Free State, Bloemfontein, South Africa.

Cohen M. 1997. Steenbok *Raphicerus campestris*. Page 267 in Mills G, Hes L, editors. The Complete Book of Southern African Mammals. Struik Publishers, Cape Town, South Africa.

du Toit JT. 1990. Home range – body mass relations: a field study on African browsing ruminants. Oecologia **85**:301–303.

du Toit JT. 1993. The feeding ecology of a very small ruminant, the steenbok (*Raphicerus campestris*). African Journal of Ecology **31**:35–48.

du Toit JT. 2013. *Raphicerus campestris* Steenbok. Pages 311–314 in Kingdon JS, Hoffmann M, editors. The Mammals of Africa. Volume VI: Pigs, Hippopotamuses, Chevrotain, Giraffes, Deer and Bovids. Bloomsbury Publishing, London, UK.

East R. 1999. African Antelope Database 1998. IUCN SSC Antelope Specialist Group. IUCN, Gland, Switzerland and Cambridge, UK.

Haim A, Skinner JD. 1991. A comparative study of metabolic rates and thermoregulation of two African antelopes, the steenbok *Raphicerus campestris* and the blue duiker *Cephalophus monticola*. Journal of Thermal Biology **16**:145–148.

Hofmeyr JM, Skinner JD. 1969. A note on ovulation and implantation in the steenbok and the impala. Proceedings of the South African Society of Animal Production **8**:175.

IUCN SSC Antelope Specialist Group. 2016. *Raphicerus campestris*. The IUCN Red List of Threatened Species 2016: e.T19308A50193533.

Kingdon JS. 1997. The Kingdon Field Guide to African Mammals. Academic Press Natural World, San Diego, California, USA.

Lynch CD. 1994. The mammals of Lesotho. Navorsinge van die Nasionale Museum Bloemfontein **10**:177–241.

Meester JAJ, Rautenbach IL, Dippenaar NJ, Baker CM. 1986. Classification of southern African mammals. Transvaal Museum **5**:359.

Nowak RM. 1991. Walker's Mammals of the World. Fifth edition. Johns Hopkins University Press, Baltimore, USA.

Power RJ. 2014. The Distribution and Status of Mammals in the North West Province. Department of Economic Development, Environment, Conservation & Tourism, North West Provincial Government, Mahikeng, South Africa.

Skinner JD, Chimimba CT. 2005. The Mammals of the Southern African Subregion. Third edition. Cambridge University Press, Cambridge, UK.

Stenkewitz U, Herrmann E, Kamler JF. 2010. Distance sampling for estimating springhare, cape hare and steenbok densities in South Africa. South African Journal of Wildlife Research **40**:87–92.

Walther FR. 1990. Duikers and dwarf antelopes. Pages 325–343 in Parker SP, editor. Grzimek's Encyclopedia of Mammals. McGraw-Hill, New York, USA.

Assessors and Reviewers

Coral Birss[1], Guy Palmer[1], Johan T. du Toit[2]

[1]CapeNature, [2]Utah State University

Contributors

Claire Relton[1], Matthew F. Child[1], Nico Avenant[2], IUCN SCC Antelope Specialist Group

[1]Endangered Wildlife Trust, [2]National Museum, Bloemfontein

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