Pelea capreolus – Grey Rhebok


Ian Whyte

Red List status (2016)	Near Threatened A2bd*†
Red List status (2008)	Least Concern
Reasons for change	Genuine change: Population decline
Red List status (2004)	Least Concern
TOPS listing (NEMBA)	None
CITES listing	None
Endemic	Yes

*Watch-list Data †Watch-list Threat

The decline of this endemic antelope is a cause for concern but the reasons for its decline are poorly understood. Hypotheses include increases in illegal hunting and predation pressure.

Taxonomy

Pelea capreolus (Forster 1790)

ANIMALIA - CHORDATA - MAMMALIA - CETARTIODACTYLA - BOVIDAE - *Pelea* - *capreolus*

Common names: Grey Rhebok, Common Rhebok (English), Vaal Ribbok (Afrikaans), Letsa (Sesotho), Phele (Setswana), Liza (Swati), Iza, Iliza (Xhosa, Zulu)

Taxonomic status: Species

Taxonomic notes: Recent molecular work indicates that this species is a sister taxon to a clade that includes both waterbuck (*Kobus*) and reedbuck (*Redunca*) species (Robinson et al. 2014). No subspecies are recognised (Skinner & Chimimba 2005).

Assessment Rationale

This species is endemic to the assessment region, occurring in rocky grassland habitats. Although assumed to be unthreatened due to its inaccessible habitat, collation of available subpopulation data reveals an estimated decline of *c*. 20% over three generations (1999–2014) in 13 formally protected areas across its range. Most concerning of these is an estimated decline of 15–20% in one of the largest protected subpopulations, Maloti-Drakensberg Park World Heritage Site. Corroborating the empirical data are anecdotal reports of declines or local extinctions in North West, Western Cape, Northern Cape and Mpumalanga provinces, as well as the Lesotho Highlands. No Grey Rhebok have been recorded in North West protected areas or in Ohrigstad Dam Nature Reserve (Mpumalanga Province) since 2013. We thus list as Near Threatened, close to meeting Vulnerable A2bd, under a precautionary purview, due to an estimated continuing decline and increased levels of hunting. Further long-term data are needed to improve the accuracy of the population reduction estimate, as subpopulations are suspected to be faring poorly outside of protected areas too. This species should be reassessed as further reliable data become available as it may qualify for a more threatened listing. Strongholds for Grey Rhebok are Maloti-Drakensberg Park World Heritage Site and Golden Gate Highlands National Park, both with subpopulations of > 400 individuals. Reasons for the decline are poorly understood but may be due to increases in illegal sport hunting with dogs, bushmeat poaching, incidental snaring and the emerging threat of inflated predation rates. Long-term monitoring sites should be established to quantify subpopulation trends and threat severity.

Distribution

Grey Rhebok are endemic to South Africa, Lesotho and parts of Swaziland (although they formerly occurred widely in the western regions), existing patchily in areas of suitable habitat. They may marginally occur in southwestern Namibia (Irish 2016), but this remains to be validated. Although believed to have occurred in hilly country around Gaborone in southeast Botswana (Skinner & Chimimba 2005), they no longer occur there (Smithers 1971). Similarly, while no formal records are available, they once occurred throughout Lesotho as the “only bovid found in reasonable numbers” (Lynch 1994), but now probably only exist in a few scattered subpopulations (Avenant 2013).

Generally, Grey Rhebok still occur throughout much of their historical range in both protected areas and private lands (Skinner & Chimimba 2005), but agricultural transformation and human settlement expansion may have reduced occupancy. While there is doubt that they historically occurred on Table Mountain, they are accepted to have occurred in the Cape Peninsula and the mountains near Stellenbosch (Skinner & Chimimba 2005; Radloff 2008; Skead 2011). While they are fairly common in the Karoo and fynbos regions (for example, Anysberg Nature Reserve; M. Drouilly unpubl. data), they no longer occur north of the Orange River in the Northern Cape, or in parts of the North West Province. Indeed, a recent province-wide survey in North West did not find any Grey Rhebok in protected areas (Nel 2015). They may have historically occurred in the Kgaswane and Rustenberg

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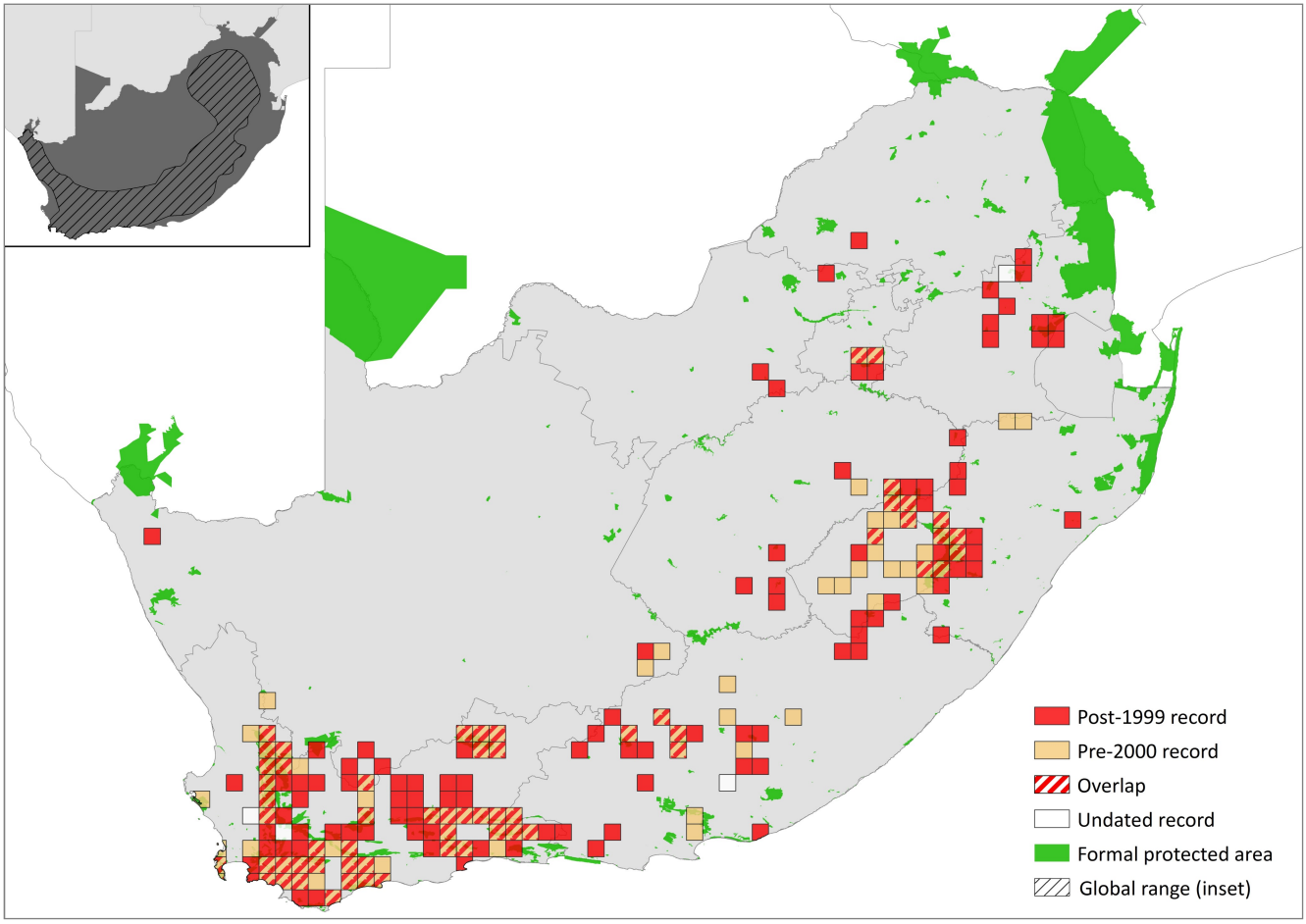

Figure 1. Distribution records for Grey Rhebok (*Pelea capreolus*) within the assessment region

Table 1. Countries of occurrence within southern Africa

Country	Presence	Origin
Botswana	Absent	-
Lesotho	Extant	Native
Mozambique	Absent	-
Namibia	Absent – but perhaps marginally in the southwest	-
South Africa	Extant	Native
Swaziland	Extant	Native
Zimbabwe	Absent	-

areas (Kettlitz 1962; Bigalke 1968; Rautenbach 1978), and may still persist in the Magaliesberg and Waterberg (although surveys are required to confirm this) (Power 2014). Despite its supposedly widespread occurrence in the eastern part of the province (see Friedmann & Daly 2004), reported subpopulations from private landowners could not be ground-truthed (Power 2014). Confusion with Mountain Reedbuck (*Redunca fulvorufula*) may explain the difficulty in confirming its presence (Lloyd & Millar 1983; Power 2014). Thus, while records from private lands do exist for North West, they are not included in Figure 1 until they can be validated. In Limpopo they may occur in the Waterberg and the northern escarpment (for example, the Wolkberg Mountains). In the Northern Cape, this species only naturally occurs within the Namaqualand District but is rarely observed (K. Craft pers. comm. 2016). Recently, however, it has been positively identified in Nababiep Nature Reserve, situated 140 km north of Springbok (Pienaar 2010; Figure 1), which indicates that they still occur in the Succulent Karoo Biome and on private lands.

Although the area of occupancy has not been calculated for protected areas, this species also occurs outside protected areas on private land in a number of provinces, so its occupancy is likely to be higher than the minimum for the Vulnerable category (2,000 km^2).

Population

While East (1999) suggested a total population of about 18,000, at least 25% occurring in protected areas and more than 30% on private land, the lack of comprehensive data prevent an accurate estimate of current population size. The remaining proportion of the population, which is in decline, is made up of scattered populations on the peripheries of protected areas in South Africa, as well as remnant populations in Lesotho and Swaziland. There are estimated to be a minimum of 2,000 individuals in formally protected areas, but further research is needed to determine whether there are over 10,000 individuals across its range. The largest known subpopulations occur in the Maloti-Drakensberg Park World Heritage Site, where numbers were estimated to be 2,000–3,000 in 1994 (Rowe-Rowe 1994), but which are thought to have declined by at least 15–20% (and possibly more) over the last 15 years (1999–2015; I. Rushworth pers. comm. 2016); and Golden Gate Highlands National Park, where a recent aerial survey counted 414 individuals at 1.3 animals / km^2 (Bissett et al. 2016). Estimated population densities of the Grey Rhebok in protected areas are generally in the range 0.5–1.7 animals / km^2 (IUCN SSC Antelope Specialist Group 2008), but occasionally lower, for example, 0.2–

0.3 animals / km² in Addo-Zuurberg and Karoo National Parks; or higher, for example, 4.3 animals / km² in Bontebok National Park (Beukes 1987); or 6.4 animals / km² at Sterkfontein Dam Nature Reserve (summarised in East 1999; Taylor et al. 2007). The Grey Rhebok subpopulation in the Coleford Nature Reserve (southern Drakensberg) varies greatly in size due to their utilisation of adjacent lands. An increase in subpopulation size was described between 1986 and 1988 with 27 individuals in the 1,272 ha reserve, probably due to compression of subpopulations from adjoining properties as a result of an increase in hunting by dogs. This increase was followed by a decrease until 1993, likely due to poaching and a succession of long, dry winters (O'Connor & Krüger 2003). Between 1993 and 2001, the mean subpopulation size in the reserve was 7.6 individuals (O'Connor & Krüger 2003).

Generation length for this species has been calculated as 4.9 years (based on a longevity of 12 years in captivity) (Pacifici et al. 2013), which yields a 14.7 year three generation period (1999–2014). The IUCN SSC Antelope Specialist Group estimate generation length as 4.4 years, yielding a 13 year three generation window (D. Mallon pers. comm. 2016). The Grey Rhebok is a difficult species to count accurately, and inconsistent counting methods in many areas have resulted in a paucity of reliable trend data on which to base an assessment. Collation of available subpopulation data from 13 formally protected areas across its range with adequate long-term count data, suggests a decline of 17–25% over three generations. Additionally, anecdotal evidence in other protected areas confirms a generally declining trend. In the Northern Cape there are no reliable population trend data, but numbers are suspected to be declining primarily due to poaching (K. Craft pers. comm. 2016). In the Western Cape (where trend data are also lacking) there are similar reports of declining subpopulations across national and provincial protected areas, private lands and the Boland Mountain Complex (T. Barry pers. comm. 2016; C. Birss & C. Cowell unpubl. data). Additionally, only two individuals were counted in Table Mountain National Park in 2011 (C. Cowell unpubl. data), and Grey Rhebok are absent from a number of private farms in the Western Cape where their occurrence would be expected. Conversely, the subpopulation in Golden Gate Highlands National Park appears to be genuinely increasing (Bissett et al. 2016). However, counts of the Golden Gate Highlands National Park are excluded because the count methods have changed significantly over the three generation period and the park has increased in size, rendering comparisons between 1999 and 2016 spurious (C. Bissett pers. comm. 2016). Further collation of long-term data, especially outside protected areas, is necessary to more accurately estimate population reduction over three generations. Overall, while the decline is *c.* 20% from a sample of protected areas, the net decline may be greater, as subpopulations may be declining more severely outside protected areas. As the Near Threatened category is based on declines of 20–25%, (IUCN Standards and Petitions Subcommittee 2014) we thus feel a precautionary listing is appropriate.

The level of fragmentation is unknown. While the distribution of Grey Rhebok is discontinuous and patchy, they occur outside of protected areas and will be able to move fairly freely in many areas. They are also accomplished leapers known to jump fences (Skinner & Chimimba 2005). There is natural geographic fragmentation by mountain ranges and fragmentation


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caused by agricultural land uses. Grey Rhebok are quite widespread and free-roaming, and although the number of locations is unknown, they are unlikely to be affected by any single threat. That being said, given the declines in numbers across the country, the level of fragmentation may be increasing.

Current population trend: Declining

Continuing decline in mature individuals: Yes, from hunting, poaching and increased predation rates. Possibly also due to the Allee effect.

Number of mature individuals in population: Unknown

Number of mature individuals in largest subpopulation: 248–290 in Golden Gate Highlands National Park, assuming a 60–70% mature population structure. The Maloti-Drakensberg Park World Heritage Site may be the largest subpopulation but subpopulation size is currently unknown.

Number of subpopulations: Unknown

Severely fragmented: Unknown

Habitats and Ecology

Grey Rhebok are associated with rocky hills, grassy mountain slopes, and plateau grasslands in the eastern extent of their distribution. In the south and southwest, their distribution is associated with the rocky hills of mountain fynbos and the little Karoo. They are predominantly browsers, often feeding on ground-hugging forbs, and largely water independent, obtaining most of their water requirements from their food (Avenant 2013). Forbs constitute the majority of their diet, especially the flowers and leaves of the plants (Esser 1973; Rowe-Rowe 1983a; Beukes 1988). They require good grass cover within their home ranges for shelter and to hide from predators, but often use steep open areas with little cover when feeding. In the Western Cape, they are often observed on agricultural lands (Radloff 2008; C. Birss pers. obs. 2016). For example, there is seasonal movement between Bontebok National Park and surrounding agricultural lands (C. Cowell unpubl. data). Similarly, in the southern Drakensberg, Grey Rhebok move over large areas that encompass protected areas and adjacent farmlands (O'Connor & Krüger 2003).

Home range size is estimated at 30–100 ha in the eastern Free State mountain grasslands (Taylor et al. 2007). The social system of Grey Rhebok is female defence polygyny, with males aggressively defending a harem of 2–7 females

Table 2. Use and trade summary for the Grey Rhebok (*Pelea capreolus*)

Category	Applicable?	Rationale	Proportion of total harvest	Trend
Subsistence use	Yes	Suspected from general poaching levels.	Unknown	Unknown, but possibly increasing with settlement sprawl.
Commercial use	Yes	-	Majority	-
Harvest from wild population	Yes	Most subpopulations are wild and free roaming.	Majority	Unknown
Harvest from ranched population	Yes	Inferred from reports from game farms and wildlife ranches.	Minority	Stable
Harvest from captive population	Unknown	Anecdotal reports of captive breeding.	Minority	Unknown

plus accompanying young in a stable herd (Taylor & Skinner 2006). This harem system of females remaining permanently with a single territorial male for long periods is very unusual amongst antelope species. Non-territorial males generally remain solitary. This behaviour may exacerbate an Allee effect in this species (whereby there is a decline in individual fitness at low population size or density) since family groups are closed to outsiders and male offspring disperse as yearlings and remain peripheral until they gain a territory, but further research is required to investigate this.

Ecosystem and cultural services: Grey Rhebok are an important foraging species in hilly areas. In many small protected areas, or those close to urban areas, Grey Rhebok are the largest browsing ungulate that can be stocked, thus performing a pivotal role in the ecosystem. The Dutch spelling of the species, *reebock*, gave its name to the sport brand Reebok. The name “roebuck” appears often in early records of settlers in the Cape (South Africa); this animal probably reminded these settlers very much of the European Roebuck (Roe Deer, *Capreolus capreolus*). The pronunciation and spelling over the years have changed through Roe, Rabock, Reebok, Raybuck to Rhebok in English and “Ribbok” in Afrikaans (Skead 2011).

Use and Trade

They are used on a commercial basis for trophy hunting, both locally and internationally, with prices between $900 and $1,400 for the trophy itself (M. Drouilly unpubl. data, Department of Environmental Affairs, trophy hunting statistics). Roughly 100 individuals are trophy hunted every year. Although Grey Rhebok are occasionally hunted by domestic hunters, they do not appear to be a popular species for game meat. All legal hunting activities should theoretically be based on sustainable use principles, so should not negatively impact on populations. However, this should be monitored. They are also increasingly used on a subsistence basis by local communities as bushmeat, or recreationally as part of sport hunting with dogs (O’Connor & Krüger 2003; Grey-Ross et al. 2010). There is also commercial value in live animal sales and translocating animals between game farms and protected areas, but translocations should not mix ecotypes.

Threats

While the threats to Grey Rhebok and their severity require more research, the primary threat is suspected to be increased levels of bushmeat and illegal sport hunting with dogs (Avenant 2013; Avenant et al. 2014; du Plessis et al. 2014). In KwaZulu-Natal alone, a recent survey of 92 people in rural settlements in the Wartburg, Estcourt and Creighton areas found that 82% of respondents hunt illegally (42% for meat and 46% hunted with dogs) on a regular basis, with 51% hunting every week (Grey-Ross et al. 2010). While the Grey Rhebok was not explicitly mentioned as a target, we infer such hunting to affect this species. Protected areas close to urban areas exhibit increased predation by illegal sport hunting with packs of dogs and also feral dogs, such as in Bontebok National Park where recently eight Grey Rhebok were killed by dogs (C. Cowell unpubl. data). Similarly, the Cape Leopard Trust has raised serious concerns about the general decline of Leopard (*Panthera pardus*) prey species and suspect that, due to the proximity of the Boland Mountains to the urban areas and expanding informal settlements, that the smaller antelope are targeted by snaring and hunted with dogs for bushmeat (C. Birss pers. comm. 2016). In Coleford Nature Reserve in the southern Drakensberg, where the Grey Rhebok subpopulation declined between 1986 and 2001, 79 dogs were removed from 1985–2002 and 96 snares were removed during 1990/91 alone (O’Connor & Krüger 2003). An initial subpopulation spike was coincident with the first removal of dogs from the reserve, which was probably symptomatic of escalated dog hunting in the adjacent properties and thus Grey Rhebok moving into Coleford Nature Reserve (O’Connor & Krüger 2003). In the Northern Cape, illegal hunting of Grey Rhebok by communal farmers is also a problem (C. Kraft pers. comm. 2016).

Local declines are also suspected from increased densities of natural predators (Avenant 2013). Anecdotal reports from the Free State and Northern Cape suggest that an emerging threat is increased predation levels from higher abundances of mesopredators, especially Black-backed Jackal (*Canis mesomelas*) (Rowe-Rowe 1983b; C. Kraft & N. Avenant pers. obs. 2015), Caracals (*Caracal caracal*) (Palmer & Fairall 1988) and perhaps Leopard in the arid areas (C. Kraft pers. comm. 2016). Poor carnivore management may be responsible for increased mesopredator abundance (Minnie et al. 2016).

Habitat degradation may also play a role, such as climate-change or land-use induced bush encroachment (Hudak & Wessman 2001; Wigley et al. 2009) in areas such as the North West and Limpopo (Power 2014). There is no evidence for disease as a threat (Taylor et al. 2006), but Grey Rhebok may occasionally be affected by parasite infestation (Beukes 1988).

Table 3. Threats to the Grey Rhebok (*Pelea capreolus*) 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 & Collecting Terrestrial Animals*: bushmeat and illegal sport hunting (including snaring and hunting with dogs).	South African National Parks, City of Cape Town unpubl. data	Empirical	Regional	Possibly increasing with rural settlement expansion.
		O'Connor & Krüger 2002	Indirect	Local	
		Grey-Ross et al. 2010	Indirect	Regional	
2	*1.1 Housing & Urban Areas*: loss of habitat from rural settlement expansion. Current stress *2.1 Species Mortality*: increased poaching rates.	GeoTerraImage 2015	Indirect (remote sensing)	National	Increasing
		Turpie et al. 2014a,b	Indirect (remote sensing)	Regional	
3	*2.3.2 Small-holder Grazing, Ranching or Farming*: disturbance caused by livestock ranching. Current stress *2.1 Species Mortality*: increased predation by farm dogs.	O'Connor & Krüger 2002	Indirect	Local	Possibly increasing with rural settlement expansion.
4	*8.2.2 Problematic Native Species/Diseases*: increased predator density, possibly from poor carnivore management. Current stress *2.1 Species Mortality*: increased predation rates.	-	Anecdotal	-	Possibly increasing with suspected increase in mesopredators density.

It is likely that several threats synergise to cause subpopulation decline. For example, in Sterkfontein Dam Nature Reserve, Free State, the reasons behind declines are the observed increase in poaching (mainly hunting with dogs), increased predation rates due to the closure of the local vulture restaurant, and possibly habitat degradation related to increased frequency of fires (E. Schulze unpubl. data).

Current habitat trend: Unknown. Although agricultural transformation has likely reduced suitable habitat for this species, the conversion to wildlife ranching may have created additional protected habitat. Furthermore, camera trap data suggest that Grey Rhebok can occupy farmlands in the central Karoo, despite the livestock that may overgraze these lands (M. Drouilly unpubl. data). Across the range of the species, rural and urban settlements have expanded by 0.8–39% and 6–15%, respectively, between 2000 and 2013 (GeoTerraImage 2015), which we infer to correlate with increased levels of illegal hunting. Similarly, in the Mohale and Katse areas in the Lesotho Highlands, the intact grassland decreased by *c*. 6% over the period from 1993–2013, while the percentage area under subsistence farming increased by *c*. 5% (Turpie et al. 2014a, 2014b).

Conservation

Grey Rhebok are reported to occur in many provincial reserves and national parks in the assessment region, with two strongholds in the Maloti-Drakensberg Park World Heritage Site and Golden Gate Highlands National Park. The primary intervention at this stage is to investigate the causes of the decline and to then outline appropriate interventions. Adaptive management of formally protected areas is recommended to trial strategies that are effective in stabilising or increasing subpopulations. For example, while Grey Rhebok were previously threatened by unplanned fires, poaching and livestock overgrazing in QwaQwa National Park, its amalgamation with Golden Gate Highlands National Park in 2008 saw the subpopulation increase from 150 in 2003 to 269 in 2016 (Schulze 2016), with 414 animals overall in the combined area in 2016 (Bissett et al. 2016). This positive growth is attributed to improved fences and fence maintenance, decreased poaching and livestock overgrazing (following land restitution settlement), and habitat improvement due to better fire management and vegetation rehabilitation (Schulze 2016). Such interventions could be trialled in other protected areas and private lands. In Seekoeivlei Nature Reserve, Free State, the subpopulation is stable or increasing due to it being fairly secure from poaching as well as the relatively high abundance of other prey species, in this case waterbirds (E. Schulze unpubl. data).

The most important immediate intervention is to combat illegal dog hunting through enforcement in affected areas and education/awareness campaigns in local communities to encourage alternative forms of recreations. Programmes to remove or control feral dogs should also be implemented. Private landowners should be encouraged to continue to form conservancies to reduce the edge effects of small areas of natural habitat, such that vulnerability to poaching is lessened. The maintenance of indigenous grassland through livestock ranching under private tenure is particularly important around small reserves that are too small to maintain Grey Rhebok subpopulations (O'Connor & Krüger 2003).

The effects of translocations and reintroduction success should also be monitored, especially in the case of translocating adult males. Given the highly aggressive nature of territorial males towards foreign males, it is hard for new males to establish themselves if pre-existing territories are present. Vegetation types such as the Waterberg-Magaliesberg Mountain Sourveld (Mucina & Rutherford 2006) are suitable for this species, and reintroduction should be considered in, for example, Kgaswane Nature Reserve, North West, to restore former antelope diversity and to gather information on the causes on subpopulation persistence or decline (Power 2014). Private conservancies and stewardship lands should also

Table 4. Conservation interventions for the Grey Rhebok (*Pelea capreolus*) 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	*5.4 Compliance & Enforcement*: increased prosecution of illegal hunting.	-	Anecdotal	-	-	-
2	*2.1 Site/Area Management*: patrolling to detect illegal hunters and removing snares/fence maintenance	Schulze 2016 Bissett et al. 2016	Empirical Anecdotal	Local Local	Active patrolling and fence maintenance allowed subpopulation recovery.	SANParks and provincial conservation authorities.
3	*3.2 Species Recovery*: maintain predator densities at ecologically suitable levels to reduce excessive predation rates.	-	Anecdotal	-	-	Predator management plan for SANParks, deals mainly with larger cats but includes Black-backed Jackal.
4	*3.1.1 Harvest Management*: monitoring and regulation of hunting and translocation activities.	-	Anecdotal	-	-	Department of Environmental Affairs and provincial conservation agencies.
5	*6.2 Linked Enterprises & Livelihood Alternatives*: substitute illegal sport hunting with other forms of recreation.	-	Anecdotal	-	-	-
6	*3.3.1 Species Reintroduction*: establish new subpopulations and monitor reintroduction success.	-	Anecdotal	-	-	-
7	*1.2 Resource & Habitat Protection*: establish conservancies to protect key habitats.	-	Anecdotal	-	-	-

be encouraged to reintroduce Grey Rhebok where they are absent.

Recommendations for land managers and practitioners:

- Monitor and enforce penalties for illegal hunting.
- Patrols of private land for the purposes of apprehending would-be hunter trespassers, and snare removals must be regularly performed.
- More suitable survey methodologies should be considered to assist in acquiring more reliable population numbers. General multi-species aerial surveys tend to result in under-counts in many of the typical habitat types. Implement consistent monitoring projects to assess trends consistently throughout the species' distribution.
- Identify areas of suitable habitat where Grey Rhebok could be reintroduced.

Research priorities:

- Investigate the reasons why the formally protected subpopulations have declined and quantify the severity of various threats.
- Assess subpopulation trends on private lands and establish long-term monitoring sites.
- Identify and test suitable conservation interventions, such as the outcomes of translocations.
- Potential effects of removals from wild subpopulations for game ranching and the occurrence and popularity of the species on private land.
- Identify suitable habitat areas, particularly in areas where wildlife ranching is commonplace.
- Status surveys of the species in the Magaliesberg and Waterberg mountains of both the North West and Limpopo provinces respectively.
- Identify appropriate and accurate methods of census for this species depending on the vegetation type.

Encouraged citizen actions:

- Report sightings on virtual museum platforms (for example, iSpot and MammalMAP), especially outside protected areas, and submit a photograph if possible as this species is easily confused with Mountain Reedbuck.
- Encourage reintroduction onto private land where suitably large open areas and adequate protection from poaching occur.
- Create conservancies to protect suitable habitats.

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Data Sources and Quality

Table 5. Information and interpretation qualifiers for the Grey Rhebok (*Pelea capreolus*) assessment

Data sources	Field surveys (unpublished), indirect information (literature, expert knowledge)
Data quality (max)	Estimated
Data quality (min)	Suspected
Uncertainty resolution	Best estimate
Risk tolerance	Precautionary

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