Hystrix africaeaustralis – Cape Porcupine

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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 (2016)	Least Concern
TOPS listing (NEMBA) (2007)	None
CITES listing	None
Endemic	No

Cape Porcupines are important ecosystem engineers and thus play a valuable role in geophyte-rich ecosystems in sub-Saharan Africa. For example, in Nieuwoudtville, Northern Cape Province, their diggings contained significantly more seedlings than adjacent areas and they displaced over 2.2 m^3 of soil / ha / year, thus helping to sustain landscape heterogeneity (Bragg et al. 2005).

Taxonomy

Hystrix africaeaustralis Peters 1852

ANIMALIA - CHORDATA - MAMMALIA - RODENTIA - HYSTRICIDAE - *Hystrix* - *africaeaustralis*

Common names: Cape Porcupine, South African Porcupine (English), Ystervark (Afrikaans), Noko (Sepedi, Sesotho, Setswana), Ingungubane, Inungu (Swati, Zulu), Nungu (Tsonga, Venda),

Taxonomic status: Species

Taxonomic notes: No subspecies have been recognised (Meester et al. 1986).

Assessment Rationale

The species remains Least Concern in view of its wide distribution within the assessment region, its occurrence in many habitats, including agricultural and urban environments, and its relatively high densities in some regions. Hunting for bushmeat and persecution for damage caused to fences and crops may result in local declines. Holistic management strategies, such as creating artificial passageways in game fences and establishing sustainable quill and meat trades, should be employed for this species, with positive effects for the wider socio-ecological community.

Regional population effects: Extensive and well connected throughout all range states. Rescue effects are possible. Females do not conceive while living in their natal groups and dispersal is a prerequisite for successful reproduction (van Aarde 1987a; van Aarde & van Wyk 1991). However, it is unknown what distances they travel when dispersing.

Distribution

Cape Porcupines have a wide distribution in sub-Saharan Africa, avoiding the tropical forests of the Congo basin, and the driest parts of the Namib Desert (Monadjem et al. 2015). They occur from Kenya and southern Uganda in the north, through Tanzania, Rwanda, southeastern Democratic Republic of the Congo, extreme southwestern Congo, Angola, Zambia, Malawi and Mozambique, and then south throughout southern Africa (although they are absent from much of central Botswana).

Within the assessment region, they occur widely across all provinces, as well as Swaziland and Lesotho. For example, Power (2014) recorded them as common throughout the North West Province, occurring in every vegetation type but showing some local preference for riparian and rocky habitats. In the Drakensberg Midlands, relative occupancy of ten terrestrial mammal species was highest for Cape Porcupine (Ramesh & Downs 2015). They may be locally absent from some areas where there is high hunting pressure (Skinner & Chimimba 2005).

Population

It is a fairly common species across the assessment region, with relatively high densities. For example, in the semi-arid landscapes around Nieuwoudtville, Northern Cape Province, burrow entrances were found to be a good predictor of the number of Porcupines it contained, where occupied burrow density was estimated to be 2.6 burrows / km^2 and density on the study farm was estimated to be 8 individuals / km^2 (Bragg et al. 2005). This high density in a semi-arid area was proposed by Bragg et al. (2005) to be a result of the high food availability in the region (high geophyte density). However, within more arid regions porcupine numbers can be as low as 0.8 individuals / km^2 such as in the Kalahari (Bragg, unpubl. data). Thus, we infer that there are over 10,000 mature individuals within the assessment region. However, hunting pressure and persecution (by farmers and farm labourers because it is a considered an agricultural pest, for bushmeat by rural communities, and for harvesting of the quills for use in the decor sector) may account for local extinctions in some areas, and current

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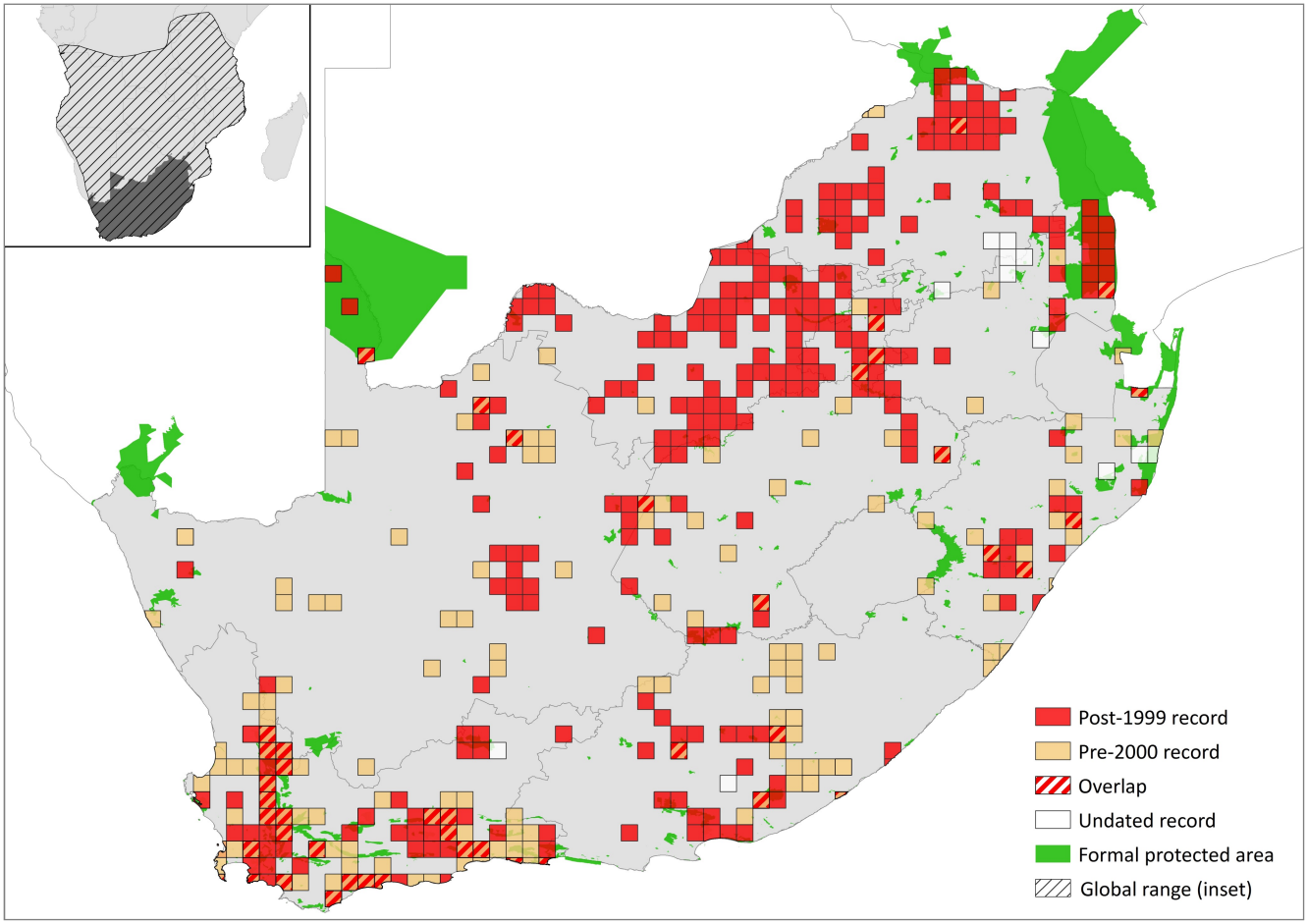

Figure 1. Distribution records for Cape Porcupine (*Hystrix africaeaustralis*) within the assessment region

Table 1. Countries of occurrence within southern Africa

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

density estimates from throughout its range should be ascertained to determine population size more accurately.

Cape Porcupines live in extended family groups, consisting of a breeding male, breeding female and offspring of consecutive years (van Aarde 1987b). Female porcupine offspring do not conceive while in their natal groups and thus dispersal is a prerequisite for reproduction (van Aarde 1987b). This has important implications for the regulation of population size (van Aarde 1987a), because, if there are insufficient resources available in the environment, mature offspring cannot disperse from their natal group and thus cannot reproduce (van Aarde 1987a, 1987b). In captivity, the gestation period is *c*. 93 days, average litter size is 1–3, and young are usually suckled for 100 days or more (van Aarde 1985a, 1985b). Offspring attain sexual maturity between 1–2 years of age, during which time annual survival is relatively high for a rodent (van Aarde 1987a, 1987b, 1987c). The inter-litter interval in captivity is approximately one year (van Aarde 1985b).

Current population trend: Stable

Continuing decline in mature individuals: Locally, due to hunting pressure and persecution.

Number of mature individuals in population: > 10,000

Number of mature individuals in largest subpopulation: Unknown

Number of subpopulations: Unknown

Severely fragmented: No. Can exist in human modified habitats.

Habitats and Ecology

They are found in most of the types of vegetation encountered in southern Africa (including the coastal areas of the Namib Desert), from sea level to 2,000 m asl (Skinner & Chimimba 2005). They are generally absent from forest, and are only found here marginally. In Nylsvley Nature Reserve, Limpopo Province, they showed a preference for *Burkea* over *Acacia* savannah due to higher concentrations of food in the former (de Villiers et al. 1994; de Villiers & van Aarde 1994). In the Bokkeveld Plateau, in the Northern Cape, they showed seasonal changes in preference for habitats based on the habitat's substrate, seasonal food availability and refuge capacity. They can also exist in human-modified areas, such as croplands and suburban gardens.

Porcupines feed predominantly on roots, geophytes and tubers, which are dug up from under the ground using

Table 2. Use and trade summary for the Cape Porcupine (*Hystrix africaeaustralis*)

Category	Applicable?	Rationale	Proportion of total harvest	Trend
Subsistence use	Yes	Bushmeat and traditional medicine.	Majority	Unknown
Commercial use	Yes	Traditional medicine and trophy hunting. Quill décor industry.	Minority	Unknown
Harvest from wild population	Yes	All	Majority	Unknown
Harvest from ranched population	No	-	-	-
Harvest from captive population	No	-	-	-

their strong incisors. Cape porcupines not only consume plants selectively (Bragg 2003; de Villiers & van Aarde 1994) and sometimes en masse (Bragg 2003), but they are also able to consume (without any apparent side-effects) geophyte species that are known to be toxic for livestock. They also feed on fallen fruits, and gnaw bones. Due to the combination of their diet and digging abilities, porcupines can become agricultural pests in farming areas (Monadjem et al. 2015). They do not appear to scavenge (Shaw et al. 2015). They are nocturnal, territorial and solitary foragers, although they can occasionally be found foraging in groups of two to three animals. They are monogamous and live in groups comprising either an adult pair, an adult pair and their offspring from consecutive litters, or an adult male and young of the year (Skinner & Chimimba 2005). They are long-lived and have a slow reproductive rate.

Porcupines of the genus *Hystrix* are the largest African rodents with a mass of up to 20 kg (Monadjem et al. 2015). They typically rest during the day in rock crevices, small caves, or burrows, the latter either dug by the Aardvark (*Orycteropus afer*) or by the Porcupines themselves. Shelters often contain an accumulation of bones carried in by the Porcupines themselves (Skinner & Chimimba 2005).

Ecosystem and cultural services: Cape Porcupines are ecosystem engineers. Foraging diggings or pits obstruct the flow of resources, trapping windborne organic matter and fine soil particles such as silt and clay, which would normally be captured by shrubs and their hummocks. The scale of the engineering effects caused by Cape Porcupines in the Nieuwoudtville region in the Northern Cape is on a par with, or at an even greater scale than, many other ecosystem engineer species' impacts reported in the literature. The fact that Cape Porcupines can dig up to 0.87 m^3 of soil / hectare over a year, which is equivalent to 5,859 tonnes / year and that their disturbance can cover up to 510,391 m^2 demonstrates the scale and intensity of their disturbance patterns (C. Bragg unpubl. data). Cape Porcupine disturbance created distinct soil property changes in chemicals and moisture, and probably also texture, and therefore creates a mosaic of modified, unmodified and regenerating patches that provide habitats of differing resource availability and physical characteristics (C. Bragg unpubl. data). Additional disturbance impacts of Cape Porcupines take the form of the widespread distribution of their multi-entrance burrows (*c.* 60 on the 4,000 ha study area; Bragg et al. 2005). Cape Porcupines are also important patch creators, such as shown by Bragg (2003) through their maintenance of the Endangered *Sparaxis pillansii* geophytic species in the landscape of the Nieuwoudtville region, through their regular diggings and foraging activities.

Use and Trade

They may be extensively hunted for bushmeat, even within formally protected areas (for example, Hayward 2009). They are also used in traditional medicine and the quills are used as ornaments. The quill trade is suspected to have a negligible impact on the population as a whole (for example, Power 2014) but might have local impacts on subpopulations (Chevallier & Ashton 2006). They are also hunted as trophies in some regions.

Threats

There are no major threats to this species. However, bushmeat hunting and persecution may be causing local decline or even extinctions in some areas. Such local depletion should be monitored.

Table 3. Threats to the Cape Porcupine (*Hystrix africaeaustralis*) ranked in order of severity with corresponding evidence (based on IUCN threat categories, with regional context)

Rank	Threat description	Evidence in the scientific literature	Data quality	Scale of study	Current trend
1	*5.1.3 Persecution/Control*: persecution for damaging crops, trees and fences.	Ramesh & Downs 2015	Simulation	Regional	Possibly increasing given the trend for increasing fence construction.
2	*5.1.1 Hunting & Collecting Terrestrial Animals*: bushmeat, traditional medicine and quill trade.	Hayward et al. 2005	Empirical	Local National	Possibly increasing with settlement expansion.
		Chevallier & Ashton 2006	Empirical	Local	
		Whiting et al. 2011	Empirical		
3	*4.1 Roads & Railroads*: road collisions.	W. Collinson unpubl. data	Empirical	National	Unknown

They are persecuted primarily for digging holes beneath fences, which, aside from the cost of repair, may allow predators into a farm or wildlife ranch with subsequent damage to livestock or game (Rust et al. 2015). Given the expansion of intensive wildlife ranching and the breeding of rare game species, which require increased fencing of properties, this threat could be increasing. They are also persecuted for damaging crops in agricultural areas (for example, Power 2014), especially where root crops are grown, and for ring-barking trees (which exposes the tree's heartwood and increases susceptibility to fungal infections). Correspondingly, Cape Porcupine occupancy was negatively correlated with human abundance, which could be related to persecution, and livestock activity in the Drakensberg Midlands, KwaZulu-Natal Province (Ramesh & Downs 2015). In the Eastern Cape, anecdotal reports suggest Cape Porcupines are being severely depleted by farmers and local communities to the extent that some subpopulations are locally extinct. Cape Porcupines are also often killed on roads.

Current habitat trend: Stable. They have high occupancy rates in multiple habitats (*sensu* Power 2014; Ramesh et al. 2016), and adapt well to human-modified landscapes, including agricultural and urban areas. While agricultural expansion may have benefitted this species, they are also persecuted, thus the net effect is unknown.

Conservation

They occur in many protected areas within the assessment region. No direct interventions are necessary at present, but this species would benefit from encouraging landowners and local communities to adopt holistic management techniques, such as burying water pipes below ground to avoid porcupine damage, and setting up porcupine-permeable fences. For example, research from Namibia has shown that swing gates may be an effective alternate passageway for burrowing animals. For example, Schumann et al. (2006) and Rust et al. (2015) showed that the installation of swing gates decreased the number of holes created for the duration of the studies. Similarly, the use of discarded car tyres installed into wildlife-proof fences has been demonstrated to be a cost-efficient and effective way to reduce damage and facilitate dispersal, where Cape Porcupines and Black -backed Jackals (*Canis mesomelas*) used the tyres most frequently (Weise et al. 2014). Setting up electrified fencing around crops of high value would also provide a deterrent to porcupines and minimize agricultural losses.

Even though porcupines probably play a major role in maintaining the heterogeneity of landscapes and facilitating the persistence of patches of endangered geophyte species in vegetation types of conservation priority (C. Bragg unpubl. data), the Cape Porcupine continues to be actively eradicated from agricultural landscapes in South Africa. Clearly their value in the ecosystem has been understated and their conservation value needs to be recognised.

Recommendations for land managers and practitioners:

- The trade in Porcupine quills must be managed more sustainably and ethically.
- Porcupine-friendly fences must be encouraged in farm and ranch lands to reduce damage.
- Managers of high-priority vegetation types, such as Renosterveld, which contain high geophyte diversity, should be aware of the ecological value of porcupine herbivory and disturbance as a driver of diversity.

Research priorities: Research should determine how porcupines in urban areas utilise the urban-natural mosaic, as understanding how porcupines utilise these fragmented landscapes could elucidate the types and extent of corridors and refuges required to maintain overall biodiversity or resilience in urban conservation.

Further research should be focused on what levels of porcupine foraging activities are required to maintain diversity in different-sized Renosterveld fragments.

Encouraged citizen actions:

- Report sightings on virtual museum platforms (for example, iSpot and MammalMAP), especially outside protected areas.

Table 4. Conservation interventions for the Cape Porcupine (*Hystrix africaeaustralis*) 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*: install swing gates and/or car tyres into wildlife-proof fences; bury water pipes.	Schumann et al. 2006	Indirect	Local	18% of all instances using closed swing gates along 4.8 km game fence.	None known
		Rust et al. 2015	Indirect	Local	263 swing gates installed along 23.93 km game fence decreased number of holes created and reopened.	
		Weise et al. 2014	Indirect	Local	21% of all instances using passageways.	
2	*3.1.1 Harvest Management*: establish a sustainable local trade in meat/quills.	-	Anecdotal	-	-	-
3	*4.3 Awareness & Communications*: inform landowners and communities of benefits of holistic management.	-	Anecdotal	-	-	-

- Do not buy quill décor items unless the product is shown to be from sustainably harvested sources.

References

Bragg CJ. 2003. Porcupine ecology in Nieuwoudtville, a hotspot of geophyte diversity. M.Sc. Thesis. University of Cape Town, Cape Town, South Africa.

Bragg CJ, Donaldson JD, Ryan PG. 2005. Density of Cape porcupines in a semi-arid environment and their impact on soil turnover and related ecosystem processes. Journal of Arid Environments **61**:261–275.

Chevallier N, Ashton B. 2006. A report on the porcupine quill trade in South Africa. Page 26. IFAW (International Fund for Animal Welfare). Available from http://media.withtank.com/477275f26c/porcupine_quill_trade.pdf (accessed June 23, 2016).

de Villiers MS, van Aarde RJ. 1994. Aspects of habitat disturbance by Cape porcupines in a savanna ecosystem. South African Journal of Zoology **29**:217–220.

de Villiers MS, van Aarde RJ, Dott HM. 1994. Habitat utilization by the Cape porcupine *Hystrix africaeaustralis* in a savanna ecosystem. Journal of Zoology **232**:539–549.

Hayward MW. 2009. Bushmeat hunting in Dwesa and Cwebe Nature Reserves, Eastern Cape, South Africa. South African Journal of Wildlife Research **39**:70–84.

Hayward MW, White RM, Mabandla KM, Bukeye P. 2005. Mammalian fauna of indigenous forest in the Transkei region of South Africa: an overdue survey. South African Journal of Wildlife Research **35**:117–124.

Meester JA, Rautenbach IL, Dippenaar NJ, Baker CM. 1986. Classification of southern African mammals. Transvaal Museum Monographs **5**:1–359.

Monadjem A, Taylor PJ, Denys C, Cotterill FPD. 2015. Rodents of Sub-Saharan Africa: A Biogeographic and Taxonomic Synthesis. De Gruyter, Berlin, Germany.

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.

Ramesh T, Downs CT. 2015. Impact of land use on occupancy and abundance of terrestrial mammals in the Drakensberg Midlands, South Africa. Journal for Nature Conservation **23**:9–18.

Ramesh T, Kalle R, Rosenlund H, Downs CT. 2016. Native habitat and protected area size matters: Preserving mammalian assemblages in the Maputaland Conservation Unit of South Africa. Forest Ecology and Management **360**:20–29.

Rust NA, Nghikembua MT, Kasser JJW, Marker LL. 2015. Environmental factors affect swing gates as a barrier to large carnivores entering game farms. African Journal of Ecology **53**:339–345.

Schumann M, Schumann B, Dickman A, Watson LH, Marker L. 2006. Assessing the use of swing gates in game fences as a potential non-lethal predator exclusion technique. South African Journal of Wildlife Research **36**:173–181.

Shaw JM, Merwe R van der, Merwe E van der, Ryan PG. 2015. Winter scavenging rates under power lines in the Karoo, South Africa. African Journal of Wildlife Research **45**:122–126.

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

Data Sources and Quality

Table 5. Information and interpretation qualifiers for the Cape Porcupine (*Hystrix africaeaustralis*) assessment

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

van Aarde RJ. 1985a. Age determination of Cape porcupines, *Hystrix africaeaustralis*. South African Journal of Zoology **20**:232–236.

van Aarde RJ. 1985b. Reproduction in captive female Cape porcupines (*Hystrix africaeaustralis*). Journal of Reproduction and Fertility **75**:577–582.

van Aarde RJ. 1987a. Pre-and postnatal growth of the Cape porcupine *Hystrix africaeaustralis*. Journal of Zoology **211**:25–33.

van Aarde RJ. 1987b. Reproduction in the Cape porcupine *Hystrix africaeaustralis*: An ecological perspective. South African Journal of Science **83**:605–607.

van Aarde RJ. 1987c. Demography of a Cape porcupine, *Hystrix africaeaustralis*, population. Journal of Zoology **213**:205–212.

van Aarde RJ, van Wyk V. 1991. Reproductive inhibition in the Cape porcupine, *Hystrix africaeaustralis*. Journal of Reproduction and Fertility **92**:13–19.

Weise FJ, Wessels Q, Munro S, Solberg M. 2014. Using artificial passageways to facilitate the movement of wildlife on Namibian farmland. South African Journal of Wildlife Research **44**:161–166.

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