Acomys subspinosus – Cape Spiny Mouse


Cliff and Suretha Dorse

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	Yes

*Watch-list Threat

This species has sharp bristles instead of fur (Skinner & Chimimba 2005).

Taxonomy

Acomys subspinosus (Waterhouse 1838)

ANIMALIA - CHORDATA - MAMMALIA - RODENTIA - MURIDAE - *Acomys* - *subspinosus*

Common names: Cape Spiny Mouse (English), Kaapse Stekelmuis (Afrikaans)

Taxonomic status: Species

Taxonomic notes: This species appears to be basal in phylogenies of *Acomys* (Barome et al. 2001; Verheyen et al. 2011).

Assessment Rationale

Listed as Least Concern because it is widespread in the Western Cape of South Africa with an estimated extent of occurrence of 148,787 km^2. As this species mainly exists in rocky habitat unlikely to be transformed, there are suspected to be no major threats that could cause widespread population decline. Currently, although around 76% of the Western Cape is still considered natural or near-natural, information from the Western Cape Nature Conservation Board indicates that there is a continuing decline in natural habitat from agricultural expansion, especially on lower- to mid-slope areas (below 1,000 m) from planted pastures and rooibos, wine and fruit cultivation, which may impact the species in the future as climate change makes higher elevation habitats more suitable for agriculture. Additionally, there may be localised losses of habitat quality due to the spread of alien invasive species, inappropriate fire regimes (too frequent fires), and edge effects associated with agricultural and residential land-uses (for example, use of pesticides and predation from domestic pets). Although the species remains widespread and regularly encountered, proactive mitigation measures, including protected area expansion and habitat restoration, should be continued to counteract habitat loss.

Distribution

This species is a true fynbos endemic (Breytenbach 1982) (Table 1), occurring in the Western Cape Province (Avery et al. 2005) and extending marginally into the Eastern and Northern Cape provinces (Avery & Avery 2011) (Figure 1). Its range extends from Citrusdal in the west to Knysna in the east (Skinner and Chimimba 2005). It is generally associated with rocky habitats on mountain slopes, and thus can exist at high altitudes, but also occurs in lowland fynbos habitats. No range shifts have been documented.

The extent of occurrence (EOO) is estimated to be between 48,286 km^2 (using post-2000 records only) and 148,787 km^2 (using all records). The area of occupancy (AOO) is estimated to be 74,165 km^2 using all fynbos vegetation types within the EOO (Mucina & Rutherford 2006). The current amount of untransformed fynbos will be lower than this estimate but still above the 2,000 km^2 threshold for Least Concern.

Population

This species is widespread but not abundant. It is never trapped in high numbers at a site (J. Midgley unpubl. data) and it is never the dominant species in an area (Avery et al. 2005). Although direct population estimates and trends are not available for this species, we suspect a declining population based on ongoing habitat loss from agricultural expansion in the Western Cape Province (Pence 2014), which may be exacerbated by the current trend of planted pastures and rooibos, wine and fruit cultivation expanding onto lower- and mid-slopes below 1,000 m a.s.l. (Pence 2014). However, given that the core rocky habitats of the species are likely to be left untransformed and that habitat continues to be protected (between 2007 and 2014, 775 km^2 were added to the conservation estate of Western Cape Province; Pence 2014), the net effect on population trend is unknown and thus assumed to be stable. Provided the current protected area network persists this species should not decline. Further research should test this assumption at sites from across the province.

Current population trend: Stable

Continuing decline in mature individuals: Unknown

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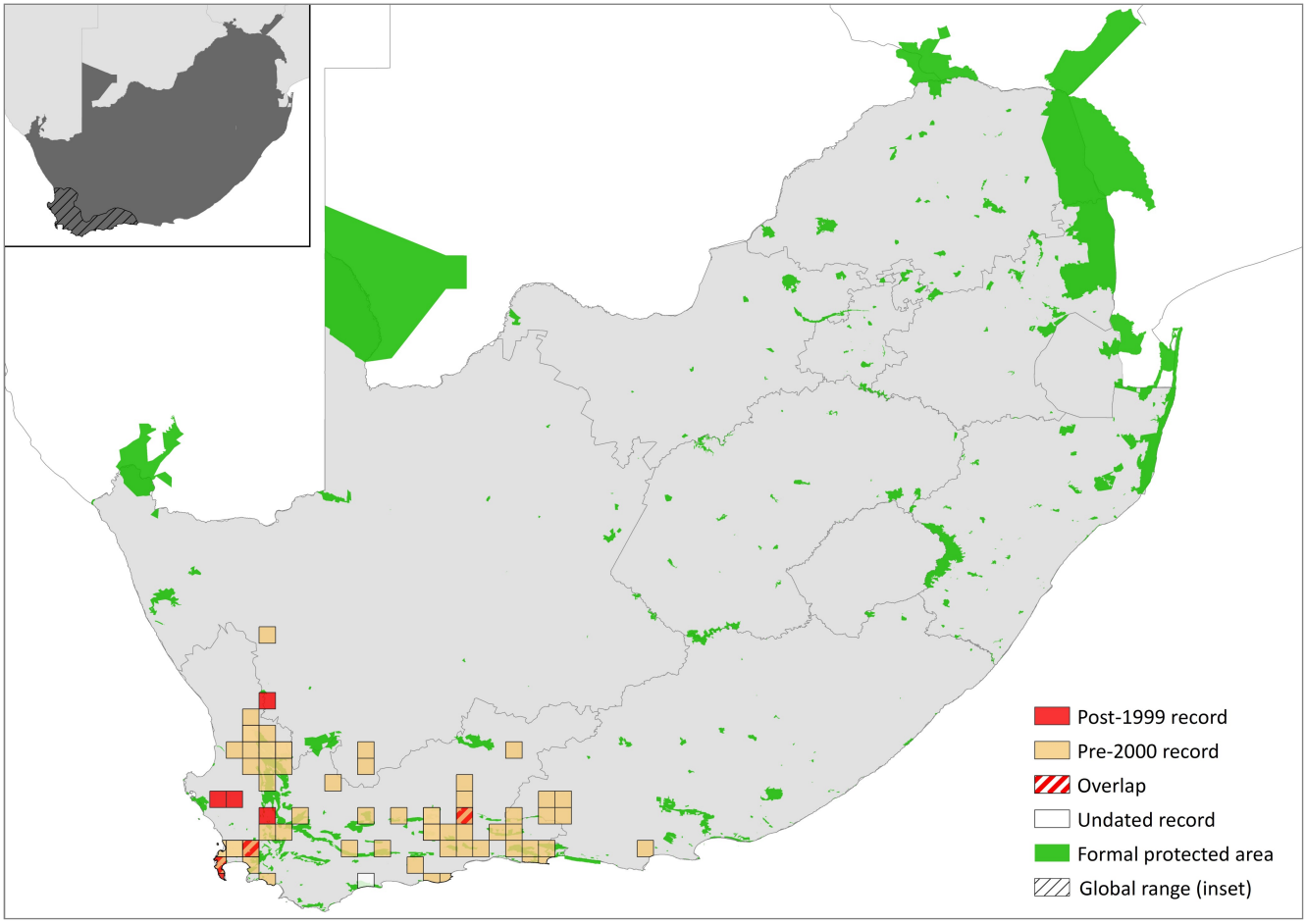

Figure 1. Distribution records for Cape Spiny Mouse (*Acomys subspinosus*) within the assessment region

Table 1. Countries of occurrence within southern Africa

Country	Presence	Origin
Botswana	Absent	-
Lesotho	Absent	-
Mozambique	Absent	-
Namibia	Absent	-
South Africa: Eastern Cape	Extant	Native
South Africa: Northern Cape	Extant	Native
South Africa: Western Cape	Extant	Native
Swaziland	Absent	-
Zimbabwe	Absent	-

Number of mature individuals in population: Unknown

Number of mature individuals in largest subpopulation: Unknown

Number of subpopulations: Unknown

Severely fragmented: Naturally fragmented.

Habitats and Ecology

This species is often, but not only, associated with rocky areas on mountain slopes in fynbos vegetation and is almost entirely dependent on fynbos that has all its functional components. It is widespread but poorly correlated with vegetation structure (Bond et al. 1980), which may be due to its specific habitat compositional requirements, such as rodent-pollinated plants and plants with nuts (see below). This species is thus generally not found in modified habitats. It appears to favour more mature fynbos where it can find seeds, particularly from restios (to which it is partial), but also takes green plant material, insects, millipedes and snails (Stuart & Stuart 2007). It changes its diet from primarily insects in winter and spring to mainly seeds in summer and autumn, which parallels a foraging behaviour shift from seed consumption to seed burial (Rusch et al. 2014). However, isotope analysis suggests their diet is stable for most of the year besides summer (van den Heuvel & Midgley 2014). It is nocturnal and thus a prey species for owls (Avery et al. 2005), and sometimes nests in holes rather than cracks and crevices (Breytenbach 1982). It seems to be an opportunistic breeder (Fleming & Nicolson 2002) and to disappear after fire before slowly recovering (van Hensbergen et al. 1992). It is absent from fire-breaks so is probably disadvantaged by frequent fires.

Ecosystem and cultural services: It is also a keystone species as it scatter-hoards (by burying) seeds (Midgley & Anderson 2005) and pollinates flowers (for example, Letten & Midgley 2009; Turner et al. 2011). It may even be dependent on these resources. For instance, Fleming and Nicholson (2002) noted how breeding and population numbers depended on access to rodent-pollinated *Protea humiflora*. As up to 76% of seed caches contain just one seed, suggesting that scatter-hoarding may have evolved as an anti-pilfering strategy (Rusch et al. 2013), Cape Spiny Mice may help sustain landscape heterogeneity.

Use and Trade

This species is not known to be traded or utilised in any form.

Threats

Although no major or specific threats are suspected to be impacting this species, habitat loss (see below) and degradation are suspected to be causing local declines. Habitat loss from agricultural expansion and urbanisation is suspected to have severely affected individuals existing in fringe habitats on low-lying fynbos areas (of the 24% that is severely degraded or entirely devoid of natural vegetation, about 14% is attributed to intensive agricultural land uses, Pence 2014).

The fynbos habitat is impacted in parts by invasive alien plants (IAPs) which, despite control efforts, are expanding (van Wilgen et al. 2012). Since the Cape Spiny Mouse feeds primarily on the seeds of restios (Skinner & Chimimba 2005), replacement of natural vegetation by non-indigenous species may impact the species and effectively reduce its area of occupancy. Similarly, altered fire regimes caused by synergies between IAPs and climate change may be or become a threat if the fire return interval becomes so short that seeds preferred by the Cape Spiny Mouse cannot be produced.

Current habitat trend: Although there is a continuing decline in fynbos habitat within the Western Cape Province (Pence 2014), primarily through agricultural expansion, especially vineyards (for example, Fairbanks et al. 2004), it is uncertain how this impacts Cape Spiny Mouse subpopulations considering the species primarily inhabits rocky areas and mountain slopes. As 76% of the province remains natural or near-natural and the protected area network continues to expand (Pence 2014), we suspect that habitat loss from agricultural expansion will only impact the species if higher-elevation areas are increasingly converted to crops, which may become likely as climate change makes such areas suitable. For example, climate change is projected to increase the suitability of upslope habitats for viticulture, increasing the footprint of winelands by 14% by 2050 (Hannah et al. 2013). Such trends in transformation of mid- and upper-slopes should be monitored.

Conservation

The Cape Spiny Mouse has been recorded from virtually all protected areas in the Western Cape, including all eight components of the Cape Floral Region Protected Areas World Heritage Sites, which includes the Baviaanskloof in the Eastern Cape.

No specific interventions are necessary at this stage. However, protected area expansion and biodiversity stewardship schemes, especially to counteract the potential for vineyards to transform the mountain slopes where this species occurs, are encouraged. Progress is being made in protected area expansion in the Western Cape, especially in Critical Biodiversity Areas (CBAs) (Pence 2014). Stewardship on private lands may be particularly promising. For example, the Biodiversity Stewardship Programme has added over 490 km^2 to the Western Cape's formal protected area network since its launch in 2003, by entering into biodiversity agreements with private landowners (Maree et al. 2015). Such agreements should be enhanced through best practice management techniques for both viticulture and biodiversity, a new field dubbed vinecology, which is actively implemented in South Africa (reviewed in Viers et al. 2013).

Ongoing clearing of IAPs and restoration of fynbos habitats will also likely benefit this species by creating habitat with indigenous restio species and thus food resources.

Recommendations for land managers and practitioners:

- It is critical that the fight to eradicate IAPs from our protected areas continues and that every effort be made to maintain the "natural" fire regime within the fynbos. Landowners should be incentivised to employ the Working for Water programme (Department of Environmental Affairs) to restore habitats.

Research priorities:

- Rate of future habitat loss in the Western Cape, especially in higher altitude areas due to climate change and viticultural expansion.

Table 2. Threats to the Cape Spiny Mouse (*Acomys subspinosus*) 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	*2.1 Annual & Perennial Non-Timber Crops*: habitat loss from agricultural expansion in fynbos habitats.	Pence 2014	Indirect (remote sensing)	Regional	There is a continuing decrease in habitat (107 km^2/ year between 2006–2011).
2	*11.1 Habitat shifting & Alteration*: habitat loss from climate change enabling viticulture on higher elevations.	Hannah et al. 2013	Simulation	Global	14% increase in potential habitat loss from Cape winelands by 2050.
3	*8.1 Invasive Non-Native/Alien Species/ Diseases*: habitat degradation from IAPs reducing natural food resources.	van Wilgen et al. 2012	Indirect (extent of invasion based on aerial surveys)	National	Increasing (see specific rate)
4	*7.1.1 Increase in Fire Frequency/Intensity*: habitat degradation from decreased fire intervals (caused by climate change interacting with elevated fuel loads from IAPs) reducing food resources.	-	Anecdotal	-	-

Table 3. Conservation interventions for the Cape Spiny Mouse (*Acomys subspinosus*) 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*: protected area expansion of fynbos habitats.	Pence 2014	Indirect (remote sending)	Regional	775 km^2 added to the conservation estate from 2010–2013, 282 km^2 of which in CBAs.	Western Cape Biodiversity Framework, CapeNature
2	*1.2 Resource & Habitat Protection*: biodiversity stewardship agreements for fynbos habitats.	Maree et al. 2015	Indirect (collation of agreement data)	Regional	490 km^2 of natural vegetation protected since 2003.	WWF South Africa Biodiversity and Wine Initiative (*c*. 1,400 km^2 land conserved since 2004); Conservation Stewardship Programme, CapeNature (est. 2003)
3	*2.2 Invasive/Problematic Species Control*: species control: invasive alien plant removal and control from fynbos habitats.	-	Anecdotal	-	-	-

- Estimating population size through density estimates and total natural habitat available. This would enable a threshold of habitat loss to be calculated below which the population is expected to be fewer than 10,000 mature individuals.
- Effectiveness of IAP removal in increasing Cape Spiny Mouse and small mammal occurrence and abundance.
- Effectiveness of implementing vinecology management on Cape Spiny Mouse and other small mammals should be monitored and evaluated.
- Research into how the Cape Spiny Mouse responds to fire frequency and the extent of dependence on nut-fruited plants and mammal-pollinated plants.

Encouraged citizen actions:

- Report sightings on virtual museum platforms (for example, iSpot and MammalMAP). As this species is easily distinguished by its spines (see cover photo), geo-referenced observations, especially from outside protected areas, will help to map distribution and habitat preference.

Data Sources and Quality

Table 4. Information and interpretation qualifiers for the Cape Spiny Mouse (*Acomys spinosissimus*) assessment

Data sources	Field studies (unpublished); indirect information (expert knowledge); museum records
Data quality (max)	Inferred
Data quality (min)	Suspected
Uncertainty resolution	Author consensus
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.*