Petromyscus collinus – Pygmy Rock Mouse


Tim Jackson

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

*Watch-list Threat

This nocturnal species is so well-adapted to arid regions; in captivity they can survive without water for weeks consuming a diet of only air-dried seed (Withers et al. 1980).

Taxonomy

Petromyscus collinus (Thomas & Hinton 1925)

ANIMALIA - CHORDATA - MAMMALIA - RODENTIA - NESOMYIDAE - *Petromyscus* - *collinus*

Common names: Pygmy Rock Mouse, Minute Rock Mouse (English), Dwergklipmuis, Kleinklipmuis, Damaralandse Klipmuis (Afrikaans)

Taxonomic status: Species

Taxonomic notes: Originally, three subspecies of *Petromyscus collinus* were listed by Meerster et al. (1986). However, more recently Monadjem et al. (2015) considered the taxon *barbouri* (previously *P. c. barbouri*) and *shortridgei* (previously *P. c. shortridgei*) distinct species. Although *P. collinus* occurs sympatrically with *P. barbouri* and *P. monticularis* in the assessment region, the Pygmy Rock Mouse can be distinguished by its longer, uniformly coloured tail, larger skull, and three pairs of nipples, as opposed to two in *P. barbouri* (Monadjem et al. 2015). Phylogenetic analyses are required in order to confirm the taxonomic status of these species.

Assessment Rationale

This species is listed as Least Concern because of its relatively wide distribution in habitat unlikely to be rapidly transformed, and because its population is not believed to be declining at present. There are no major land-use threats to this species within the assessment region, as it does not occur in the diamond mining areas. Climate change is, however, a major emerging threat to the species. The construction of renewable energy projects earmarked in some of its distributional area may represent another emerging threat. However, more research needs to be undertaken to explicitly define the impacts of these threats. This species is considered fairly rare but could be locally common in some portions of its range, for example, large numbers have been collected on the Namibian escarpment.

Regional population effects: Occasional dispersal of this species across the Orange River between South Africa and Namibia is likely, thus rescue effect is possible.

Distribution

The Pygmy Rock Mouse has the most extensive range of all *Petromyscus* species, and is distributed from South Africa's Succulent- and Nama-Karoo biomes (Figure 1), northwards through western Namibia, including parts of the Namib Desert, and into the southwestern regions of Angola (Skinner & Chimimba 2005; Monadjem et al. 2015). Their altitudinal range limits are from 100 m to 2,000 m asl. Within the assessment region, they occur in rocky outcrops across the western Northern and Western Cape provinces. However, informal surveys have not recently recorded this species in koppies south of Springbok (C.S. Bragg unpubl. data) and so further vetting of museum records and field surveys should be undertaken to determine its current extent of occurrence.

Population

There are no population estimates available for the Pygmy Rock Mouse. It is generally considered rare but may be relatively abundant in certain locations in parts of its range (Coetzee 2013), such as in its preferred habitat of rocky outcrops. This species typically has a high survival rate, forming stable populations, and exhibiting population demographics based on a low reproductive potential (Withers et al. 1980).

Current population trend: Stable

Continuing decline in mature individuals: Unknown

Number of mature individuals in population: Unknown

Number of mature individuals in largest subpopulation: Unknown

Number of subpopulations: Unknown

Severely fragmented: Yes. Naturally fragmented as it is restricted to isolated koppies and avoids the surrounding plains.

Recommended citation: Wilson B, Bragg C, Relton C. 2016. A conservation assessment of *Petromyscus collinus*. 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.

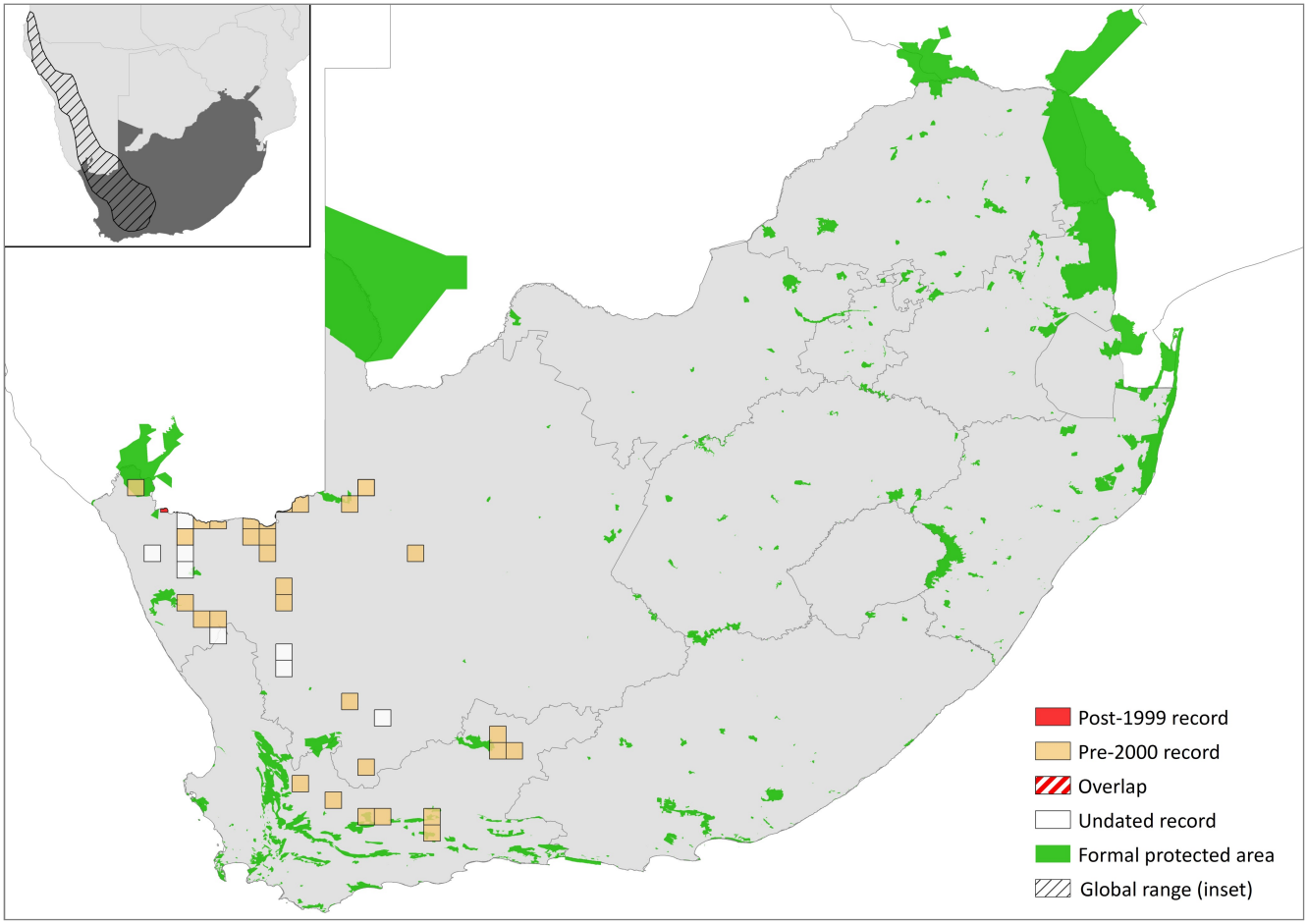

Figure 1. Distribution records for Pygmy Rock Mouse (*Petromyscus collinus*) within the assessment region

Table 1. Countries of occurrence within southern Africa

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

Habitats and Ecology

The Pygmy Rock Mouse occurs within rocky outcrops or koppies in arid and semi-arid shrubland (Monadjem et al. 2015). It prefers vegetated areas or overhangs and cracks in the rocks, which provide shelter (Withers 1979) and allow for predation avoidance (Brown et al. 1998). Breytenbach (1982) documents its preference for succulent *Portulacaria afra* shrubland in the southern portion of its range (Swartberg, Western Cape). The average body mass of *Petromyscus collinus* is 19.88 ± 1.04 g (n = 8) (Bragg 2000).

During the summers in the Namib Desert, this well-adapted, nocturnal species will undergo torpor, lowering its body temperature in order to limit water loss (Withers et al. 1980) and conserve energy (Bragg 2000). Although individuals are capable of entering torpor in winter-acclimated laboratory conditions, this proved energetically risky for them and they had difficulty arousing. It is likely that the species depends on natural ambient temperature cycles to aid its arousal in the field, and may use torpor more frequently in the summer rather than winter as a means of energy-conserving adaptations to the spatially and temporally unpredictable environment of deserts. From laboratory records, it is presumed that in the wild this species is predominantly granivorous (Skinner & Chimimba 2005). Withers (1979) noted that it was an opportunistic feeder, incorporating insects (which have c. 70% water content) and plant material into its diet. Brown et al. (1998) recorded Pygmy Rock Mouse feeding on seeds deposited in the faecal pellets of hyraxes (that feed extensively away from the koppies), and insects or arthropods, which themselves were feeding on the faecal pellets. In the Namib Desert, Pygmy Rock Mice breed seasonally, and only in the presence of fog, producing one litter each summer, usually of 2–4 young with a high survival rate (Withers 1983; Bragg 2000).

Ecosystem and cultural services: This species probably contributes towards seed dispersal in the semi-arid Succulent Karoo Biome of South Africa and, similar to other nocturnal rodents, may form a valuable prey species for nocturnal aerial predators, as well as several relatively sedentary reptile and mammal species (Coetzee 2013). Since they seem to utilise hyrax faeces as a food source, an obligate relationship might exist between the two species. They may also control some associated insect populations.

Table 2. Threats to the Pygmy Rock Mouse (*Petromyscus collinus*) 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	*11.1 Habitat Shifting & Alteration* and *11.2 Droughts*: climate change leading to a decline in forage resources. Current stress 1.2 Ecosystem Degradation.	Bragg 2000	Indirect	Local	Increasing
2	*2.3.2 Livestock Farming & Ranching*. Current stress *1.2 Habitat Degradation*: from overgrazing.	-	Anecdotal	-	Increasing
3	*3.3 Renewable Energy*: habitat loss from renewable energy projects.	-	Anecdotal	-	Increasing

Use and Trade

This species does not appear to be utilised or traded in any form.

Threats

No major threats have been identified for this species. However, in association with global climate change, the projected vegetation shift in the semi-arid Succulent Karoo may represent a future threat to this species (Rutherford et al. 1999). Increased temperatures, in conjunction with an enhanced frequency and duration of drought, are predicted to have negative effects on resource availability for small herbivorous mammals in the arid regions of southern Africa (Hoffman et al. 2009). The conservative metabolic rates and summer torpor shown by *P. collinus* suggest tolerance to limited, periodic supplies of food such as that experienced in the summer rainfall season of southern African arid regions. During summer, resources are unpredictable but might be of sufficient quantity and quality for the mouse to have adequate energy reserves to enter torpor. Bragg (2000) showed that it was extremely risky for *P. collinus* to enter torpor. Thus, any prolonged droughts and concomitant shortages of food resources during summer, such as climate change-exacerbated droughts, are likely to have severe energetic consequences on this species.

The rapidly expanding construction of major solar farms in the Northern Cape may signify an emerging threat to this species as its range partially overlaps areas in the west of South Africa earmarked for projects (van der Westhuizen 2013). However, it is unlikely that these solar farms will impact the species' habitat as their habitat is mostly limited to rocky outcrops and koppies, which is not suitable for the construction of solar farms, but the presence of these developments on the flats and plains might cause disruption of dispersal.

Data Sources and Quality

Table 3. Information and interpretation qualifiers for the Pygmy Rock Mouse (*Petromyscus collinus*) assessment

Data sources	Museum records, indirect information (expert knowledge)
Data quality (max)	Suspected
Data quality (min)	Suspected
Uncertainty resolution	Expert consensus
Risk tolerance	Evidentiary

Overgrazing, which could be exacerbated by climate change, impacts on natural grazing capacity of the vegetation, which could lead to habitat loss for the species and in addition, increase predation risk as the vegetation cover decreases. It was observed that the species is not as aggressive as its habitat counterpart, *Micaelamys namaquensis*, and resource constraints, such as that caused by overgrazing or climate change-exacerbated drought periods, might lead to increased interspecific competition.

Current habitat trend: Stable

Conservation

No specific conservation initiatives have been identified for the Pygmy Rock Mouse. The range of this species extends into a number of protected areas, including Anysberg Nature Reserve, the Groot Swartberg Nature Reserve, Richtersveld National Park, Augrabies Falls National Park, and the Karoo National Park. However, field surveys are needed to confirm its presence in these protected areas. This species is likely to benefit from continued research into the potential threat of enhanced aridity associated with climate change, and how this may affect food resources for this species, as well as potential habitat loss in areas earmarked for alternative energy developments.

Recommendations for land managers and practitioners:

- Systematic surveys needed to gather information on population size and trends.

Research priorities:

- Population size, distribution and trend estimates.
- Analysis of potential impacts of alternative energy projects falling within the distributional area.
- Analysis of potential impacts of increased resource constraints and increased temperature extremes on energetics of the species under climate change scenarios.

Encouraged citizen actions:

- Report sightings on virtual museum platforms (for example, iSpot and MammalMAP), especially outside protected areas. However, due to their morphological similarities, misidentification of this species with other *Petromyscus* species is common. See taxonomic note for distinguishing characteristics.

- Encourage the inclusion of mitigation measures specific to the species in the Environmental Management Plans for new renewable energy developments overlapping with this species' distribution.

References

Bragg CJ. 2000. Thermoregulation and torpor in the pygmy rock mouse, *Petromyscus collinus* - energy-conservative traits in a desert subject to the unpredictability of El Nino Southern Oscillations. Honours Thesis. University of KwaZulu-Natal, Pietermaritzburg, South Africa.

Breytenbach GJ. 1982. Small mammal responses to the environmental gradients in the Groot Swartberg of the Southern Cape. M.Sc. Thesis. University of Pretoria, Pretoria, South Africa.

Brown JS, Kotler BP, Knight MH. 1998. Patch use in the pygmy rock mouse (*Petromyscus collinus*). Mammalia **62**:108–112.

Coetzee CG. 2013. *Petromyscus collinus* Pygmy Rock Mouse. Pages 205–207 in Happold DCD, editor. Mammals of Africa. Volume III: Rodents, Hares and Rabbits. Bloomsbury Publishing, London, UK.

Hoffman MT, Carrick PJ, Gillson L, West AG. 2009. Drought, climate change and vegetation response in the succulent karoo, South Africa. South African Journal of Science **105**:54–60.

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

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

Rutherford MC, Powrie LW, Schulze RE. 1999. Climate change in conservation areas of South Africa and its potential impact on floristic composition: a first assessment. Diversity and Distributions **5**:253–262.

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

van der Westhuizen C. 2013. Determination of Development Potential: Department of Environmental Affairs National Wind and Solar PV Strategic Environmental Assessments - To facilitate the efficient and effective rollout of wind and solar PV energy in South Africa. Second Expert Reference Group Meeting. Centre for Scientific and Industrial Research, Pretoria, South Africa.

Withers PC. 1979. Ecology of a small mammal community on a rocky outcrop in the Namib Desert. Madoqua **11**:229–246.

Withers PC. 1983. Seasonal reproduction by small mammals of the Namib Desert. Mammalia **47**:195–204.

Withers PC, Louw GN, Henschel JR. 1980. Energetics and water relations of Namib desert rodents. South African Journal of Zoology **15**:131–137.

Assessors and Reviewers

Beryl Wilson[1], Christy Bragg[2], Claire Relton[3]

[1]McGregor Museum, [2]Three Foxes Biodiversity Solutions, [3]Endangered Wildlife Trust

Contributors

Matthew F. Child[1], Nico L. Avenant[2], Margaret Avery[3], Rod Baxter[4], Duncan MacFadyen[5], Ara Monadjem[6], Guy Palmer[7], Peter Taylor[4]

[1]Endangered Wildlife Trust, [2]National Museum, Bloemfontein, [3]Iziko South African Museums, [4]University of Venda, [5]E Oppenheimer & Son, [6]University of Swaziland, [7]Western Cape Nature Conservation Board

Species champion

James Skuse

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