Micaelamys namaquensis – Namaqua Rock Mouse


Isa-Rita Russo

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

The colloquial name for *Micaelamys namaquensis* was given as the species was described from a specimen collected from Witwater in Namaqualand (Shortridge 1942), and because it favours rocky habitat throughout most of its range.

Taxonomy

Micaelamys namaquensis (Smith 1834)

ANIMALIA - CHORDATA - MAMMALIA - RODENTIA - MURIDAE - *Micaelamys* - *namaquensis*

Synonyms: *Aethomys namaquensis* and 20 others listed in Kesner et al. (2013)

Common names: Namaqua Rock Mouse, Golden Rat (English), Namakwalandse Klipmuis (Afrikaans), Kondlo (Tsonga), Lekôtéé (Tswana), Fondo (Venda)

Taxonomic status: Species complex

Taxonomic notes: Two subgenera, namely *Micaelamys* and *Aethomys* have been recognised within the genus *Aethomys*. Although *A. namaquensis* and *A. granti* have traditionally been allocated to the subgenus *Micaelamys*, recent molecular studies reported the paraphyly of the genus (Ducroz et al. 2001; Castiglia et al. 2003; Russo et al. 2006), and the two subgenera have since been elevated to full generic rank. Therefore, the genus *Micaelamys* now includes *M. namaquensis* and *M. granti*. This close relationship between the species is evident from dental morphology, karyology, gross sperm and bacular morphology and cranial phenetic analysis. However, the two species can be distinguished on both morphological and chromosomal characters (Visser & Robinson 1986, 1987; Chimimba et al. 1999).

There are as many as 16 recognised subspecies of *M. namaquensis* (Roberts 1951; Skinner & Chimimba 2005), based on a limited number of samples with little or no assessment of patterns of geographic variation over the entire distributional range of the species. However, a comprehensive intraspecific morphometric study within *M. namaquensis* covering a wide geographic range showed that patterns of intraspecific variation suggested the recognition of four subspecies based on traditional morphology/cranial morphometrics (Chimimba 2001). Similarly, a recent molecular study identified at least eight well supported lineages based on mitochondrial DNA (mtDNA) sequences (Russo et al. 2010). This differentiation (considerable mtDNA diversity) is in contrast with the most recent taxonomic treatment, which only recognised four subspecies. Some of the mtDNA lineages broadly correspond with the distributional patterns of the previously described subspecies *monticularis*, *namaquensis*, *lehocla* and *alborarius*. This supports earlier views that this taxon may represent a species complex.

Assessment Rationale

Listed as Least Concern in view of its extremely wide distribution within the assessment region, tolerance of a broad range of habitats, including occurring commensally with human settlements, and because there are no major threats likely to cause population decline. It is the most common species recorded in rocky areas across the assessment area. While the effects of local threats, such as gravel mining, on subpopulation trends should be monitored, no major decline is expected. The Namaqua Rock Mouse likely comprises a species complex and, pending further research, may require reassessment.

Regional population effects: Opportunities for dispersal occur where rocky areas are continuous and are widespread along the border.

Distribution

This species is widely distributed in semi-arid to mesic savannahs of southern Africa, generally south of the Caprivi strip, in a wide variety of habitats that contain rocky outcrops (Monadjem et al. 2015). Its distribution extends marginally into the western parts of Angola and across the Zambezi into central Mozambique and southern Malawi (Monadjem et al. 2015). It has also been recorded in rocky areas at Shangani Ranch, southern Zimbabwe (D. MacFadyen unpubl. data).

Within the assessment region, it is considered common in all provinces within South Africa, and also occurs extensively in Swaziland and Lesotho, avoiding only parts of the coastal areas in Kwa-Zulu Natal and the Eastern Cape provinces, and central and coastal Mozambique (Skinner & Chimimba 2005). Although it is often

Recommended citation: Russo I-R, MacFadyen D, Taylor P, Child MF. 2016. A conservation assessment of *Micaelamys namaquensis*. 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.

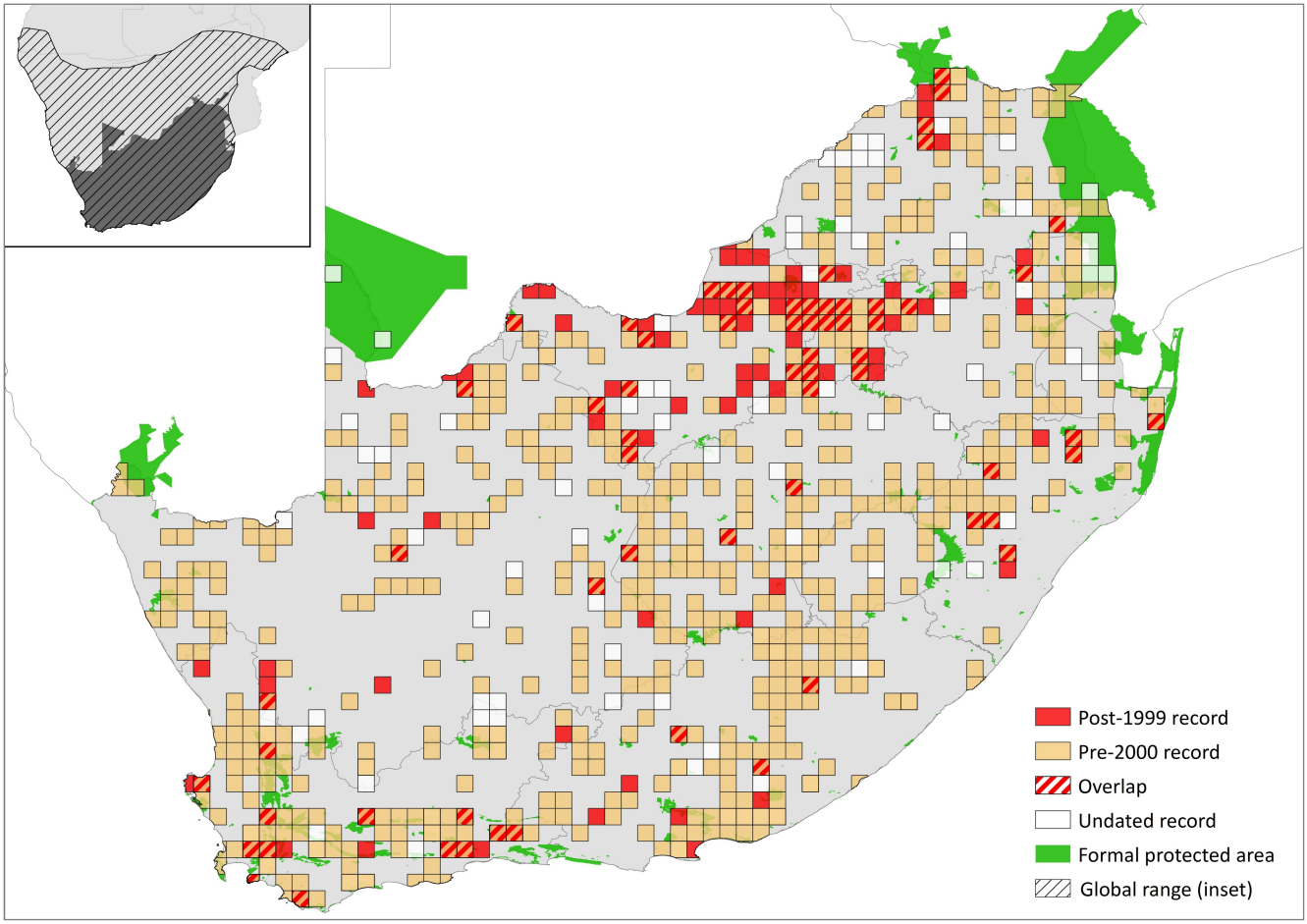

Figure 1. Distribution records for Namaqua Rock Mouse (*Micaelamys namaquensis*) within the assessment region

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

encountered away from rocky habitats (for example, in woodlands and grasslands), even small rocky knolls can offer sufficient habitat for a population to thrive (Power 2014). Similarly, the amount of rubble or size of the rocks (or boulders) does not seem to influence its distribution, as it has been captured on hilly slopes covered in small rocks and stones (for example, the foothills of the Lubombo Mountains) or on small, isolated rocky outcrops (Monadjem 1998). It co-occurs with *Elephantulus myurus* in many parts of its range in the assessment area (for example, Lancaster & Pillay 2010).

Population

This species is widespread and common, especially common in highveld rocky grasslands (Kesner et al. 2013). In the western Soutpansberg of Limpopo Province it is common at all altitudes at densities of up to 54 individuals / ha (Taylor et al. 2015). Similarly, it was regularly trapped in rocky outcrops in Tussen-die-Riviere Nature Reserve, Free State Province (Watson 2006), and it is common in the Korannaberg Mountain Range between Black Rock and Van Zylsrus in the Northern Cape Province. It was the most abundant species sampled on the Bokkeveld plateau near Nieuwoudtville, Northern Cape Province, comprising 75% of 219 small mammal individuals (O'Farrell et al. 2008), and in Telperion/ Ezemvelo Nature Reserve, Gauteng Province, comprising 59% of all samples (Fagir et al. 2014). In Swaziland, it is also closely associated with rocky outcrops where it is often the most common rodent species present (Monadjem 1998).

Russo et al. (2006) reveal at least eight genetically unique subpopulations across the range where physical barriers such as rivers and mountains do not appear to separate the lineages (one exception is a lineage that appears to be restricted to high elevations of the Great Escarpment). Instead, most lineages, or sub-clades within them, show a strong association with different vegetation types of southern Africa, including the Grassland and Savannah biomes; Albany Thicket; Western Fynbos; Bushmanland/ Upper Karoo Bioregion (Nama-Karoo/Savanna); Nama-Karoo; Kalahari Duneveld (Nama-Karoo); Sub-Escarpment Grassland Bioregion (Grassland); Eastern Kalahari Bushveld; and Savannah (Russo et al. 2006).

Current population trend: Stable

Continuing decline in mature individuals: No

Number of mature individuals in population: > 10,000

Table 2. Threats to the Namaqua Rock Mouse (*Micaelamys namaquensis*) 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	*3.2 Mining & Quarrying*: habitat loss from mining for granite and rock	Lötter et al. 2014	Indirect	Regional	Increasing (numbers of prospecting and mining applications received).
		Desmet & Schaller 2015	Indirect	Regional	

Number of mature individuals in largest subpopulation: Unknown, but >10,000

Number of subpopulations: Eight, based on genetic distinctiveness correlated with vegetation type (Russo et al. 2006).

Severely fragmented: Naturally

Habitats and Ecology

This species occupies a wide range of habitats, as long as they contain patches of rocky areas. It prefers areas with rocky koppies, outcrops and boulders, and shelters in rocky crevices, hollow trees or in burrows constructed under logs or dense shrubs. On Telperion Nature Reserve, Gauteng Province, it was recorded in grassy areas where only a few scattered red sandstone rocks occurred, less than 20% rock cover (MacFadyen 2014). In the Swartberg region of the Western Cape Province, it is found at low altitudes on north-facing slopes with more than 30% ground cover (Breytenbach 1982). In the Kalahari, it occurs in open shrub, open woodland and on the fringes of pans where there are calcareous outcrops (Skinner & Chimimba 2005). In KwaZulu-Natal Province, it occupies sparse to fairly dense bushveld and also medium to tall grassland within 1 km of rocky habitat (Taylor 1998). On the Bokkeveld plateau, Northern Cape Province, it was trapped solely on dolerite ridges (O'Farrell et al. 2008). It is absent from agricultural monocultures, rockless grasslands, sodic areas and wetlands. It is commensal with humans, often found in houses and huts. Juveniles are regularly recorded in the buildings at Tswalu Kalahari Reserve in the Northern Cape Province (D. MacFadyen pers. obs.).

It is a predominantly nocturnal and communal species (Perrin 1981). It is omnivorous, feeding on seeds, green plant material and insects (Breytenbach 1982; Kerley et al. 1990; Monadjem 1997). It has a preference for *Protea caffra* seeds, and may consume large numbers in a relatively short period of time. On a number of occasions where two individuals were captured, signs of cannibalism were recorded (MacFadyen 2014). The presence of this species is often observed by nests of large amounts of dry grass between rock cracks and between rocky overhangs. It closely resembles the Red Veld Rat (*Aethomys chrysophilus*), which is larger, more reddish and more heavily built. The colour of the pelage, the length of the tail and body size in *M. namaquensis* varies greatly over its wide distributional range (Chimimba 2001). This variation suggested that *M. namaquensis* may reflect either a complex of species or subspecies.


Tim Jackson

Ecosystem and cultural services: They act as seed dispersers (Bond & Breytenbach 1985) and move large amounts of vegetation between areas, and are thus important in regulating the nutrient cycle of soil. They are also pollinators of certain geoflorous Protea species by consuming the nectar; for example, *Protea welwitschia,* which exists in undisturbed sites in the Rocky Highveld Grasslands of Gauteng and Mpumalanga provinces. However, there are also concerns that the abundance of this species equates to it being a reservoir for zoonotic diseases (Fagir et al. 2014).

Use and Trade

Due to their high numbers, they are probably used as bush meat in certain rural areas but this is unlikely to impact the population significantly.

Threats

There are no major threats to this species as it inhabits areas that are not prone to agriculture, livestock production and forestry. However, mining, especially for granite, would probably be the number one cause of local habitat destruction, especially in the northern provinces. Overall, this species is common and not declining.

Current habitat trend: Stable. It is commensal with humans and able to live in modified landscapes. However, the mining sector is suspected to be expanding rapidly in Limpopo, Mpumalanga and North West provinces (NW READ 2014; Desmet & Schaller 2015), but the extent of impacts from this sector is currently poorly known (V. Egan pers. comm. 2015; Lötter 2015).

Conservation

This species is considered common in all provinces within South Africa and occurs in numerous protected areas across its range; for example, Telperion Nature Reserve (Mpumalanga), Ezemvelo Nature Reserve and Premier Game Farm (Gauteng), Venetia Limpopo Nature Reserve (Limpopo), Rooipoort Nature Reserve and Tswalu Kalahari Reserve (Northern Cape). No specific interventions are currently necessary. However, legislation regarding the

Table 3. Conservation interventions for the Namaqua Rock Mouse (*Micaelamys namaquensis*) 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	*1.2 Resource & Habitat Protection*: private protection of rocky vegetation and surrounding habitat to connect habitats through biodiversity stewardship programmes.	-	Anecdotal	-	-	None
2	*5.1.2 National Level* and *5.1.3 Sub-national Level Legislation*: to limit area mined, allowing for suitable habitat to remain post mining.	-	Anecdotal	-	-	None

protection of habitat from mining rock (especially granite) and mitigating rock crushing in Limpopo, Mpumalanga and North West provinces, would benefit this species. Similarly, protected area expansion through biodiversity stewardship to connect naturally fragmented rocky habitats would facilitate adaption to climate change.

Recommendations for land managers and practitioners:

This species is abundant and no management recommendations are required.

Research priorities:

- A study is needed to finalise the recognition of subspecies based on traditional morphology, cranial morphometrics and DNA.

Encouraged citizen actions:

- Landowners and city planners can conserve natural vegetation around rocky outcrops.
- Public pressure to enforce legislation to ensure buffer areas are protected when sites are mined.

Data Sources and Quality

Table 4. Information and interpretation qualifiers for the Namaqua Rock Mouse (*Micaelamys namaquensis*) assessment

Data sources	Field study (literature)
Data quality (max)	Estimated
Data quality (min)	Inferred
Uncertainty resolution	Best estimate
Risk tolerance	Evidentiary

References

Bond WJ, Breytenbach GJ. 1985. Ants, rodents and seed predation in Proteaceae. South African Journal of Zoology **20:** 150–154.

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

Castiglia R, Corti M, Colangelo P, Annesi F, Capanna E, Verheyen W, Sichilima A, Makundi R. 2003. Chromosomal and molecular characterization of *Aethomys kaiseri* from Zambia and *Aethomys chrysophilus* from Tanzania (Rodentia, Muridae). Hereditas **139:**81–89.

Chimimba CT. 2001. Infraspecific morphometric variation in *Aethomys namaquensis* (Rodentia: Muridae) from southern Africa. Journal of Zoology **253**:191–210.

Chimimba CT, Dippenaar NJ, Robinson TJ. 1999. Morphometric and morphological delineation of southern African species of *Aethomys* (Rodentia: Muridae). Biological Journal of the Linnean Society **67**:501–527.

Desmet PG, Schaller R. 2015. North West Biodiversity Sector Plan Technical Report. North West Department of Rural, Environment and Agricultural Development, Mahikeng, South Africa.

Ducroz JF, Volobouev V, Granjon L. 2001. An assessment of the systematics of arvicanthine rodents using mitochondrial DNA sequences: evolutionary and biogeographical implications. Journal of Mammalian Evolution **8**:173–206.

Fagir DM, Ueckermann EA, Horak IG, Bennett NC, Lutermann H, others. 2014. The Namaqua rock mouse (*Micaelamys namaquensis*) as a potential reservoir and host of arthropod vectors of diseases of medical and veterinary importance in South Africa. Parasites & Vectors **7**:366.

Kerley GIH, Knight MH, Erasmus T. 1990. Small mammal microhabitat use and diet in the southern Kalahari, South Africa. South African Journal of Wildlife Research **20**:123–126.

Kesner MH, Linzey AV, Chimimba CT. 2013. *Aethomys namaquensis* Namaqua Veld Rat (Namaqua Aethomys). Pages 371–373 in Happold DCD, editor. Mammals of Africa. Volume III: Rodents, Hares and Rabbits. Bloomsbury Publishing, London, UK.

Lancaster J, Pillay N. 2010. Behavioral interactions between a coexisting rodent *Micaelamys namaquensis* and macroscelid *Elephantulus myurus*. Current Zoology **56**:395–400.

Lötter MC. 2015. Technical Report for the Mpumalanga Biodiversity Sector Plan – MBSP. Mpumalanga Tourism & Parks Agency, Mbombela (Nelspruit), South Africa.

Lötter MC, Cadman MJ, Lechmere-Oertel RG. 2014. Mpumalanga Biodiversity Sector Plan Handbook. Mpumalanga Tourism & Parks Agency, Mbombela (Nelspruit), South Africa.

MacFadyen DN. 2014. The dynamics of small mammal populations in Rocky Highveld Grassland, Telperion, South Africa. Ph.D. Thesis. University of Pretoria, Pretoria, South Africa.

Monadjem A. 1997. Stomach contents of 19 species of small mammals from Swaziland. South African Journal of Zoology **32**:23–26.

Monadjem A. 1998. The Mammals of Swaziland. Conservation Trust of Swaziland and Big Games Parks, Mbabane, Swaziland.

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

NW READ. 2014. North West Environment Outlook Report 2013. North West Provincial Government, Mahikeng, South Africa.

O'Farrell PJ, Donaldson JS, Hoffman MT, Mader AD. 2008. Small mammal diversity and density on the Bokkeveld escarpment, South Africa-implications for conservation and livestock predation: short communications. African Zoology **43**:117–124.

Perrin MR. 1981. Notes on the activity patterns of 12 species of southern African rodents and a new design of activity monitor. South African Journal of Zoology **16**:248–258.

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.

Roberts A. 1951. The Mammals of South Africa. The Trustees of the Mammals of South Africa, Central News Agency, Johannesburg, South Africa.

Russo I-RM, Chimimba CT, Bloomer P. 2006. Mitochondrial DNA differentiation between two species of *Aethomys* (Rodentia: Muridae) from southern Africa. Journal of Mammalogy **87**:545–553.

Russo I-RM, Chimimba CT, Bloomer P. 2010. Bioregion heterogeneity correlates with extensive mitochondrial DNA diversity in the Namaqua rock mouse, *Micaelamys namaquensis* (Rodentia: Muridae) from southern Africa-evidence for a species complex. BMC Evolutionary Biology **10**:307.

Shortridge GC. 1942. Field notes on the first and second expeditions of the Cape Museums mammal survey of the Cape Province, and descriptions of some new subgenera and subspecies. Annals of the Cape Provincial Museums. Natural History **36**:27–100.

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

Taylor PJ. 1998. The Smaller Mammals of KwaZulu-Natal. University of Natal Press, Pietermaritzburg, South Africa.

Taylor PJ, Munyai A, Gaigher I, Baxter R. 2015. Afromontane small mammals do not follow the hump-shaped rule: altitudinal variation in the Soutpansberg Mountains, South Africa. Journal of Tropical Ecology **31**:37–48.

Visser DS, Robinson TJ. 1986. Cytosystematics of the South African *Aethomys* (Rodentia: Muridae). South African Journal of Zoology **21**:264–268.

Visser DS, Robinson TJ. 1987. Systematic implications of spermatozoan and bacular morphology for the South African *Aethomys*. Mammalia **51**:447–454.

Watson JP. 2006. Check list of the mammals of Tussen-die-Riviere Provincial Nature Reserve, Free State Province, South Africa. Koedoe **49**:111–117.

Assessors and Reviewers

Isa-Rita Russo[1], Duncan MacFadyen[2], Peter Taylor[3], Matthew Child[4]

[1]Cardiff University, [2]E Oppenheimer & Son, [3]University of Venda, [4]Endangered Wildlife Trust

Contributors

Nico L. Avenant[1], Margaret Avery[2], Rod Baxter[3], Ara Monadjem[4], Guy Palmer[5], Beryl Wilson[6]

[1]National Museum, Bloemfontein, [2]Iziko Museums of South Africa, [3]University of Venda, [4]University of Swaziland, [5]Western Cape Nature Conservation Board, [6]McGregor Museum

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