Otomys karoensis – Robert's Vlei Rat

Photograph wanted

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	Yes

*Watch-list Data

The two disjunct populations in Western Cape and northern Eastern Cape and Free State may be distinct species pending molecular and chromosomal analysis (Monadjem et al. 2015).

Taxonomy

Otomys karoensis Roberts 1931

ANIMALIA - CHORDATA - MAMMALIA - RODENTIA - MURIDAE - *Otomys* - *karoensis*

Common names: Robert's Vlei Rat (English)

Taxonomic status: Species

Taxonomic notes: *Otomys karoensis* was previously included as a synonym or subspecies of *O. saundersiae* (Meester et al. 1986) but chromosomal and molecular evidence show that *O. saundersiae* from the Eastern Cape is a synonym of *O. irroratus* and that *O. karoensis* is the correct name for the species (Taylor et al. 2009).

Assessment Rationale

This mountain fynbos, thicket and grassland endemic species is listed as Least Concern because it has a relatively wide distribution within the assessment region (including Western Cape, Northern Cape, Eastern Cape and Free State provinces) and occupies habitats that are largely inaccessible and unlikely to be transformed on a significant scale. It is very common in high mountain fynbos, predominantly on rocky slopes and dense fynbos patches, and this habitat is not prone to being overgrazed. However, the effects of climate change on this species should be monitored and, should molecular research reveal a species complex, it will necessitate a reassessment.

Distribution

The species is endemic to South Africa and occurs in two disjunct regions, the fynbos of the Cape Fold Belt Mountains of the Western Cape as well as in the grasslands of southern Drakensberg in northern Eastern Cape and the central plateau grasslands of the southern Free State (Monadjem et al. 2015). It has been reported as occurring in Lesotho but this appears to have been a misidentification. Specifically, in the Eastern Cape, they occur south of 32°S from King William's Town in the east to Port Elizabeth in the west, possibly as far as Bredasdorp (Taylor 2013). In the Western Cape, it occurs in mountainous winter rainfall areas from the Cape Peninsula to Citrusdal (Taylor 2013). It also occurs in summer rainfall areas of the southern areas of the Drakensberg range (north of 32°S and west of Lesotho) and into the Free State (Taylor 2013). The two disjunct populations in Western Cape and northern Eastern Cape and Free State may be distinct species, although molecular and chromosomal data are currently lacking (Monadjem et al. 2015). However, individuals from the Free State are conspicuously smaller than other members of this species (Taylor et al. 2005). Further research is needed to resolve its taxonomic and thus geographical delimitations. Vetting of museum records from the Eastern Cape is required to separate *O. irroratus* specimens from *O. karoensis* (*sensu* Taylor et al. 2009).

Population

While the population size or density is unknown, it is much less common that *O. irroratus* in the Eastern Cape (Taylor 2013). Recent surveys suggest it may be hybridising with *O. irroratus,* however, further genetic and chromosomal research is needed to determine the taxonomic status of these populations.

Current population trend: Stable

Continuing decline in mature individuals: No

Number of mature individuals in population: Unknown

Number of mature individuals in largest subpopulation: Unknown

Number of subpopulations: Unknown

Severely fragmented: No

Habitats and Ecology

This species occupies open grassland and shrubland habitats on the upper slopes of hilly terrain and Restio-dominated rocky mountain fynbos (Taylor 2013). While some *Otomys* species can occupy disturbed habitats such

Recommended citation: Taylor P, Baxter R, Child MF. 2016. A conservation assessment of *Otomys karoensis*. 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.

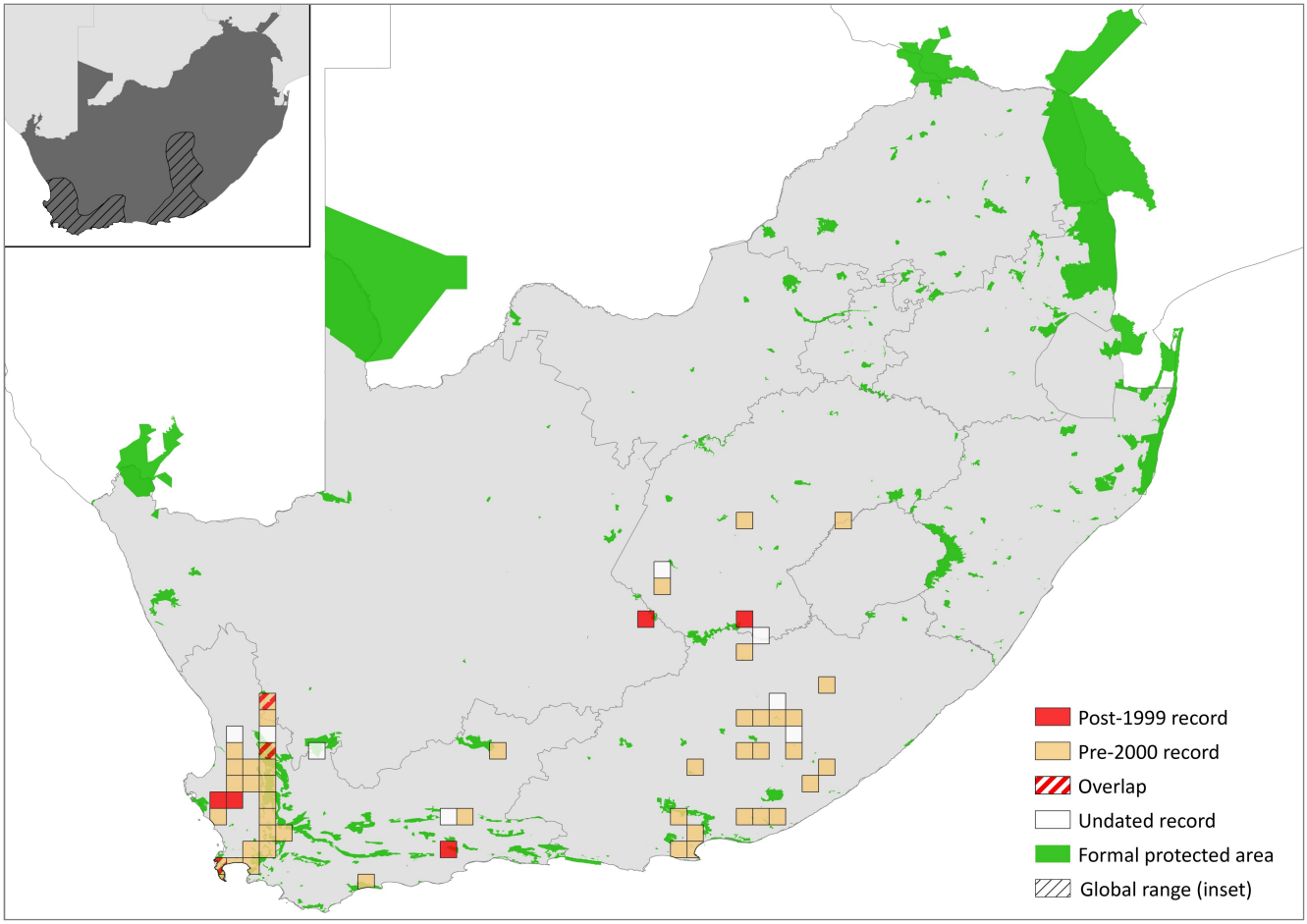

Figure 1. Distribution records for Robert's Vlei Rat (*Otomys karoensis*) within the assessment region

Table 1. Countries of occurrence within southern Africa

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

as lush overgrown lawns and gardens, young pine plantations, and rank vegetation along drainage lines and roads (Taylor 1998), it is not known if the species can persist in modified habitats. Taylor et al. (1993) provide morphometric data that completely separates *O. karoensis* from *O. irroratus*.

Ecosystem and cultural services: Vlei rats are important food for a number of mammalian predators, as well as raptors such as Marsh Owls (*Asio capensis)* and Barn Owls (*Tyto alba*) (Skinner & Chimimba 2005; Monadjem et al. 2015). For example, Vlei rats are favoured food by the Serval (*Leptailurus serval*) (Bowland 1990), so their range expansion could be interrelated (Power 2014).

Use and Trade

This species is not known to be utilised or traded.

Threats

There are no major threats known, although habitat loss and degradation from wetland drainage, grassland loss and exotic vegetation, are all suspected to be minor threats. Additionally, hybridisation may be a problem for the eastern subspecies. Additionally, climate change may represent an emerging threat to the montane grassland habitats that this species predominantly occupies. Climate modelling for similarly mesic-adapted *Otomys* species reveals significant reductions in area of occupancy by 2050, particularly in the Western Cape region (Taylor et al. 2016). More research is needed to determine specific effects of climate change on *O. karoensis*.

Current habitat trend: Declining. Wetlands are the most threatened ecosystem in South Africa (Driver et al. 2012). The South African National Land-Cover change report found a 32.8% decline in natural wetlands nationally from 1990–2013/14, which is a combination of both genuine wetland loss through anthropogenic activities and the generally drier conditions currently than in 1990 (GeoTerraImage 2015). In the Western Cape, specifically, 31% of all wetlands (plus a 32 m buffer) and riparian areas have been transformed/lost to agricultural land use (Pence 2012).

Conservation

This species occurs within several protected areas within the Western and Eastern Cape, although these are yet to be comprehensively documented. Although no specific interventions are necessary at present, the conservation and restoration of wetlands and grasslands would benefit

Table 2. Threats to the Robert's Vlei Rat (*Otomys karoensis*) 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*: loss of habitat from climate change.	Taylor et al. 2016	Inferred	National	Increasing
2	*2.1.3 Agro-industry Farming*: wetland habitat loss from agricultural expansion. Current stress *1.2 Ecosystem Degradation*.	Pence 2012	Indirect	Regional	Ongoing
		GeoTerraImage 2015	Indirect	National	
3	*2.1.2 Small-holder Farming*: wetland habitat loss from agricultural expansion. Current stress *1.2 Ecosystem Degradation*.	Pence 2012	Indirect	Regional	Ongoing
		GeoTerraImage 2015	Indirect	National	
4	*1.1 Housing & Urban Areas*: wetland habitat loss from settlement expansion. Current stress *1.2 Ecosystem Degradation*: from water abstraction.	Pence 2012	Indirect	Regional	Ongoing
		GeoTerraImage 2015	Indirect	National	
5	*2.2.2 Agro-industry Plantations*: wetland and grassland habitat loss from forestry plantations. Current stress *1.2 Ecosystem Degradation.*	Pence 2012	Indirect	Regional	Ongoing
		GeoTerraImage 2015	Indirect	National	
6	*8.1.1 Invasive Non-Native/Alien Species/Diseases*. Current stress *1.2 Ecosystem Degradation*.	-	Anecdotal	-	Ongoing

this species. The following interventions are thus encouraged:

1. Using previously cultivated areas for development instead of remaining natural areas.
2. Land managers should maintain a vegetation buffer around wetlands to reduce impacts of land-use practices (Driver et al. 2012).

Recommendations for land managers and practitioners:

- Long-term, systematic monitoring is needed to establish subpopulation trends and threat levels.
- Land managers should maintain vegetation around wetlands.
- Prioritise old fields for development in systematic conservation planning.

Research priorities:

- Effects of climate change on distribution.
- Genetic and taxonomic research is recommended to refine distribution.

Encouraged citizen actions:

- Report vlei rat sightings on MammalMAP: The feeding signs of this species are easy to detect by short chopped lengths of grass and green moist faecal pellets (Skinner & Chimimba 2005).

Data Sources and Quality

Table 4. Information and interpretation qualifiers for the Robert's Vlei Rat (*Otomys karoensis*) assessment

Data sources	Field study (unpublished), museum records, indirect information (expert knowledge)
Data quality (max)	Inferred
Data quality (min)	Suspected
Uncertainty resolution	Expert consensus
Risk tolerance	Evidentiary

References

Bowland JM. 1990. Diet, home range and movement patterns of serval on farmland in Natal. Ph.D Thesis. University of KwaZulu-Natal, Pietermaritzburg, South Africa.

Driver A, Sink KJ, Nel JN, Holness S, van Niekerk L, Daniels F, Jonas Z, Majiedt PA, Harris L, Maze K. 2012. National Biodiversity Assessment 2011: An assessment of South Africa's biodiversity and ecosystems. Synthesis Report. South African National Biodiversity Institute and Department of Environmental Affairs, Pretoria, South Africa.

GeoTerraImage. 2015. 1990–2013/14 South African National Land-Cover Change. DEA/CARDNO SCPF002: Implementation of Land-Use Maps for South Africa. Project Specific Data Report, Pretoria, South Africa.

Table 3. Conservation interventions for the Robert's Vlei Rat (*Otomys karoensis*) 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	*5.2 Policies & Regulations*: prioritising previously cultivated areas "old lands" for development.	-	Anecdotal	-	Unknown	-
2	*2.3 Habitat & Natural Process Restoration*: wetland conservation and restoration.	-	Anecdotal	-	Unknown	-

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.

Pence GQK. 2012. Contribution of C.A.P.E. Business and Biodiversity Initiatives to conservation of critical biodiversity, landscape connectivity and ecological support areas: Post-baseline assessment (2010). A Green Choice Alliance project report. Conservation South Africa. Kirstenbosch, South Africa.

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.

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. 2013. *Otomys saundersiae* Saunder's Vlei Rat. Pages 588–589 in Happold DCD, editor. Mammals of Africa. Volume III: Rodents, Hares and Rabbits. Bloomsbury Publishing, London, UK.

Taylor PJ, Kumirai A, Contrafatto G. 2005. Species with fuzzy borders: the taxonomic status and species limits of Saunders vlei rat, *Otomys saundersiae* Roberts (Rodentia: Muridae: Otomyini). Mammalia **69**:297–322.

Taylor PJ, Maree S, Van Sandwyk J, Baxter R, Rambau RV. 2009. When is a species not a species? Uncoupled phenotypic, karyotypic and genotypic divergence in two species of South African laminate-toothed rats (Murinae: Otomyini). Journal of Zoology **277**:317–332.

Taylor PJ, Meester J, Kearney T. 1993. The taxonomic status of Saunders' vlei rat, *Otomys saundersiae* Roberts (Rodentia: Muridae: Otomyinae). Journal of African Zoology **107**:1–26.

Taylor PJ, Nengovhela A, Linden J, Baxter RM. 2016. Past, present, and future distribution of Afromontane rodents (Muridae: *Otomys*) reflect climate-change predicted biome changes. Mammalia **80**:359–375.

Assessors and Reviewers

Peter Taylor[1], Rod Baxter[1], Matthew F. Child[2]

[1]University of Venda, [2]Endangered Wildlife Trust

Contributors

Lizanne Roxburgh[1], Nico L. Avenant[2], Margaret Avery[3], Duncan MacFadyen[4], Ara Monadjem[5], Guy Palmer[6], Beryl Wilson[7]

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

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