Otomys irroratus – Southern African Vlei Rat

Regional Red List status (2016)	Least Concern*
National Red List status (2004)	Least Concern
Reasons for change	No change
Global Red List status (2008)	Least Concern
TOPS listing (NEMBA) (2007)	None
CITES listing	None
Endemic	Yes

*Watch-list Threat

Climate change is projected to decrease the range of this species by 12–24% by 2050, which will be more severe in the Western Cape than in the Eastern Cape (Taylor et al. 2016).

Taxonomy

Otomys irroratus (Brants 1827)

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

Synonyms: *bisulcatus, capensis, coensus, cupreoides, cupreus, natalensis, obscura, orientalis, randensis, typicus*

Common names: Southern African Vlei Rat (English), Vleirot (Afrikaans)

Taxonomic status: Species

Taxonomic notes: Taylor et al. (2009) and Engelbrecht et al. (2011) used mitochondrial and ecological data to delineate between two cryptic species: *Otomys irroratus* (Western and Eastern Cape provinces) and *Otomys auratus* (Free State, KwaZulu-Natal, Northern Cape and Mpumalanga provinces), with a contact zone between the two species in the Eastern Cape around Alice. These species correspond to bioregions (*O. irroratus* pertaining to fynbos and thicket regions; *O. auratus* pertaining to high-lying grasslands) rather than karyotype, and thus no subspecies are recognised (Taylor 2013). Similarly, while *O. tropicalis* was formerly included in *O. irroratus sensu lato,* the two can be distinguished on morphological and molecular grounds (Taylor et al. 2011).

Assessment Rationale

Listed as Least Concern because it is widespread within the Fynbos Biome of the Western Cape and Eastern Cape, it is present in several protected areas, and has a degree of tolerance for modified habitats. However, the population is expected to show slow declines in the future from climate change, with niche modelling showing that it will undergo a 12–24% reduction in area of occupancy between 1975 and 2050 from climate change. Similarly, continued habitat loss of wetlands and associated vegetation will lead to a decline in the future. In the Western Cape, already 31% of all wetlands (plus a 32 m buffer) and riparian habitats have been lost to agricultural expansion. Thus, while we infer that the population is not threatened currently, it should be monitored as it may qualify for a threatened category in the future. Key interventions for this species include the conservation and restoration of wetlands and holistic management strategies to curb habitat degradation from overgrazing.

Distribution

Otomys species are generally associated with mesic grasslands and moorlands within alpine, montane and sub-montane regions of Southern, Central, East and West Africa (Monadjem et al. 2015). This species is endemic to South Africa and associated with Fynbos and Albany Thicket biomes in the Western Cape and Eastern Cape provinces of South Africa respectively (Monadjem et al. 2015), particularly in wetlands. It marginally occurs in the Savannah and Nama Karoo biomes, for example, in the Fish River Valley (Engelbrecht et al. 2011). The contact zone with *O. auratus* occurs around Alice in the Eastern Cape (Engelbrecht et al. 2011). The estimates extent of occurrence (EOO) is 292,998 km^2; the estimated area of occupancy (AOO) is 10,288 km^2 based on remaining natural fynbos and thicket habitats in 2013 (GeoTerraImage 2015). However, AOO could be as low as 305 km^2 if considering the area around wetlands only (32 m buffer strip). Further vetting of museum specimens is needed to more accurately delimit distribution.

Population

It is a common species, especially in wetlands. For example, it is more common than *O. laminatus* in similar habitats. However, it tends to be trap-shy (Haim & Fairall 1987; Avenant 2011). For example, from 1,170 trap nights inside and outside the Great Fish River Nature Reserve, Eastern Cape, only four individuals were sampled (Lagesse & Thondhlana 2016). The population is projected to be declining due to decreasing habitat suitability under climate change (Taylor et al. 2016).

Current population trend: Declining

Continuing decline in mature individuals: No

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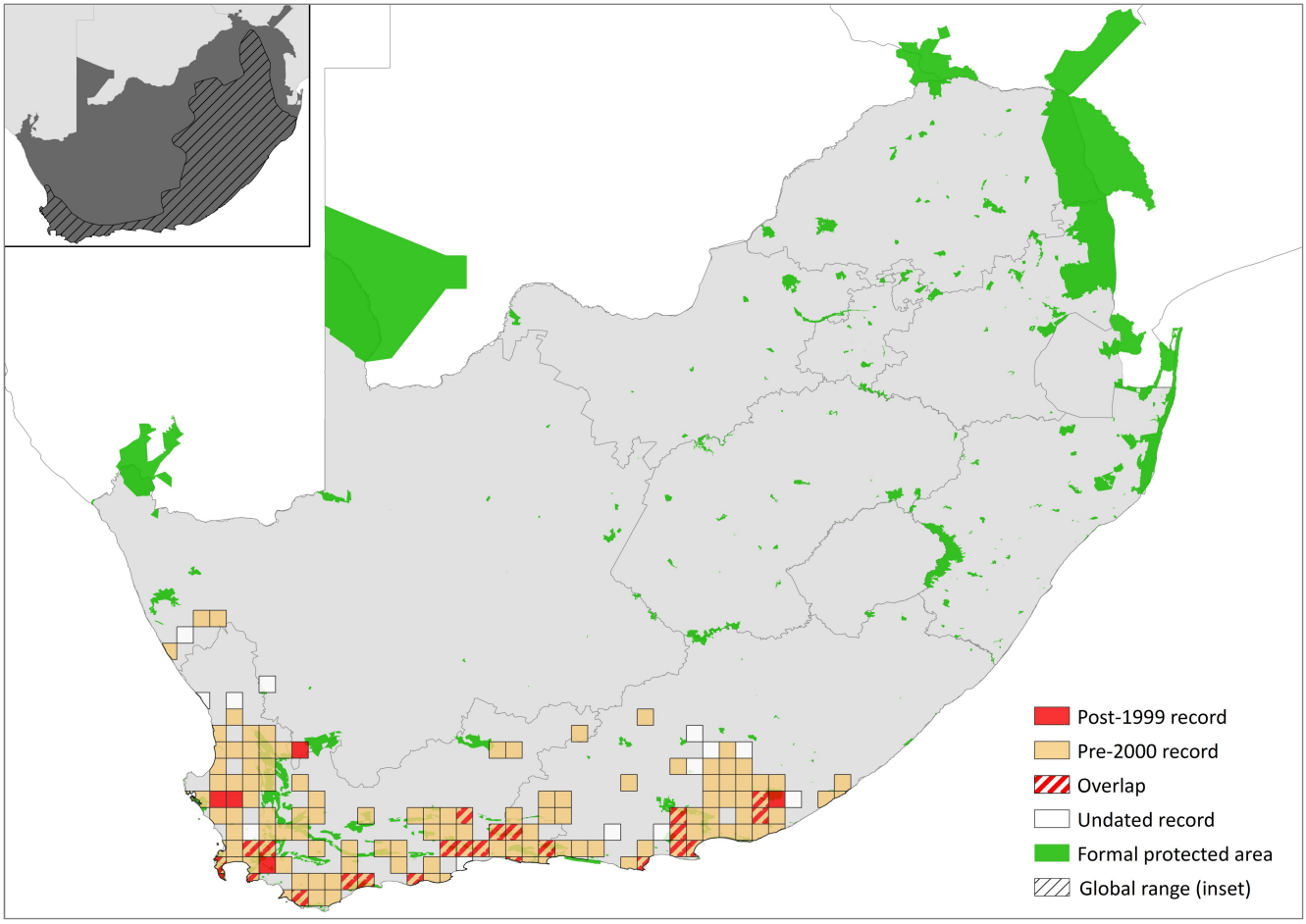

Figure 1. Distribution records for Southern African Vlei Rat (*Otomys irroratus*) within the assessment region

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	-

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

It is known from grassland and marshes in fynbos and thicket habitats. It generally occurs in areas of dense vegetation cover and higher moisture content. It also occurs in pine plantations. Vlei rats are exclusively herbivorous (Photo 1), with a diet mainly comprised of grasses (Monadjem et al. 2015). They are generally K-selected, giving birth usually to one or two offspring (maximum five) which are precocial and born with erupted incisors enabling them to nipple-cling to their mother immediately after birth (Monadjem et al. 2015).

Ecosystem and cultural services: Southern African Vlei Rats are important food for a number of mammalian predators, as well as raptors such as Marsh Owls (*Asio capensis*) and Common 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). *Otomys* skulls typically comprise the bulk of owl pellets.

Photo 1. Typical feeding signs of a Vlei Rat (*Otomys* spp.)

Use and Trade

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

Threats

Although this species is not under significant threat at present, there are three main threats that may cause population decline in the future:

1. Wetland habitat loss and degradation from agricultural expansion, human settlement sprawl and agroforestry. Water abstraction or filling in of wetlands from human settlement and industrial expansion also leads to habitat loss. Similarly, suppression of natural ecosystem processes, such as fire, can also lead to habitat degradation through bush encroachment or loss of plant diversity through alien invasive species, and is suspected to be increasing with human settlement expansion. Overall, 45% of our remaining wetland area exists in a heavily modified condition, due primarily to on-site modification from crop cultivation, coal mining, urban development, dam construction, and overgrazing (and thus erosion) and off-site modifications from disruptions to flow regime and deterioration of water quality (Driver et al. 2012).
2. Climate change is projected to reduce AOO by 12–24% between 1975 and 2050 through decreasing habitat suitability (Taylor et al. 2016). Most of these habitat declines will occur in the Western Cape because, while the fynbos component of the Eastern Cape will be heavily reduced, the species is able to persist in thicket habitats and thus its future distribution in this region will be relatively unaltered (Taylor et al. 2016).
3. Overgrazing the vegetation around wetlands reduces ground cover and thus leads to decreased small mammal diversity and abundance (Bowland & Perrin 1989, 1993). The expansion of wildlife ranching will have to be monitored in this regard, as game overstocking may also affect wetland condition.

Overgrazing and climate change may synergise to cause non-linear and accelerating population decline. More research is needed to validate these hypotheses.

Table 2. Threats to the Southern African Vlei Rat (*Otomys irroratus*) 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	Projected	National	Increasing
2	*2.1.3 Agro-industry Farming:* wetland habitat loss from agricultural expansion. Current stress *1.2 Ecosystem Degradation*.	Driver et al. 2012	Indirect	National	Ongoing
		Pence 2012	Indirect	Regional	
		GeoTerraImage 2015	Indirect	National	
3	*2.1.2 Small-holder Farming*: wetland habitat loss from agricultural expansion. Current stress *1.2 Ecosystem Degradation*.	Driver et al. 2012	Indirect	National	Ongoing
		Pence 2012	Indirect	Regional	
		GeoTerraImage 2015	Indirect	National	
4	*2.3.3 Agro-industry Grazing, Farming or Ranching*: wetland habitat loss from agricultural expansion. Current stress *1.2 Ecosystem Degradation*: from overgrazing.	Bowland & Perrin 1989	Empirical	Local	Ongoing
		Bowland & Perrin 1993	Empirical	Local	
		Driver et al. 2012	Indirect	National	
		Pence 2012	Indirect	Regional	
		GeoTerraImage 2015	Indirect	National	
5	*2.3.2 Small-holder Grazing, Ranching or Farming*: wetland habitat loss from agricultural expansion. Current stress *1.2 Ecosystem Degradation*: from overgrazing.	Bowland & Perrin 1989	Empirical	Local	Ongoing
		Bowland & Perrin 1993	Empirical	Local	
		Driver et al. 2012	Indirect	National	
		Pence 2012	Indirect	Regional	
		GeoTerraImage 2015	Indirect	National	
6	*1.1 Housing & Urban Areas*: wetland habitat loss from settlement expansion. Current stress *1.2 Ecosystem Degradation*: from water abstraction.	Driver et al. 2012	Indirect	National	Ongoing
		Pence 2012	Indirect	Regional	
		GeoTerraImage 2015	Indirect	National	
7	*2.2.2 Agro-industry Plantations:* wetland and grassland habitat loss from forestry plantations. Current stress *1.2 Ecosystem Degradation*.	Driver et al. 2012	Indirect	National	Ongoing
		Pence 2012	Indirect	Regional	
		GeoTerraImage 2015	Indirect	National	

Table 3. Conservation interventions for the Southern African Vlei Rat (*Otomys irroratus*) 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	-
3	*2.1 Site/Area Management*: holistic management of ranchlands to reduce impacts of overgrazing.	-	Anecdotal	-	Unknown	-

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 would greatly benefit 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).
3. Holistic management of ranchlands: including de-stocking, rotational grazing and buffering wetland vegetation, are encouraged.

Recommendations for land managers and practitioners:

- Land managers should decrease stocking rates to maintain vegetation around wetlands.
- Prioritise old fields for development in systematic conservation planning.

Research priorities:

- Long-term, systematic monitoring is needed to establish subpopulation trends and threat levels.
- Fine scale studies on habitat loss and inferred impact on the species.
- Effects of overgrazing on the density and viability of this species.
- Effects of habitat connectivity on dispersal rates.
- Further vetting of museum records to delimit distribution more accurately.

Encouraged citizen actions:

- Report vlei rat sightings on virtual museum platforms (for example, iSpot and MammalMAP); the feeding signs of vlei rat are easy to detect when one delves into the reedbeds (Photo 1) (Skinner & Chimimba 2005).

Data Sources and Quality

Table 4. Information and interpretation qualifiers for the Southern African Vlei Rat (*Otomys irroratus*) assessment

Data sources	Field study (literature, unpublished), museum records, indirect information (literature)
Data quality (max)	Estimated/projected
Data quality (min)	Inferred
Uncertainty resolution	Best estimate
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.*