Grammomys cometes – Mozambique Thicket Rat

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Regional Red List status (2016)	**Least Concern***
National Red List status (2004)	Data Deficient
Reasons for change	Non-genuine change: New information
Global Red List status (2016)	Least Concern
TOPS listing (NEMBA) (2007)	None
CITES listing	None
Endemic	No

*Watch-list Data

In KwaZulu-Natal, this species is easily confused with the Woodland Thicket Rat (*Grammomys dolichurus*), but *G. cometes* is generally slightly larger in size than *G. dolichurus* (Skinner & Chimimba 2005) and utilises a distinct ecological niche.

Taxonomy

Grammomys cometes (Thomas & Wroughton 1908)

ANIMALIA - CHORDATA - MAMMALIA - RODENTIA - MURIDAE - *Grammomys* - *cometes*

Synonyms: *Grammomys silindensis* Roberts 1938

Common names: Mozambique Thicket Rat, Coastal Forest Mouse, Mozambique Woodland Mouse (English), Mosambiek-woudmuis, Kusmuis (Afrikaans)

Taxonomic status: Species complex

Taxonomic notes: In the past *Grammomys cometes* included *G. ibeanus*, which is now recognised to occur to the north of the Zambezi River, and the two thicket rats are not considered sister species. Relations between *G. cometes* and *G. dolichurus* are poorly understood. The two species are sympatric and occasionally even syntopic. Distinguishing *G. cometes* from *G. dolichurus* by morphological characteristics is not fully reliable since character states partly overlap. Genetically, *G. cometes* is very close to *G. dolichurus* (mean sequence divergence of 3.4% ± 0.8% SE) and these two thicket rats have identical diploid number of chromosomes (2n = 52). Despite being close genetically and similar morphologically, *G. cometes* and *G. dolichurus* have segregated ecological niches and behave as distinct species. Only the southern-most population of *G. cometes* from Amathole forest complex has been satisfactorily defined by means of morphology, karyology, and molecular markers (Kryštufek et al. 2008). This population may be a geographic isolate and differs in certain cranial traits from conspecifics further north in KwaZulu-Natal and Mozambique. More work is needed for a proper assessment of a taxonomic scope of *G. cometes*.

Assessment Rationale

Although the Mozambique Thicket Rat was listed as Data Deficient in the 2004 assessment, we list it now as Least Concern as field surveys have revealed its range to extend west beyond the Amathole mountains and could potentially extend into the forests of Somerset East. This species thus has a wide extent of occurrence within the assessment region with potential rescue effects from Mozambique and Zimbabwe. Although deforestation is a threat, much of its habitat is protected within the assessment region and it is not suspected to be declining. However, further surveys are needed to clarify population status and research is needed to resolve its taxonomy. This species should be reassessed as new data emerge.

Regional population effects: Rescue effect is possible through dispersal from Mozambique or Zimbabwe in the Great Limpopo Transfrontier Conservation Area, and from Mozambique into northern KwaZulu-Natal. It is restricted to the forest biotic zone, and requires dense and developed forests regardless of the elevation. This type of ecosystem is naturally fragmented in southern Africa, and not all forest patches are inhabited although they seem suitable for the species. The range is therefore fragmented but also imperfectly known. For example, it is not possible to claim whether a gap of 500 km, between KwaZulu-Natal and the Amathole complex, where no *G. cometes* have been found, is a gap in distribution or in our knowledge.

Distribution

This species is endemic to the eastern parts of southern Africa, south of the Zambezi River in southern Mozambique, eastern Zimbabwe and South Africa, including Limpopo, KwaZulu-Natal and Eastern Cape provinces. There is a single record from Mpumalanga, but its validity is doubtful (Skinner & Chimimba 2005). It is possibly present in Swaziland and Lesotho, although this requires confirmation. The subpopulation in the mistbelt forests of Katberg and Amathole in the Eastern Cape is possibly isolated from the rest of the population (Kryštufek et al. 2008).

Population

The species is traditionally reported as rare and the great majority of known individuals were collected or trapped

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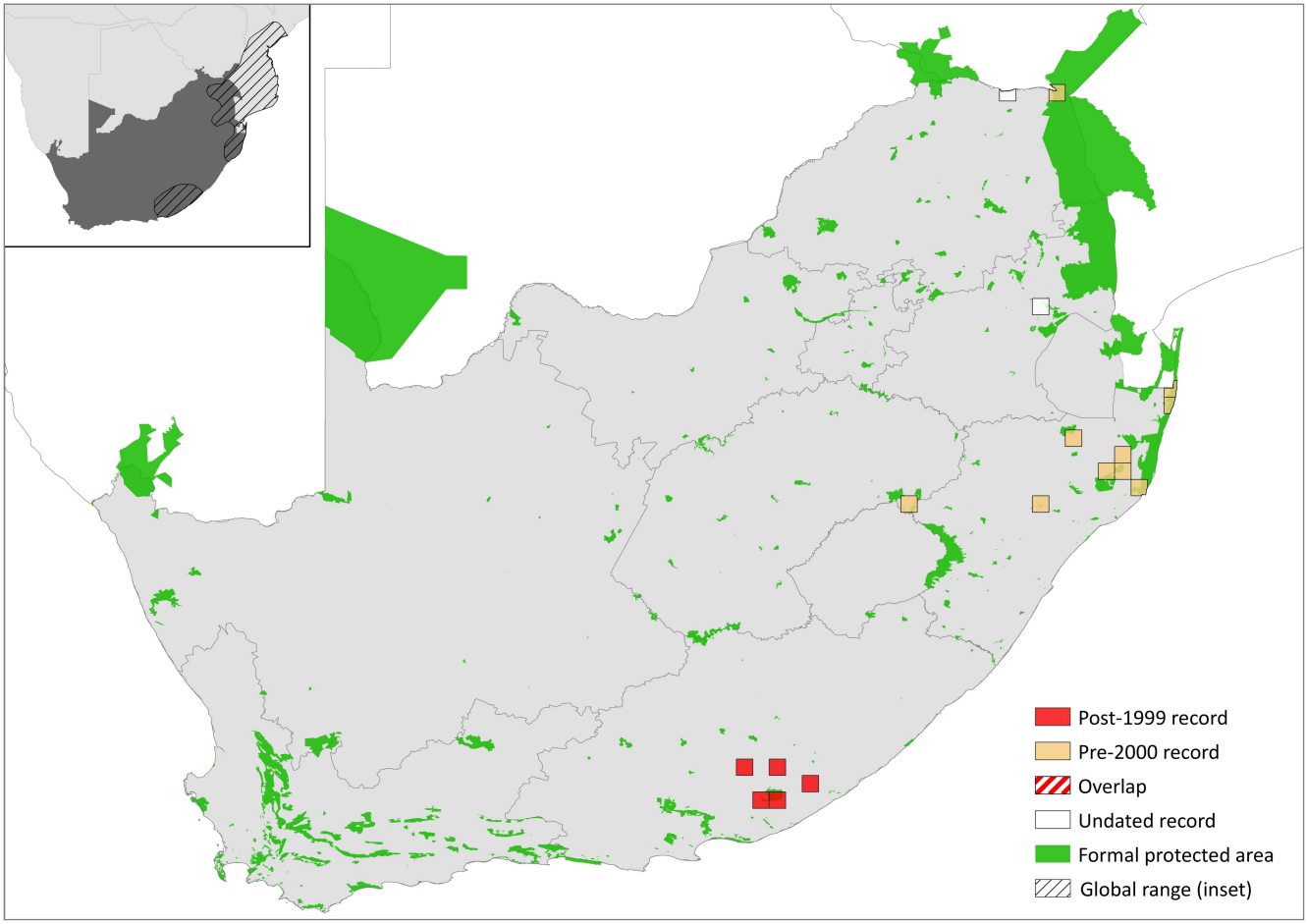

Figure 1. Distribution records for Mozambique Thicket Rat (*Grammomys cometes*) within the assessment region

Table 1. Countries of occurrence within southern Africa

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

since 2002 (Kryštufek et al. 2008; Arnolds 2009; Gebe 2014). It has a strong subpopulation in the Amathole forest complex, and it is suspected that the extent of occurrence might increase extensively if the entire forest complex was sampled. Between 2002 and 2003, relative densities were described for three sites in the Eastern Cape: 5.1 specimens were caught per 100 trap nights in Hobbiton (Hogsback Forest); 0.8 specimen per 100 trap nights were caught in Fort Fordyce Nature Reserve; and, in Great Fish River Nature Reserve (GFRNR), 2.2 specimens per 100 trap nights were caught (Kryštufek et al. 2008). At one specific site in GFRNR – a riverine *Combretum* forest – Gebe (2014) similarly recorded a yearly trapping success of 2.2 captures per 100 trap nights, with a minimum of 0.7 capture in spring and a maximum of 4.2 in autumn. Gebe (2014) recorded a minimum of 38 different individuals over the whole year in a 6 ha forest stretch, which corresponds to a density of 6.3 individuals / ha. However, some populations of this species can fluctuate locally with rainfall, in a "boom and bust" fashion.

The population trend in the assessment region is unknown, but it is unlikely to be declining. It is probably under-represented in the literature, as although the species can sometimes be detected when traps are exclusively set on the ground (Arnolds 2009), 75–82% of captures in Afromontane forest (Malinga 2003; Dali 2006) and 92–100% of captures in *Combretum* lowland forest were made with traps set in trees (Kryštufek et al. 2008; Gebe 2014).

Current population trend: Unknown, but probably stable as there is no evidence of decline.

Continuing decline in mature individuals: Unknown, but probably not.

Number of mature individuals in largest subpopulation: Unknown

Number of subpopulations: It is not currently possible to determine the extent or number of subpopulations.

Severely fragmented: Yes, it is assumed that the population is severely fragmented, as a consequence of fragmentation of their natural forest habitat. This species does not occupy pine plantations.

Habitats and Ecology

Mozambique Thicket Rats are found in dense evergreen forests in southern Africa (de Graaff 1981). They have also been reported from drier bushveld or coastal forest

Table 2. Threats to the Mozambique Thicket Rat (*Grammomys cometes*) 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	*1.1 Housing & Urban Areas*: habitat loss and fragmentation by deforestation from residential development.	-	Anecdotal	-	-
2	*2.2 Wood & Pulp Plantations*: habitat loss and fragmentation.	-	Anecdotal	-	-
3	*5.3 Logging & Wood Harvesting*: habitat destruction and fragmentation.	-	Anecdotal	-	-
4	*11.1 Habitat Shifting & Alteration*: increasing aridity from climate change.	Eeley et al. 1999	Indirect	Regional	Unknown

(Skinner & Chimimba 2005). In KwaZulu-Natal, they have been recorded in montane forests and *Podocarpus* forests; and are thought to favour denser, more well-developed forests compared to *G. dolichurus* (Taylor 1998). In the Eastern Cape, they are generally restricted to *Podocarpus*-dominated Afromontane forest and riverine *Combretum* forest (Kryštufek et al. 2008; Gebe 2014). In the GFRNR, however, during periods of boom, individuals will move out of the forest and venture into the thicket (R. Baxter pers. obs. 2003–2007). This explains why this species can be caught, albeit locally in small numbers, in nearly all habitat types of the reserve (Do Linh San et al. 2011). In Mozambique, this species has been recorded from forest fringes and thickets (Smithers & Lobão-Tello 1976).

Mozambique Thicket Rats are predominantly nocturnal, arboreal and prefer dense canopy cover, possibly because this decreases predation risk at the microhabitat level (Gebe 2014). During the day rats essentially sleep inside branches and trunks, and rarely in burrows, dense bushes or dead logs (Gebe 2014). In GFRNR, Cape Bushwillows (*Combretum caffrum*) are the predominant trees used for the resting sites, probably due to their abundance in the forest, and their propensity to rot from the inside and provide natural cavities. Mozambique Thicket Rats use several resting sites throughout the year, but site fidelity on consecutive days is very high (Gebe 2014). Specific resting sites are used by several different rats, although simultaneous sharing is relatively rare, and generally only takes place between males. Based on extensive trapping and radio-tracking data, Gebe (2014) suggested that females are solitary but not territorial, while at least some males are more social or tolerant towards each other, and have overlapping home ranges. These observations could be indicative of a promiscuous mating system.

Very little is known about the reproductive biology of the species. Skinner and Chimimba (2005) stated that *G. cometes* can have from 2 to 5 young and up to three litters during the warm, wet season, and similar observations have been made at GFRNR (Z.J.K. Madikiza & E. Do Linh San pers. obs. 2006–2012). Similarly, Kryštufek et al. (2008) reported that the animals from different sites used in their study had morphologically heterogeneous reproductive conditions, although a large proportion of specimens of adult *G. cometes* showed reproductive activity (scrotal testes, presence of placental scars or embryos in the uterus of sacrificed animals). There is virtually no information available on the diet of *G. cometes*, although we suspect that it is very similar to that of *G. dolichurus*. The latter is reported to feed on fruits, leaves, stems, invertebrates, green vegetable matter, white plant material and wood fibres (Skinner & Chimimba 2005). It is unclear whether forays on the ground are therefore linked to foraging purposes rather than dispersal events or responses to overpopulation.

Ecosystem and cultural services: *Grammomys cometes* is one of the core small mammals in the forest ecosystem. In the Eastern Cape, this species represented 18–23.4% of all small mammals captured (Kryštufek et al. 2008), therefore in these habitats it is likely to play a significant ecological role, for example in seed dispersal and/or as a food source for small carnivores (Nqinana 2009; Matolengwe 2010; Mbatyoti 2010; Bizani 2014).

Use and Trade

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

Threats

There are no major threats to this species, however deforestation due to agricultural expansion and resource extraction in forests, as well as expanding residential development in coastal forests, may result in local subpopulation declines or even extinction. Additionally, as this species lives in moist evergreen forests, it may be threatened to a minor extent by increasing aridity, due to climate change.

Current habitat trend: Declining

Conservation

This species occurs in several protected areas within the assessment region, for example Fort Fordyce Nature Reserve, Mpofu Nature Reserve and Great Fish River Nature Reserve. There are no specific interventions currently necessary, but the species would benefit from protected area expansion to include key forest complexes and biodiversity stewardship schemes that could provide corridors for movement.

Recommendations for land managers and practitioners:

- Landowners and city planners can conserve corridors of forest on their properties.

Research priorities:

- A more accurate determination of the geographic distribution of this species is required.

Table 3. Conservation interventions for the Mozambique Thicket Rat (*Grammomys cometes*) 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 to include key forest complexes and conserve forest habitat.	-	Anecdotal	-	-	-
2	*1.2 Resource & Habitat Protection*: conservancy formation and stewardship agreements to protect key corridors.	-	Anecdotal	-	-	-

- Taxonomic revision of this species complex is necessary.
- Studies on the reproductive biology and colonisation (dispersal) abilities would provide precious information on the potential resilience of this species to future threats.

Encouraged citizen actions:

- Report sightings on virtual museum platforms (for example, iSpot and MammalMAP), especially outside protected areas. However, due to morphological similarity and sympatric distributions in some parts, misidentification of this species with *G. dolichurus* is common.

Data Sources and Quality

Table 4. Information and interpretation qualifiers for the Mozambique Thicket Rat (*Grammomys cometes*) assessment

Data sources	Field study (literature, unpublished), indirect information (literature, expert knowledge), museum records
Data quality (max)	Inferred
Data quality (min)	Suspected
Uncertainty resolution	Expert 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.*

References

Arnolds LJ. 2009. Vegetation sampling in correlation with small mammal abundance and richness in the Andries Vosloo Kudu Nature Reserve (Eastern Cape, South Africa). B.Sc. Honours Thesis. University of Fort Hare, Alice, South Africa.

Bizani M. 2014. Diet of the yellow mongoose (*Cynictis penicillata*) in the Albany Thicket Biome of South Africa. M.Sc. Thesis. University of Fort Hare, Alice, South Africa.

Dali LO. 2006. Observations on the ecology of the Mozambique woodland mouse, *Grammomys cometes*, in Afromontane forest at Hogsback in Eastern Cape province, South Africa. B.Sc. Honours Thesis. University of Fort Hare, Alice, South Africa.

de Graaff G. 1981. The Rodents of Southern Africa: notes on their identification, distribution, ecology, and taxonomy. Butterworth-Heinemann, Pretoria, South Africa.

Do Linh San E, Arnolds L, Matolengwe T, Mbatyoti A, Nqinana A, Buwa L, Madikiza Z. 2011. Small mammal abundance, diversity and richness in the Andries Vosloo Kudu Nature Reserve (Eastern Cape, South Africa). Poster presented at the 11th African Small Mammal Symposium. July 2011. Kwaluseni, Swaziland.

Eeley HA, Lawes MJ, Piper SE. 1999. The influence of climate change on the distribution of indigenous forest in KwaZulu-Natal, South Africa. Journal of Biogeography **26**:595–617.

Gebe Z. 2014. Resting site ecology and microhabitat use of the Mozambique thicket rat (*Grammomys cometes*) in a riverine *Combretum* forest. M.Sc. Thesis. University of Fort Hare, Alice, South Africa.

Kryštufek B, Baxter RM, Haberl W, Zima J, Bužan EV. 2008. Systematics and biogeography of the Mozambique thicket rat, *Grammomys cometes*, in Eastern Cape province, South Africa. Journal of Mammalogy **89**:325–335.

Malinga TJ. 2003. Observations on the population ecology of *Grammomys cometes* in Hogsback Forest, Eastern Cape, South Africa. B.Sc. Honours Thesis. University of Fort Hare, Alice, South Africa.

Matolengwe T. 2010. Diet of the small spotted-genet *Genetta genetta* (Carnivora: Viverridae) in the Great Fish River Reserve (South Africa). B.Sc. Honours Thesis. University of Fort Hare, Alice, South Africa.

Mbatyoti OA. 2010. The diet of the Cape grey mongoose *Galerella pulverulenta* in the Albany Thicket Biome (South Africa). B.Sc. Honours Thesis. University of Fort Hare, Alice, South Africa.

Nqinana A. 2009. Diet of the marsh mongoose *Atilax paludinosus* in the Andries Vosloo Kudu Nature Reserve (Eastern Cape Province, South Africa). B.Sc. Honours Thesis. University of Fort Hare, Alice, South Africa.

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

Smithers RHN, Lobão-Tello JLP. 1976. Check List and Atlas of the Mammals of Mozambique. Trustees of the National Museums and Monuments of Rhodesia, Salisbury, Rhodesia.

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