Thallomys paedulcus – Tree Rat


Sam Laurence

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 Data

Prior to 1988, *Thallomys paedulcus* was the only species recognised under this genus in southern Africa. However, although morphologically alike, chromosomal studies have since revealed that this species is distinct from the Black-tailed Tree Rat, *T. nigricauda* (Lovegrove 1997).

Taxonomy

Thallomys paedulcus (Sundevall 1846)

ANIMALIA - CHORDATA - MAMMALIA - RODENTIA - MURIDAE - Thallomys - paedulcus

Common names: Tree Rat, Acacia Rat (English), Boomrot (Afrikaans)

Taxonomic level: Species complex

Taxonomic note: *Thallomys paedulcus* possibly represents a complex of several similar species. This species has been controversial and there have been many changes in its definition (Perrin 2013). Further studies are needed to clarify the taxonomic status of populations currently allocated to this species, and the relationships between this species and others of its genus (Monadjem et al. 2015). As *T. nigricauda* was included in *T. paedulcus* until recently, some information for the latter may actually refer to the former (Perrin 2013).

Assessment Rationale

Listed as Least Concern in view of its wide distribution within the assessment region, and its occurrence in numerous protected areas, including Kruger National Park. However, this species may become threatened in the near future as encroaching human settlements and industries degrade the woodlands needed by this species. Selective harvesting of tall trees for firewood and charcoal production, as well as wholesale destruction of woodlands by mining and agricultural expansion, threaten to cause population decline. For example, it is estimated that, between 1990 and 2006, 20% of woodland cover was lost to pine and *Eucalyptus* plantations and residential expansion in the Soutpansberg, Limpopo Province. Assuming the rate of loss is linear, 1.25% of woodland is lost per year in the region, which, if extrapolated across the province, could lead to a 12.5% decline in woodland cover over the next ten years and a suspected population decline. Similarly, models of fuelwood extraction from the Bushbuckridge region in Mpumalanga Province indicate that biomass in the area will be exhausted within 13 years at current rates of extraction. However, the relationship between woodland loss and population density is unknown, and more research is needed to estimate potential population decline. Remote sensing techniques (for example, Landsat imagery or LiDAR) should be used to assess tall tree loss at finer spatial scales and field surveys should be used to ground-truth the suspected impact on this species' population. These data can then be used to estimate both the area of occupancy and the rate of population decline for this species. A reassessment will be needed when such data are available, as we suspect that this species may qualify for a threatened category. This species is a dietary specialist with a complex gastric anatomy containing microbial symbionts, which may negatively affect the colonisation of new woodland sites, particularly those containing different species composition. Thus significant rescue effects are doubtful. Key interventions for this species include the conservation of tall tree structure through protected area expansion, biodiversity stewardship and community engagement, and active rehabilitation of degraded sites.

Regional population effects: Possible through contiguous habitat or patches linked by corridors and dispersal across Botswana, Zimbabwe and Mozambique.

Distribution

This species ranges widely from southern Ethiopia and southern Somalia in the north, through East Africa, to southern parts of the Democratic Republic of the Congo, Angola and much of Zambia. From here, it ranges south to northeastern South Africa (northern KwaZulu-Natal, Mpumalanga, Limpopo, Gauteng and North West provinces) and Swaziland. The western limit of its distribution within the assessment region is unclear and may be more or less extensive than shown in Figure 1 (see Perrin 2013; Monadjem et al. 2015). For example, Power (2014) captured this species in the northeastern

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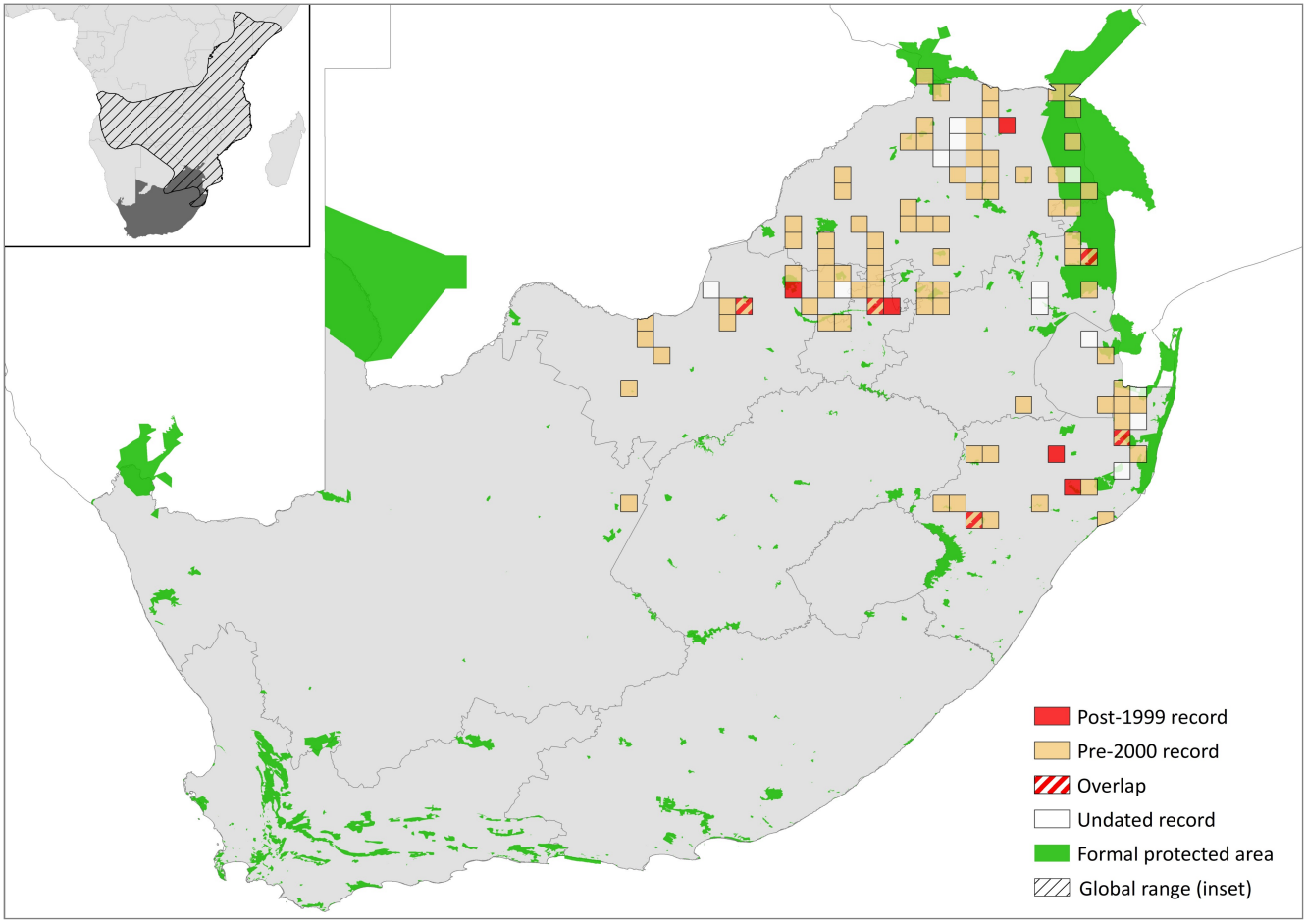

Figure 1. Distribution records for Tree Rat (*Thallomys paedulcus*) within the assessment region

Table 1. Countries of occurrence within southern Africa

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

bushveld of the North West Province, where it often associates with human habitation, but there were no captures in the western district in the Kalahari, where one could expect them to be and all grass nests examined belonged to the Namaqua Rock Mouse *Micaelamys namaquensis*. *Thallomys paedulcus* and *T. nigricauda* are believed to be parapatric, possibly overlapping partially in a narrow contact zone (Taylor et al. 1995). Further vetting of museum records is required to delimit the respective distributions of *T. nigricauda* and *T. paedulcus*.

Population

It can be locally common in suitable habitats but populations are generally small and isolated (Perrin 2013). Although southern Africa is considered a stronghold for this species, it is uncommon. It is difficult to catch and researchers should consider putting traps in trees. For example, P.J. Taylor (unpubl. data) has not captured any individuals in the Soutpansberg Mountains, Limpopo Province, across a gradient of land-use types despite similar overall rodent densities. Worryingly, this corresponds to general woodland loss in the region as estimated by Landsat imagery (Munyati & Kabanda 2009).

Current population trend: Unknown

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: No

Habitats and Ecology

This is an arboreal species associated with established woodlands, particularly *Acacia* bushland. It prefers woodland trees, and does not inhabit shrublands or ecotones. Although *T. nigricauda* may be confined to arid savannahs, aside from some degree of distributional overlap, *T. paedulcus* generally inhabits broad-leaved and *Acacia* savannahs with an average annual precipitation of approximately 500 mm (Lovegrove 1997). They nest in cavities in the stems of large trees (Dean et al. 1999). In East Africa, they are mainly associated with *Acacia xanthophloa* and *A. tortilis* (Perrin 2013).

This species is a dietary specialist with a complex gastric anatomy containing microbial symbionts, which may

negatively affect the colonisation of new woodland sites, particularly those having a different species composition (Perrin 1986). In most respects the behaviour, feeding ecology and reproductive biology of the Tree Rat is similar to that of its sibling species, the Black-tailed Tree Rat. They are both nocturnal and forage mainly in the canopies of *Acacia* trees (Perrin 2013), but small families of Tree Rats are thought to be less selective in their choice of nesting tree, and may nest in any tree offering a suitable fork or hollow (Lovegrove 1997). Additional research is required to reliably validate disparities in the ecology and morphological characteristics of these sister species (Skinner & Chimimba 2005).

Ecosystem and cultural services: No specific ecosystem or cultural services have been identified for this species, however, it is expected that, similar to other arboreal *Thallomys* species, this species may represent a valuable prey species for opportunistic predators such as tree roosting owls (e.g. the Spotted Eagle Owl, *Bubo africanus*; Reed 2005), small carnivores and snakes.

Use and Trade

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

Threats

The major threat to this species is woodland loss and degradation (Driver et al. 2012), especially of large mature trees that are potential cavity nesting sites (*sensu* Dean et al. 1999). Ongoing illegal commercial harvesting of tall trees for firewood or charcoal production is causing a decline in the habitat quality for this species, which is a noted problem in the North West Province (DACE 2008). Fuelwood extraction and plantation forestry has led to a 20% decrease in woodland cover in the Soutpansberg, Limpopo from 1996–2006 (Munyati & Kabanda 2009). In Limpopo Province specifically, urban expansion and agriculture, particularly overgrazing in ranchlands, are key drivers of woodland loss (Munyati & Kabanda 2009). Encroaching human settlements also put pressure on woodlands for supplementary firewood and charcoal production. For example, in the Bushbuckridge region of Mpumalanga, airborne light detection and ranging (LiDAR) modelling indicates that biomass will be exhausted within 13 years given unsustainable fuelwood extraction (Wessels et al. 2013).

Current habitat trend: Declining

Conservation

It is present within a number of protected areas, including Kruger National Park. Although no interventions are necessary at present, several interventions could be trialled to prevent this species from becoming threatened in the future. For example, protected area expansion to protect and connect woodlands. This can be done formally or informally through conservancy formation and biodiversity stewardship schemes. Wildlife ranches and conservancies may be helping to conserve habitat for this species by protecting tall trees from charcoal harvesting. This should be encouraged. Harvest management for fuelwood extraction should also be considered. For example, Wessels et al. (2013), in their study area in Mpumalanga, suggested that a 15% annual reduction in consumption for eight years is required to reach sustainable fuelwood extraction levels.

Recommendations for land managers and practitioners:

- Subpopulations should be monitored to record any changes in abundance and distribution. However, it should be considered that live-trapping in trees off the ground can be time-consuming, and population densities are likely to fluctuate.
- Land managers should be encouraged to conserve woodlands and old trees.

Research priorities:

- Rate of woodland loss across the species' range and its effect on population trend. This can be achieved through the combined use of Landsat imagery and field surveys.
- Urgent molecular analysis and taxonomic resolution of the species complex.

Table 2. Threats to the Tree Rat (*Thallomys paedulcus*) 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	*5.3.3 Logging & Wood Harvesting*: harvesting of trees for firewood and charcoal production.	Anderson & Anderson 2001	Indirect	Regional	Unknown
		Wessels et al. 2013	Simulated	Regional	Biomass could be depleted over 13 years.
2	2.2.2 *Agro-industry Plantations*: habitat loss from *Eucalyptus* and pine plantations. Current stress *1.1 Ecosystem Conversion*.	Munyati & Kabanda 2009	Estimated	Regional	Between 1990 and 2006, 20% of woodland cover was lost to pine and *Eucalyptus* plantations in the Soutpansberg, Limpopo.
3	*2.3.2 Livestock Farming & Ranching*: woodland clearing for pasture. Current stress *1.1 Ecosystem Conversion*.	von Staden & Raimondo 2015	Indirect	Regional	Increasing
4	*2.1.3 Annual & Perennial Non-Timber Crops*: habitat loss from crop agriculture. Current stress: *1.1 Ecosystem Conversion*.	Driver et al. 2012	Indirect	National	Ongoing

Table 3. Conservation interventions for the Tree Rat (*Thallomys paedulcus*) 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	*3.1.1 Harvest Management:* regulate fuelwood extraction of mature trees.	Wessels et al. 2013	Simulated	Regional	15% reduction in harvesting required	-
2	*1.1 Site/Area Protection*: protected area expansion to conserve woodland.	-	Anecdotal	-	-	-
3	*5.3 Private Sector Standards & Codes*: stewardship schemes to conserve woodland.	-	Anecdotal	-	-	-
4	*5.4 Compliance & Enforcement*: stricter penalties and enforcement for illegal/uncontrolled tree harvesting.	-	Anecdotal	-	-	-

- Analysis of museum records to more accurately delimit distribution.

Encouraged citizen actions:

- Report sightings on virtual museum platforms (for example, iSpot and MammalMAP), especially outside protected areas. However, this species cannot be readily distinguished from *T. nigricauda* based on morphological characteristics.
- Landowners can preserve *Acacia* trees, both living and dead.

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Data Sources and Quality

Table 4. Information and interpretation qualifiers for the Tree Rat (*Thallomys paedulcus*) assessment

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

Assessors and Reviewers

Mike Perrin[1], Matthew F. Child[2], Ara Monadjem[3]

[1]University of KwaZulu-Natal, [2]Endangered Wildlife Trust, [3]University of Swaziland

Contributors

Claire Relton[1], Nico L. Avenant[2], Margaret Avery[3], Rod Baxter[4], Duncan MacFadyen[5], Guy Palmer[6], Peter Taylor[4], Beryl Wilson[7]

[1]Endangered Wildlife Trust, [2]National Museum, Bloemfontein, [3]Iziko South African Museums, [4]University of Venda, [5]E Oppenheimer & Son, [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.*

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