

Crocidura hirta – Lesser Red Musk Shrew



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)	None
CITES listing	None
Endemic	No

Although it prefers damp habitats, the Lesser Red Musk Shrew also occurs in the Kalahari, where water is only available seasonally, and it probably relies on dew for its water requirements (Skinner & Chimimba 2005).

Taxonomy

Crocidura hirta (Peters 1852)

ANIMALIA - CHORDATA - MAMMALIA - EULIPOTYPHILA - SORICIDAE - *Crocidura* - *hirta*

Common names: Lesser Red Musk Shrew (English), Klein Rooiskeerbek (Afrikaans)

Taxonomic status: Species complex

Taxonomic notes: Four subspecies are listed (Heim de Balsac & Meester 1977), of which two occur in southern Africa: *C. c. hirta*, found in the wetter eastern areas of the country with annual rainfall over 500 mm, occurring in KwaZulu-Natal, Free State, North West, Mpumalanga and Limpopo provinces, as well as Zimbabwe and Mozambique; while *C. h. deserti* (the arid variant) occurs in the drier western regions in northern Northern Cape, northern Botswana and north-eastern Namibia (Meester et al. 1986) Further research should resolve the taxonomy of these variants as there may be more than one species across the range.

Assessment Rationale

This is a widely distributed and common species within the assessment region, occurring in numerous protected areas (including Kruger National Park and presumably Kgalagadi Transfrontier Park). It has a broad habitat tolerance across its range, including agricultural landscapes (as long as they are not overgrazed) and gardens, and is one of the most common *Crocidura* species in suitable habitat. As it is largely commensal with humans, landscape transformation and modification is unlikely to have a negative effect. Thus, we list as Least Concern. Similarly to other shrew species, the following interventions will benefit this species: protected area expansion of moist grassland habitats, as well as incentivising landowners to sustain natural vegetation around wetlands and keep livestock or wildlife at ecological carrying capacity.

Regional population effects: No significant rescue effects are possible as, although habitats are presumably connected across regions in some areas, this species is too small to disperse over long distances.

Distribution

This is one of the most widespread shrew species in Africa, occurring throughout Central, East and southern Africa (Skinner & Chimimba 2005). Within the assessment region, they occur in all provinces except the Western and Eastern Cape, and only sparsely in Free State and Mpumalanga provinces, with the southern limit around Pennington in KwaZulu-Natal Province (Figure 1). Similarly, it occurs throughout the Middleveld, Lowveld and Lubombo regions, and marginally in the Highveld region at Mbabane, in Swaziland (Monadjem 1998). Although Barn Owl (*Tyto alba*) pellet analyses indicate a wider presence in the Northern Cape than displayed in Figure 1, with new records in areas such as Spitzkop Nature Reserve (Avery & Avery 2011), there is morphological and distributional overlap with *C. cyanea* and thus the mandibles retrieved from Barn Owl pellets could be confused between the two species (for example, Taylor & Contrafatto 1996). Whereas Meester (1963) has confirmed the Kalahari specimens, more vetting of museum specimens and Barn Owl pellets is needed to confirm its Karoo and West Coast distribution, particularly as the Goegap Nature Reserve record would mean a considerable range extension to the west (Avery & Avery 2011). It has been confirmed to occur widely in the bushveld and Kalahari regions of North West Province during a recent survey (Power 2014).

Population

This is one of the most common shrews in the assessment region and is the only shrew species commonly recorded from the Lowveld region, where it exhibits dramatic seasonal fluctuations in population size following fire (Kern 1981); population increases are generally related to successional regrowth of vegetation and grass cover

Recommended citation: Taylor PJ, Baxter R, Monadjem A, Child MF. 2016. A conservation assessment of *Crocidura hirta*. 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.

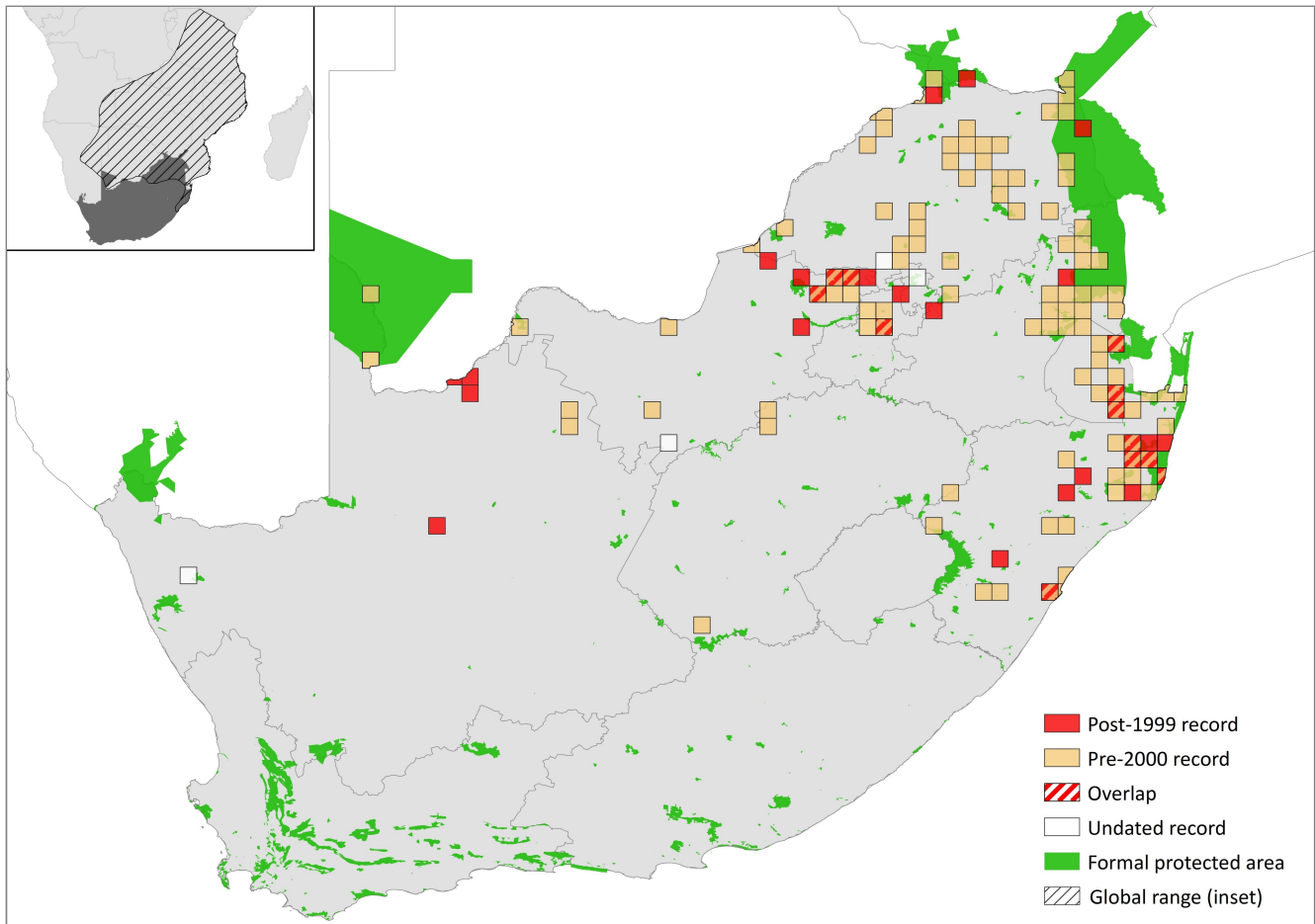


Figure 1. Distribution records for Lesser Red Musk Shrew (*Crocidura hirta*) within the assessment region

Table 1. Countries of occurrence within southern Africa

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

where a crash follows after fire removes the undergrowth. It is frequently recorded in the northern bushveld regions of North West Province (Power 2014). In Mkhuzi Game Reserve, KwaZulu-Natal Province, *C. hirta* and *C. fuscomurina* accounted for 73% of all shrew captures, where *C. hirta* was the most abundant (Delcros et al. 2014). Similarly, at Phinda Private Game Reserve, KwaZulu-Natal Province, *C. hirta* and *C. fuscomurina* were the most frequently captured shrews across all habitats, where *C. fuscomurina* was slightly more abundant overall. Thus, this species can be dominant in certain habitats. Furthermore, it is well adapted to living in association with humans or in habitats modified by humans and can be common in gardens.

In an ungrazed natural grassland near Matshapa, Swaziland, density ranged between 0.7 ± 0.4 and 2.5 ± 0.9 individuals / ha between 1995 and 1998 (Monadjem & Perrin 2003).

Current population trend: Stable. Occurs in a wide variety of habitats and in both urban and agricultural habitats, so no reason to suspect population decline based on habitat loss.

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. Occurs in a wide variety of habitats and in both urban and agricultural habitats.

Habitats and Ecology

This species is found in a wide number of habitats, including grassland, savannah, scrublands and compost heaps in gardens. In the eastern parts of its range, it is found primarily in moist habitats along streams and wetlands and requires cover through dense undergrowth, shrubs, disused rodent burrows, termitaria holes or beneath rocks (Skinner & Chimimba 2005). In North West Province, it was taken from a variety of habitats, such as vleis and dense bushveld with rank grass (Power 2014). In KwaZulu-Natal province, they have been collected from grass clumps, reedbeds, fig-dominated forests, savannah woodland, tall grassland and fallow agricultural fields (Taylor 1998). In Mkhuzi and Phinda Game Reserves, it was found in both woodland, floodplain grassland, Lebombo thicket and Sand forest habitat (Delcros et al. 2014; Rautenbach et al. 2014). In Swaziland, it occurs in a

wide range of vegetation types from moist middlelevel grasslands to *Acacia* and broad-leaf savanna in the Lowveld region, but is closely associated with areas which have tall, dense grass and absent from Highveld sour grassland (Monadjem 1998). In its western range, they occur in scrub bushes and riverine woodland where there is debris. They probably rely on dew in the water-scarce Kalahari. They show a preference for dense vegetation, deep leaf litter and proximity to water (Dickman 1995; Rautenbach et al. 2014).

It is commensal with humans and occurs in modified landscapes, such as gardens and agricultural areas. It thus fulfils a similar niche to *C. flavescens* except occurring more in the north of the assessment region. In Swaziland, for example, *C. hirta* is found in the Lowveld whereas *C. flavescens* is found at higher altitudes (Monadjem 1999), which corresponds broadly to a savannah versus grassland niche respectively.

They are active throughout day and night but predominantly nocturnal (Baxter et al. 1979) and, while normally foraging solitarily, Meester (1963) showed they can live together in pairs and groups. While mainly insectivorous, small amounts of plant material are also ingested (Dickman 1995). They also feed on carcasses of rodents and bats and can be cannibalistic (Meester 1963).

Ecosystem and cultural services: An important prey species (for example, Avery & Avery 2011).

Use and Trade

There is no known subsistence or commercial use of this species.

Threats

The main threat to shrews is the loss or degradation of moist, productive areas such as wetlands and rank grasslands within suitable habitat. The two main drivers behind this are abstraction of surface water and draining of wetlands through industrial and residential expansion, and overgrazing of moist grasslands, which leads to the

loss of ground cover (de-structures habitat) and decreases small mammal diversity and abundance (Bowland & Perrin 1989, 1993; Monadjem 1999). Suppression of natural ecosystem processes, such as fire, can also lead to habitat degradation through bush encroachment or loss of plant diversity through alien invasives, and is suspected to be increasing with human settlement expansion. There are also clear overlaps and synergistic effects between these threats. Based on loss of natural habitat, we infer a continuing decline in some local populations, which may consequently lead to a progressive impact on the national population, should this habitat loss continue.

Current habitat trend: As this is predominantly a savannah species, it does not suffer as much from habitat loss as grassland or forest specialist species, as savannah remains relatively intact within the assessment region (Driver et al. 2012). Furthermore, as it commensal with humans, urban and rural expansion has fewer negative effects. Similarly, climate change is not predicted to become a major threat for this species as savannahs are projected to expand (for example, Kgope et al. 2010). Thus, the habitat for this species is stable.

Conservation

This species is found in several protected areas across its range, including Kruger National Park and Kgalagadi Transfrontier Park. Although no interventions are currently necessary, protecting and restoring suitable habitat, such as moist grassland patches, will benefit this species. Biodiversity stewardship schemes should be promoted to conserve such patches. Importantly, at the local scale, landowners and managers should be educated, encouraged and incentivised to conserve the habitats on which shrews and small mammals depend. Retaining ground cover is the most important management tool to increase small mammal diversity and abundance. This can be achieved through lowering grazing pressure (Bowland & Perrin 1989), or by maintaining a buffer strip of natural vegetation around wetlands (Driver et al. 2012). Small mammal diversity and abundance is also higher in

Table 2. Threats to the Lesser Red Musk Shrew (*Crocidura hirta*) ranked in order of severity with corresponding evidence (based on IUCN threat categories, with regional context)

Rank	Threat description	Evidence in the	Data quality	Scale of	Current trend
1	2.3.2 <i>Small-holder Grazing, Ranching or Farming</i> : wetland and grassland degradation through overgrazing (removal of ground cover).	Bowland & Perrin 1989	Empirical	Local	Possibly increasing with human settlement expansion and intensification of wildlife farming.
		Driver et al. 2012	Indirect	National	45% of remaining wetland area exists in a heavily modified condition.
2	7.2 <i>Dams & Water Management/Use</i> : wetland loss through drainage/water abstraction during agricultural, industrial and urban expansion.	Driver et al. 2012	Indirect (land cover change from remote sensing)	National	Increasing with settlement expansion and 65% of wetland ecosystem types threatened already.
3	7.1.2 <i>Suppression in Fire Frequency/Intensity</i> : human expansion around forests has decreased natural fire frequency. Current stress 1.2 <i>Ecosystem Degradation</i> : altered fire regime leading to bush encroachment (including alien vegetation invasion) and thus loss of moist grasslands.	-	Anecdotal	-	-

Table 3. Conservation interventions for the Lesser Red Musk Shrew (*Crocidura hirta*) 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 <i>Resource & Habitat Protection</i> : stewardship agreements with private landowners to conserve wetlands and grasslands.	-	Anecdotal	-	-	Multiple organisations
2	2.2 <i>Invasive/Problematic Species Control</i> : maintain stocking rates of livestock and wildlife at ecological carrying capacity.	Bowland & Perrin 1989	Empirical	Local	Small mammal diversity and abundance significantly higher after decrease in grazing pressure.	-
3	2.1 <i>Site/Area Management</i> : maintain/restore natural vegetation around wetlands.	-	Anecdotal	-	-	-
4	2.2 <i>Invasive/Problematic Species Control</i> : clear alien vegetation from watersheds and wetlands to restore habitat quality.	-	Anecdotal	-	-	Working for Water, Department of Environmental Affairs.
5	4.3 <i>Awareness & Communications</i> : educating landowners on the importance of wetlands and grasslands.	-	Anecdotal	-	-	-

more complex or heterogeneous landscapes, where periodic burning is an important tool to achieve this (Bowland & Perrin 1993). Removing alien vegetation from watersheds, watercourses and wetlands is also an important intervention to improve flow and water quality, and thus habitat quality, for shrews. Education and awareness campaigns should be employed to teach landowners and local communities about the importance of conserving wetlands and moist grasslands.

Recommendations for land managers and practitioners:

- Landowners and communities should be incentivised to stock livestock or wildlife at ecological carrying capacity and to maintain a buffer of natural vegetation around wetlands.
- Enforce regulations on developments that potentially impact on the habitat integrity of grasslands and wetlands.

Research priorities:

- Additional field surveys are needed to clarify and confirm the distribution of this species.
- Museum records must be vetted to refine the distribution map.
- Molecular research is needed to revise the taxonomic status of putative subspecies.

Encouraged citizen actions:

- Citizens are requested to submit any shrews killed by cats or drowned in pools to a museum or a provincial conservation authority for identification, thereby enhancing our knowledge of shrew distribution (carcasses can be placed in a ziplock bag and frozen with the locality recorded).
- Practice indigenous gardening to sustain small mammals.

Data Sources and Quality

Table 4. Information and interpretation qualifiers for the Lesser Red Musk Shrew (*Crocidura hirta*) assessment

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

References

- Avery DM, Avery G. 2011. Micromammals in the Northern Cape Province of South Africa, past and present. *African Natural History* **7**:9–39.
- Baxter RM, Goulden EA, Meester J. 1979. The activity patterns of some southern African *Crocidura* in captivity. *Acta Theriologica* **24**:61–68.
- Bowland AE, Perrin MR. 1989. The effect of overgrazing on the small mammals in Umfolozi Game Reserve. *Zeitschrift für Säugetierkunde* **54**:251–260.
- Bowland JM, Perrin MR. 1993. Wetlands as reservoirs of small-mammal populations in the Natal Drakensberg. *South African Journal of Wildlife Research* **23**:39–43.
- Delcros G, Taylor PJ, Schoeman MC. 2014. Ecological correlates of small mammal assemblage structure at different spatial scales in the savannah biome of South Africa. *Mammalia* **79**:1–14.
- Dickman CR. 1995. Diets and habitat preferences of three species of crocidurine shrews in arid southern Africa. *Journal of Zoology* **237**:499–514.
- 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.

Heim de Balsac H, Meester J. 1977. Order Insectivora. Pages 1–29 in Meester J, Setzer HW, editors. *The Mammals of Africa: An Identification Manual*. Smithsonian Institution Press, Washington D.C., USA.

Kern NG. 1981. The influence of fire on populations of small mammals of the Kruger National Park. *Koedoe* **24**:125–157.

Kgope BS, Bond WJ, Midgley GF. 2010. Growth responses of African savanna trees implicate atmospheric [CO₂] as a driver of past and current changes in savanna tree cover. *Austral Ecology* **35**:451–463.

Meester J. 1963. A systematic revision of the shrew genus *Crocidura* in southern Africa. *Transvaal Museum Memoir* **13**: 1–126.

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

Monadjem A. 1999. Geographic distribution patterns of small mammals in Swaziland in relation to abiotic factors and human land-use activity. *Biodiversity & Conservation* **8**:223–237.

Monadjem A, Perrin M. 2003. Population fluctuations and community structure of small mammals in a Swaziland grassland over a three-year period. *African Zoology* **38**:127–137.

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.

Rautenbach A, Dickerson T, Schoeman MC. 2014. Diversity of rodent and shrew assemblages in different vegetation types of the savannah biome in South Africa: no evidence for nested subsets or competition. *African Journal of Ecology* **52**:30–40.

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, Contrafatto G. 1996. Mandible shape and size in three species of small musk shrews (*Crocidura Wagler*, 1832) from southern Africa. *Mammalia* **60**:753–766.

Assessors and Reviewers

Peter Taylor¹, Rod Baxter¹, Ara Monadjem², Matthew Child³

¹University of Venda, ²University of Swaziland, ³Endangered Wildlife Trust

Contributors

Nico Avenant¹, Margaret Avery², Duncan MacFadyen³, Guy Palmer⁴ and Beryl Wilson⁵

¹National Museum, Bloemfontein, ²Iziko South African Museums, ³E Oppenheimer & Son, ⁴Western Cape Nature Conservation Board, ⁵McGregor Museum

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