Myosorex sclateri – Sclater's Forest Shrew

Photograph wanted

Regional Red List status (2016)	**Vulnerable B1,2ab(i,ii,iii,iv)**
National Red List status (2004)	Endangered B1,2b(ii,iii),c(iv)
Reasons for change	Non-genuine change: New information
Global Red List status (2008)	Near Threatened B
TOPS listing (NEMBA)	None
CITES listing	None
Endemic	Yes

*Watch-list Threat †Conservation Dependent

Formerly included as a subspecies of the Dark-footed Forest Shrew (*Myosorex cafer*), biochemical, morphological and evolutionary studies have elevated Sclater's Forest Shrew to full species status (Willows-Munro 2008).

Taxonomy

Myosorex sclateri (Thomas & Schwann 1905)

ANIMALIA - CHORDATA - MAMMALIA - EULIPOTYPHLA - SORICIDAE - *Myosorex* - *sclateri*

Common names: Sclater's Forest Shrew, Sclater's Mouse Shrew (English), Sclater se bosskeerbek (Afrikaans)

Taxonomic status: Species

Taxonomic notes: Meester et al. (1986) recognised the subspecies *M. c. cafer* and *M. c. sclateri* but biochemical and morphological data suggested a rise to full species status for both (Maddalena & Bronner 1992; Kearney 1993). *Myosorex sclateri* and *M. cafer* were have thus both been elevated to full species (Willows-Munro 2008). For details on the evolutionary history and relationships within the *Myosorex* genus see Willows-Munro and Matthee (2009) and Taylor et al. (2013).

Assessment Rationale

This endemic species is a forest habitat specialist, occurring primarily in subtropical swamps, wetlands and coastal forests of northern KwaZulu-Natal Province. This species cannot exist in transformed or degraded habitats and depends on intact ecotones between forest and moist grasslands. Its extent of occurrence, based on both museum and recent field records, is estimated to be 15,972 km^2, while its area of occupancy, based on natural forest habitat remaining in 2014, is estimated to be 697 km^2. This species is threatened by ongoing habitat loss and degradation, caused primarily by coastal development, human settlement expansion, forest clear-cutting for agriculture and overgrazing from livestock farming. Recent remote sensing data show that there was a 19.7% loss of natural habitat in KwaZulu-Natal Province from 1994 to 2011, with an average loss of 1.2% per year. If this rate of loss continues into the future, there will be an estimated 12% loss of habitat over the next 10 years. Corroborating this, new national land-cover datasets reveal that, between 2000 and 2013, there has been a 5.6% and 1.1% rate of urban and rural expansion respectively in KwaZulu-Natal Province. Remaining forest patches are fragmented and the species is suspected to have poor dispersal rates. Thus, we list this species as Vulnerable B1,2ab(i,ii,iii,iv) due to its restricted range, the severely fragmented nature of remaining forest patches or subpopulations, and an inferred continuing decline in extent, occupancy and the number of subpopulations from ongoing coastal development as well as an inferred decline in habitat quality from expanding human settlements and thus potential for overgrazing and water abstraction.

Recent climate modelling research shows that suitable habitats for the species may expand by 2050, but this gain may be negated by the ongoing development in coastal areas, low dispersal capacity and inability to colonise new patches without assistance. Key interventions include protected area expansion of forest habitats, including the creation of corridors between patches to facilitate gene flow, as well as the enforcement of regulations restricting development sprawl and disturbance to protected forest/ grassland ecotones.

Distribution

Sclater's Forest Shrew is endemic to northern KwaZulu-Natal Province, South Africa (Table 1, Figure 1). It is restricted to moist lowland subtropical, scarp and coastal forests on the Maputaland coastal plain. Further field surveys are necessary to delimit its precise northern and eastern range limits. It is sympatric in some areas with the more widespread *M. varius*. Its extent of occurrence, based on both museum and recent field records, is estimated to be 15,972 km^2, while its area of occupancy, based on natural forest habitat remaining in 2014, is estimated to be 697 km^2.

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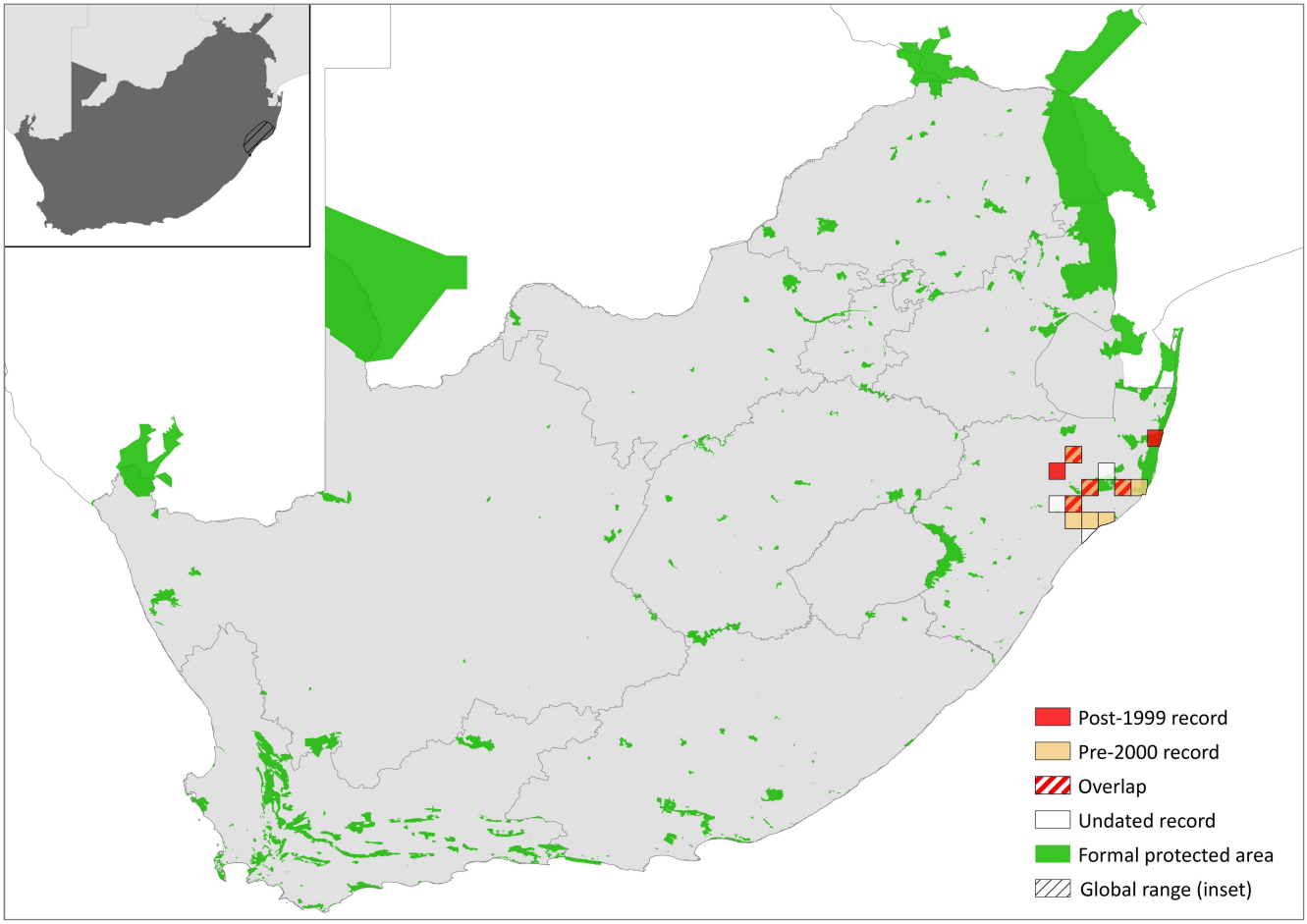

Figure 1. Distribution records for Sclater's Forest Shrew (*Myosorex sclateri*) within the assessment region

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	-

Population

This species is not common but is regularly caught during surveys (P. Taylor unpubl. data). In Dukuduku Forest, it was the most abundant shrew species sampled (Rautenbach & Bronner 1989). More research is needed to estimate densities across its range to enable a calculation of population size.

Current population trend: Declining. Inferred from ongoing forest habitat loss and degradation.

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, but may correspond to discrete forest patches.

Severely fragmented: Yes

Habitats and Ecology

Sclater's Forest Shrew is found near water in subtropical swamps and coastal forests. Skinner and Chimimba (2005) report that it is present in grassland, wetland and reedbed habitats. Specimens have been collected close to grassland/forest ecotones, and thus the species may select habitats more similar to *M. varius* than *M. cafer* (Taylor 1998). In Dukuduku Forest, it was one of the dominant shrew species found in grassland (containing sedges and reeds but no woody elements) and abundance peaked in February (Perrin & Bodbijl 2001). Not a lot is known about its biology or ecology, although it is likely to be similar to both *M. cafer* and *M. varius*.

Ecosystem and cultural services: Candidate for flagship species in forest biodiversity stewardship schemes.

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 forest 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

Table 2. Threats to the Sclater's Forest Shrew (*Myosorex sclateri*) 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	*2.3 Livestock Farming & Ranching*: 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 Dams & Water Management/Use*: wetland loss through drainage/water abstraction during agricultural, industrial and urban expansion.	Driver et al. 2012	Indirect (land cover change from remote sensing)	National	65% of wetland ecosystem types threatened.
3	*7.1.2 Suppression in Fire Frequency/Intensity*: human expansion around forests has decreased natural fire frequency. Current stress *1.2 Ecosystem Degradation*: altered fire regime leading to bush encroachment (including alien vegetation invasion) and thus loss of moist grasslands.	-	Anecdotal	-	-
4	*1.1 Housing & Urban Areas*: forest habitat lost to residential and commercial development. Current stress *1.3 Indirect Ecosystem Effects*: fragmentation and isolation of remaining forest patches with limited dispersal between.	GeoTerraImage 2015	Indirect (land cover change from remote sensing)	Regional	Continuing. Area of urban and rural expansion has increased by 5.6% and 1.1% respectively between 2000 and 2013.

leads to the loss of ground cover and decreases small mammal diversity and abundance (Bowland & Perrin 1989). An increase in overgrazing, resulting from continued rural expansion in the region (see below), may be a particularly severe threat for this species as it exists in lowland, productive areas that are desirable for grazing lands. Suppression of natural ecosystem processes, such as fire, can also lead to habitat degradation through bush encroachment or loss of plant diversity, and is suspected to be increasing with human settlement expansion. There are also clear overlaps and synergistic effects between these threats. Shrews have a high metabolic rate and thus rely on highly productive and complex environments, where small mammal diversity is highest (Bowland & Perrin 1993). Forests are protected by South African law but they are still being degraded as a result of human encroachment for livestock grazing and fuelwood extraction. The forest biome has one of the highest proportions of threatened ecosystem types (Driver et al. 2012). Similarly, 65% of wetland ecosystem types are threatened (48% Critically Endangered, 12% Endangered and 5% Vulnerable; Driver et al. 2012).

Climate change is not considered to be an emerging threat to this species as model predictions for the year 2050 show a gain in suitable areas (Taylor et al. 2016). However, the fragmented nature of forest patches is likely to persist, which may negate the benefit of suitable habitat expansion as individuals are restricted from colonising new areas. Additionally, range expansion is improbable since it is a coastal forest specialist and most of the areas included in the expanded range include unsuitable habitat which would not support populations of the species (Taylor et al. 2016).

Current habitat trend: Overall, there was a 19.7% loss of natural habitat in KwaZulu-Natal Province from 1994 to 2011, with an average loss of 1.2% per year (Jewitt et al. 2015). If this rate of loss continues into the future, there will be an estimated 12% loss of habitat over 10 years. Worryingly, a massive 7.6% of natural habitat was recently lost in KwaZulu-Natal in just six years (2005–2011). Correspondingly, Southern Coastal and Swamp Forest have declined by at least 1–3% between 2000 and 2013 (F. Daniels unpubl. data). Further analysis is needed to more accurately estimate rate of forest loss over the past ten years. Additionally, between 2000 and 2013, there has been a 5.6% and 1.1% rate of urban and rural expansion in KwaZulu-Natal Province respectively (GeoTerraImage 2015), which indicates both a loss of habitat and possibly an increase in human encroachment on forest and wetland resources, which we infer as increasing habitat degradation.

Conservation

The main intervention for this species is the protection and restoration of wetlands and grasslands within and around forest patches. This species is present in some protected areas in the northern part of its range (such as Lake St Lucia), but there is a need to protect suitable habitat within the landscapes between protected areas. Biodiversity stewardship schemes should be promoted if landowners possess wetlands or grasslands close to core protected areas or remaining forest patches, and the effects on small mammal subpopulations should be monitored. Protecting such habitats may create dispersal corridors between forest patches that will enable adaptation to climate change.

All forests in South Africa are protected by law, although the degree to which this is enforced may vary. Legislation should be enforced to prevent development or human encroachment in key habitats, which includes increased enforcement of forest-related transgressions to minimise disturbance to existing forest patches, as well as stricter

Table 3. Conservation interventions for the Sclater's Forest Shrew (*Myosorex sclateri*) 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 Resource & Habitat Protection*: stewardship agreements with private landowners to conserve wetlands and grasslands.	-	Anecdotal	-	-	-
2	*5.4 Compliance & Enforcement*: minimising disturbance to core forest patches by enforcing compliance with forest protection laws, and preventing illegal development.	-	Anecdotal	-	-	-
3	*2.2 Invasive/Problematic Species Control*: 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.	-
4	*2.1 Site/Area Management*: maintain/restore natural vegetation around wetlands.	-	Anecdotal	-	-	-
5	*2.2 Invasive/Problematic Species Control*: Clear alien vegetation from watersheds and wetlands to restore habitat quality.	-	Anecdotal	-	-	Working for Water, Department of Environmental Affairs
6	*4.3 Awareness & Communications*: educating landowners in the importance of wetlands and grasslands.	-	Anecdotal	-	-	

zonation on development to decrease fragmentation of remaining forests.

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). Research will be needed to set the recommended length of the buffer strip in various habitats, but 500 m may provide a good indication of ecological integrity (Driver et al. 2012). Small mammal diversity and abundance is also higher in more complex or heterogeneous landscapes, where periodic burning is an important tool to achieve this (Bowland & Perrin 1993). Similarly, the specific fire regime thresholds should be calibrated by research. 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. This can be achieved through the Working for Water Programme (for example, Marais et al. 2004). However, the subsequent effects on shrew subpopulations must be monitored to demonstrate success (sensu Richardson & van Wilgen 2004). 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:

- More accurate estimates of forest patch occupancy through extensive live-trapping and field surveys should be conducted through dedicated surveys by specialists and conservation authorities to more accurately establish geographical range and potential biodiversity stewardship sites, thus informing spatial conservation planning.
- Enforce regulations on developments that potentially impact on the habitat integrity of forests.
- Landowners should be incentivised to stock livestock or wildlife at ecological carrying capacity and to maintain a buffer of natural vegetation around wetlands.

Research priorities:

- Further analysis of museum specimens is needed to correctly identify and delimit the distributions of *M. cafer*, *M. sclateri* and *M. tenuis*.
- Research should be conducted to determine disturbance thresholds in various habitats (for example, ecological stocking rates, amount of natural vegetation needed to sustain a viable subpopulation, and fire intensity and frequency needed to sustain habitat complexity) needed by managers to conserve shrew species.
- Additional information is needed on the distribution, natural history and threats to this species.

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).

Data Sources and Quality

Table 4. Information and interpretation qualifiers for the Sclater's Forest Shrew (*Myosorex sclateri*) assessment

Data sources	Museum records, field study (unpublished), indirect information (literature, unpublished)
Data quality (max)	Estimated
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.*