Rhinolophus clivosus – Geoffroy's Horseshoe Bat


Leon de Kock

Regional Red List status (2016)	**Least Concern***
National Red List status (2004)	Near Threatened B2
Reasons for change	Non-genuine: New information
Global Red List status (2016)	Least Concern
TOPS listing (NEMBA) (2007)	None
CITES listing	None
Endemic	No

*Watch-list Data

Five genetically (mitochondrial DNA) and biogeographically distinct groups have been identified in South Africa and should be considered as separate units in conservation planning until further taxonomic resolution is possible (Stoffberg et al. 2012).

Taxonomy

Rhinolophus clivosus Cretzschmar 1828

ANIMALIA - CHORDATA - MAMMALIA - CHIROPTERA - RHINOLOPHIDAE - *Rhinolophus* - *clivosus*

Synonyms: *Rhinolophus clivosus* ssp. *brachygnathus* K. Andersen 1905; *acrotis* Heuglin 1861

Common names: Geoffroy's Horseshoe Bat, Arabian Horseshoe Bat, Cretzschmar's Horseshoe Bat (English), Geoffroy se Saalneusvlermuis, Geoffroy-saalneusvlermuis (Afrikaans)

Taxonomic status: Species complex

Taxonomic notes: Further taxonomic research is needed into *Rhinolophus clivosus*. Variability in mitochondrial DNA, bacular morphology, pelage colour, habitat preference, echolocation calls and reproduction strongly suggests that *R. clivosus* comprises multiple species (Benda & Vallo 2012; Stoffberg et al. 2012). Specifically, Stoffberg et al. (2012) provided genetic evidence that demonstrated southern African *R. clivosus sensu lato* are as genetically distinct from samples further north in Africa as from the sister species *R. ferrumequinum*; they described five distinct groups within South Africa corresponding to a Western Cape clade, Knysna region clade, Northern Cape clade, a predominantly KwaZulu-Natal/Mpumalanga mixed group and a Mpumalanga/Limpopo clade (ACR 2015). A useful character for separating *R. clivosus* and *R. darlingi* from all other southern African *Rhinolophus* species is the absence of the minute first upper premolar in the toothrow; and *R. clivosus* is larger than *R. darlingi* (Monadjem et al. 2010).

Assessment Rationale

Listed as Least Concern in view of its wide distribution (estimated extent of occurrence for the assessment region is 1,196,606 km^2), known large population and local abundance (colonies can comprise thousands of individuals), it being recorded from many protected areas in the assessment region and because no major threats have been identified that could cause widespread population decline. However, taxonomic resolution is required as genetic evidence suggests five distinct clades exist within South Africa largely corresponding to different biomes and should be considered as evolutionarily significant units in conservation planning. If cryptic species are described, reassessment will be necessary as distinct units may be facing unique threats.

Regional population effects: While habitats are largely connected across regions, wing-loading is low (Jacobs et al. 2007), so dispersal effects are presumed to be limited, and thus rescue effects are uncertain. This is compounded by taxonomic uncertainty (Stoffberg et al. 2012). For example, specimens of this species from Namibia have been reclassified as *R. damarensis*, thus *R. clivosus* is now not known to occur in Namibia (Monadjem et al. 2010; Jacobs et al. 2013).

Distribution

Rhinolophus clivosus sensu lato has a disjunct distribution from Algeria to Egypt and southwards through most countries in East Africa through to South Africa, and also occurs in parts of southwest Asia, including western and southeastern areas of the Arabian Peninsula. In North Africa it has been recorded from Algeria, Libya and Egypt; in East Africa, it ranges from Sudan in the north, through all East African countries to Malawi in the south; in southern Africa, it is present in Mozambique and Zambia in the north, ranging southwards into South Africa. While

Recommended citation: Jacobs D, Cohen L, Richards LR, Monadjem A, Schoeman C, MacEwan K, Sethusa T, Taylor PJ. 2016. A conservation assessment of *Rhinolophus clivosus*. 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.

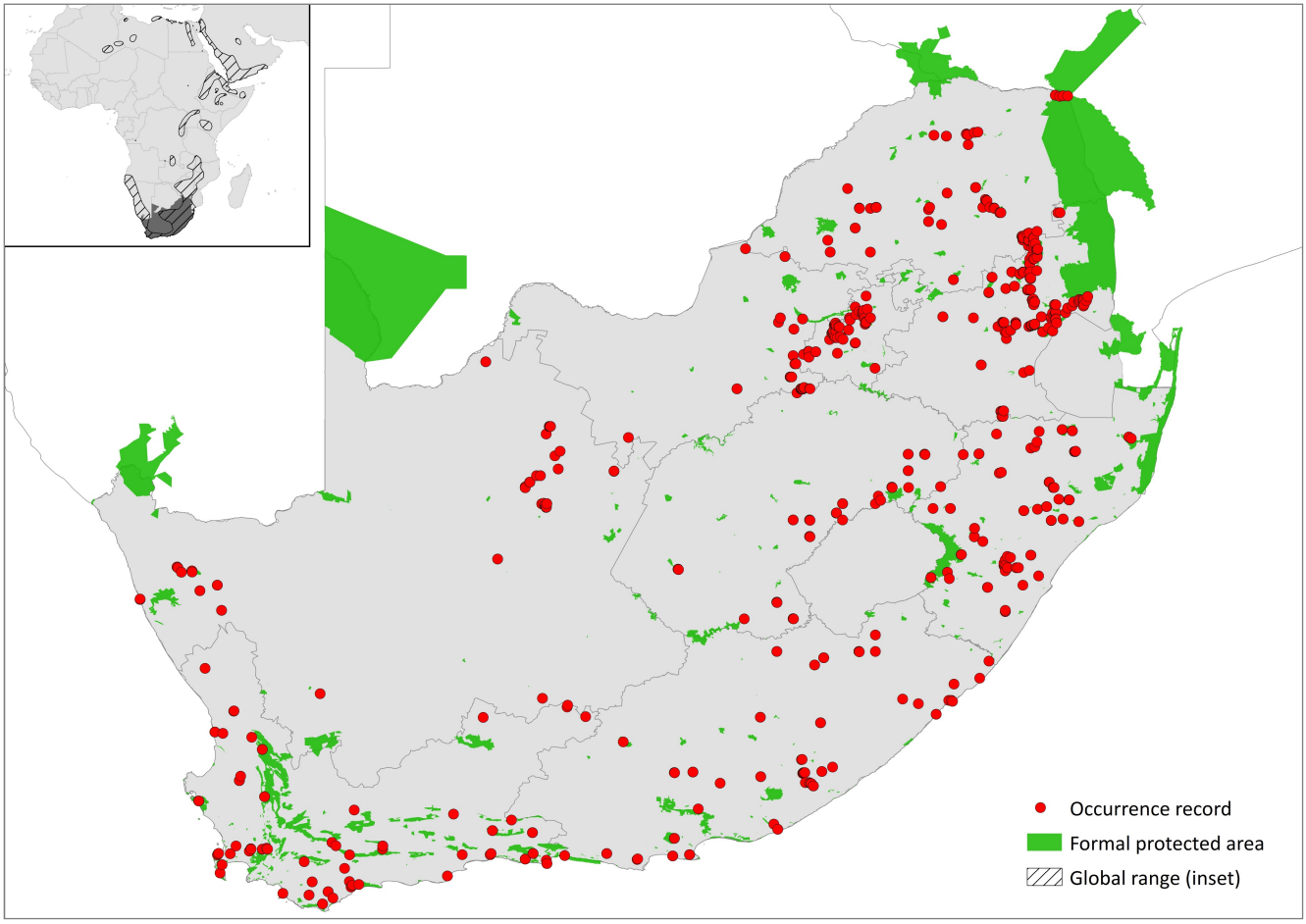

Figure 1. Distribution records for Geoffroy's Horseshoe Bat (*Rhinolophus clivosus*) within the assessment region

Table 1. Countries of occurrence within southern Africa

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

previously thought to occur in Namibia and Angola (for example, Skinner & Chimimba 2005), specimens from these regions have now been reclassified as a new species called *R. damarensis* (Stoffberg 2007; Monadjem et al. 2010; Jacobs et al. 2013). It is also absent from Botswana (Monadjem et al. 2010).

In the assessment region, the species is widespread in the eastern regions, recorded from Lesotho, Swaziland and all provinces in South Africa, absent only from parts of the arid interior (Monadjem et al. 2010). However, if *R. clivosus* comprises a complex of several species, then Stoffberg et al. (2012) should be consulted to provide the composite species distributions in South Africa where five genetically distinct groups are largely linked to different biomes, similar to those reported for *Miniopterus natalensis* (Miller-Butterworth et al. 2003). Roberts (1951) recognised southern African *R. clivosus s.l.* as an endemic southern African species *R. geoffroyi* where four of the lineages identified by Stoffberg et al. (2012) correspond to the geographical distributions of his proposed *R. geoffroyi* subspecies: clade 1 (*R. g. geoffroyi*) in the Cape Floral Kingdom (CFK) that covers the extreme southwestern and southern parts of South Africa (winter rainfall season); clade 3 *(R. g. augur*) in the arid areas on the central plateau of the western half of the country; clade 4 (*R. g. zuluensis*) in the eastern mesic parts of South Africa; and clade 5 (*R. g. zambesiensis*) occurring in the northern parts of South Africa (Stoffberg et al. 2012). An additional lineage, clade 2, may represent a unique taxon that occurs in the Knysna Forest comprising patches of indigenous forest in the southeastern parts of the CFK (Stoffberg et al. 2012). The estimated extent of occurrence for *R. clivosus s.l.* within the assessment region is 1,196,606 km^2.

Population

While abundance is uncertain throughout most of its range, it is generally common in southern Africa (besides Zimbabwe) (Taylor 2000), and can be locally abundant in certain caves (Herselman & Norton 1985), such as De Hoop Guano Cave, where it may form colonies of several thousand individuals (McDonald et al. 1990). Similarly, in Swaziland, three separate populations contained over a thousand individuals (Monadjem 1998; ACR 2015). It is well represented in museums, with over 380 specimens examined in Monadjem et al. (2010).

Current population trend: Stable

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

Habitats and Ecology

Rhinolophus clivosus sensu lato has been recorded from a wide variety of habitats, ranging from savannah woodland, Mediterranean-type shrubland, dry (and possibly moist) savannah, riparian forest, open grasslands and semi-desert to even more arid environments. However, these habitat types may correspond to cryptic species (Stoffberg et al. 2012). It is generally a temperate species, absent from hot low-lying areas and associated with mountainous areas (such as the Drakensberg) in its northerly range (Taylor 2000 p. 200; Monadjem et al. 2010). Its range is probably dependent on the availability of caves or similar day roosts. Roosting has been recorded in caves, rock crevices, disused mines, hollow baobabs (*Adansonia* spp.) and various rural and urban buildings. It can also use modified habitats, such as artificial wetlands (Sirami et al. 2013). It travels up to 10 km between caves (Rautenbach 1982) and undergoes prolonged periods of hibernation (R. T. F. Bernard unpubl. data). It is a clutter forager, feeding mainly on Lepidoptera and Coleoptera (Monadjem et al. 2010). It establishes feeding stations at night, hanging from branches of trees or from verandahs of houses to eat its prey, discarding the harder parts in a pile underneath the night roost (Monadjem et al. 2010)

Ecosystem and cultural services: As this species is insectivorous, it may contribute to controlling insect populations (Boyles et al. 2011; Kunz et al. 2011). Bats often prey on the insect species that destroy crops (Boyles et al. 2011; Kunz et al. 2011). Ensuring a healthy population of insectivorous bats can thus result in a decrease in the use of pesticides.

Use and Trade

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

Threats

Although there are generally considered to be no major threats to the species as a whole, some populations are locally threatened by disturbance to their roosting sites, and indirect poisoning resulting from the mainly agricultural use of insecticides, pesticides and similar chemicals (ACR 2015). If cryptic species are revealed (Stoffberg et al. 2012), taxon-specific threats will have to be more accurately identified and quantified.

Photo 1. *Rhinolophus clivosus*, showing high and rounded connecting process (Ara Monadjem)

Current habitat trend: Stable

Conservation

Rhinolophus clivosus sensu lato occurs in many protected areas within the assessment region including Kruger National Park, iSimangaliso Wetland Park, Garden Route National Park, De Hoop Nature Reserve, Agulhas National Park, Table Mountain National Park and West Coast National Park. Bats of the genus *Rhinolophus* are generally susceptible to indirect poisoning through the use of insecticides and thus there is a need to evaluate the impact of this threat on populations and to investigate alternative methods of insect control (D. Kock pers. comm. 2004). The strong concordance between genetic

Table 2. Threats to the Geoffroy's Horseshoe Bat (*Rhinolophus clivosus*) 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	*6.1 Recreational Activities*: roost site disturbance from tourism activities and religious ceremonies. Current stress *2.2 Species Disturbance*.	-	Anecdotal	-	Stable
2	*9.3.3 Agricultural & Forestry Effluents:* indirect poisoning. Current stress *1.3 Indirect Ecosystem Effects*: loss of prey base.	-	Anecdotal	-	Stable

Table 3. Conservation interventions for the Geoffroy's Horseshoe Bat (*Rhinolophus clivosus*) 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	*2.1 Site/Area management*: protection of key roost sites required.	-	Anecdotal	-	-	-
2	*2.3 Habitat & Natural Process Restoration*: reduce pesticide use to restore natural prey base.	-	Anecdotal	-	-	-

and ecological diversity suggests that the five distinct clades are adapted to their respective habitats and should be considered as separate units in conservation planning (Stoffberg et al. 2012).

Recommendations for land managers and practitioners:

- Identify and protect important roost sites for this species according to conservation units identified by Stoffberg et al. (2012).
- Reduce pesticide use in agricultural landscapes.

Research priorities:

- Taxonomic resolution is required by incorporating multilocus DNA sequence data, as well as morphological data, into future research (Stoffberg et al. 2012).

Encouraged citizen actions:

- Minimise disturbance at caves when visiting.
- Citizens can report sightings on virtual museum platforms (for example, iSpot and MammalMAP).

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Data Sources and Quality

Table 4. Information and interpretation qualifiers for the Geoffroy's Horseshoe Bat (*Rhinolophus clivosus*) assessment

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

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