

THREATENED SPECIES SCIENTIFIC COMMITTEE

Established under the *Environment Protection and Biodiversity Conservation Act 1999*

The Minister approved this Conservation Advice and transferred this species from the Endangered to the Vulnerable category, effective from 07/12/2016

Conservation Advice

Hipposideros semoni

Semon's leaf-nosed bat

Note: The information contained in this conservation advice was primarily sourced from 'The Action Plan for Australian Mammals 2012' (Woinarski et al., 2014). Any substantive additions obtained during the consultation on the draft have been cited within the advice. Readers may note that conservation advices resulting from the Action Plan for Australian Mammals show minor differences in formatting relative to other conservation advices. These reflect the desire to efficiently prepare a large number of advices by adopting the presentation approach of the Action Plan for Australian Mammals, and do not reflect any difference in the evidence used to develop the recommendation.

Taxonomy

Conventionally accepted as *Hipposideros semoni* (Matschie 1903).

No subspecies are currently recognised. Semon's leaf-nosed bat is closely related to several *Hipposideros* species in northern Australia, such as *H. stenotis* (northern leaf-nosed bat) and in New Guinea (Hill 1963), such as *H. muscinus* (Fly River leaf-nosed bat). A current taxonomic study is comparing closely related forms in Australia and in New Guinea (Armstrong pers. comm., cited in Woinarski et al., 2014).

Summary of assessment

Conservation status

Vulnerable: Criterion 2 B2(a),(b)(iii) and Criterion 3 C2(a)(i)

Semon's leaf-nosed bat was listed as Endangered under the EPBC Act in 2001. Following a formal review of the listing status of Semon's leaf-nosed bat, the Threatened Species Scientific Committee (the Committee) has determined that there is sufficient evidence to support a change of status of the species under the EPBC Act from Endangered to Vulnerable.

Species can be listed as threatened under state and territory legislation. For information on the listing status of this species under relevant state or territory legislation, see <http://www.environment.gov.au/cgi-bin/sprat/public/sprat.pl>

Reason for conservation assessment by the Threatened Species Scientific Committee

This advice follows assessment of new information provided to the Committee to reassess the listing status of *Hipposideros semoni*.

Public Consultation

Notice of the proposed amendment and a consultation document was made available for public comment for 32 business days between 29 February 2016 and 15 April 2016. Any comments received that were relevant to the survival of the species were considered by the Committee as part of the assessment process.

Species Information

Description

Semon's leaf-nosed bat is a small bat with a head to body length of approximately 40–50 mm and a weight of 6–10 g (Hall 2008). The fur is relatively long and has a ruffled appearance; it is dark smoky-grey in colour, though lighter on the belly (Churchill 1998, 2009). The wing membrane near the body is covered with whitish-brown hair (Hall 2008). The ears are particularly long and narrow, with an acute point (Churchill 1998).

The noseleaf is well developed, square-shaped and covers most of the muzzle. There are two wart-like protuberances – one in the centre and another on the posterior edge (Churchill 1998, 2009). The upper portion of the noseleaf is divided into four depressions and there are two supplementary leaflets under each side of the lower portion (Hall 2008). It is distinguished from *Hipposideros stenotis* (northern leaf-nosed bat) by having a longer central wart (Hall 2008).

Distribution

Semon's leaf-nosed bat occurs mainly in north-eastern Australia (along eastern Cape York Peninsula to Townsville), with the majority of records around Iron Range, Kulla, Oyala Thumotang and Cape Melville National Parks, and near Cooktown (Reardon et al., 2010). There is evidence for an isolated subpopulation further south at Kroombit Tops (south of Gladstone) (Schulz & de Oliveira 1995). Beyond Australia, it is also known from a few records in New Guinea (Flannery 1990, 1995; Bonaccorso 1998).

Bonaccorso et al. (2008) reported that the range of the species has receded northwards considerably (by approximately 30 percent of its Australian range) over the last 60 years.

Relevant Biology/Ecology

Semon's leaf-nosed bat is a poorly-known and rare species (Bonaccorso et al., 2008; Woinarski et al., 2014), which probably occurs in low densities even within core habitats (Armstrong pers. comm., 2016). It mainly occurs in rainforests, but has also been recorded from streams and rivers adjacent to rainforest (Reardon et al., 2010). A wide range of roost sites have been recorded, including in houses (Van Deusen 1975), abandoned buildings (Churchill 2009), caves (Thomson et al., 2001; Churchill 2009) and trees (Churchill 2009). Semon's leaf-nosed bat has short broad wings, and its flight is typically slow and fluttering, usually within two metres of the ground (Van Deusen 1975; Hall 2008). It is insectivorous; moths may comprise the main dietary item (Churchill 2009).

Semon's leaf-nosed bat is sexually dimorphic. Females are larger than males (Whybird et al., 1998) and echolocation call frequency varies between the sexes (de Oliveira & Schulz 1997; Armstrong pers. comm., cited in Woinarski et al., 2014). Males produce a constant frequency call of approximately 94 kHz and females produce a constant frequency call of approximately 74 kHz. Calls of this species have also been noted in the 83–85 kHz band. These characteristic differences may reflect or drive sexual differences in foraging and diet (Whybird pers. comm., cited in Woinarski et al., 2014; Armstrong pers. comm., cited in Woinarski et al., 2014).

Females give birth to a single young per year, around November (Churchill 2009). A generation length of 6–7 years is derived from a mean of age at sexual maturity (estimated at 1–2 years) and longevity (probably around 12 years), based on information for other *Hipposideros* species. No detailed information is available for this species.

Semon's leaf-nosed bat is difficult to catch while foraging as its slow flight and manoeuvrability allows it to avoid nets; however, it has a distinctive echolocation call.

Threats

Threats to Semon's leaf-nosed bat are outlined in the table below (Woinarski et al., 2014). Habitat loss and degradation (due to clearing, inappropriate fire regimes and other human activities) is postulated to be the key threat to the species.

Threat factor	Consequence rating	Distributional extent over which threat may operate	Evidence base
Disturbance, destruction or reduced accessibility to roost sites	Moderate	Minor	Thompson et al. (2001) regarded disturbance, destruction and reduced accessibility to roost sites by human visitation and mining a plausible threat to the species. This threat, however, has not been demonstrated.
Habitat loss and fragmentation	Moderate	Minor	Woinarski et al. (2014) consider habitat loss and fragmentation to be a possible threat to the species. This threat, however, has not been demonstrated.
Habitat change due to pastoralism	Minor	Moderate	Dennis (2012) considered habitat change as a result of pastoralism to be a possible threat to the species. This threat, however, has not been demonstrated.
Increased fire extent, frequency and intensity	Minor	Moderate	The species range is located over areas of differing fire regime. Dennis (2012) considered extensive, frequent and intense fires to be a possible threat to the species due to the impacts on prey abundance. This threat, however, has not been demonstrated.
Predation by cats (<i>Felis catus</i>)	Minor	Minor	Woinarski et al. (2014) consider predation by cats at roost sites and roost entrances to be a possible threat to the species. This threat, however, has not been demonstrated.

How judged by the Committee in relation to the EPBC Act Criteria and Regulations

Criterion 1. Population size reduction (reduction in total numbers)			
Population reduction (measured over the longer of 10 years or 3 generations) based on any of A1 to A4			
	Critically Endangered Very severe reduction	Endangered Severe reduction	Vulnerable Substantial reduction
A1	≥ 90%	≥ 70%	≥ 50%
A2, A3, A4	≥ 80%	≥ 50%	≥ 30%
A1	Population reduction observed, estimated, inferred or suspected in the past and the causes of the reduction are clearly reversible AND understood AND ceased.		
A2	Population reduction observed, estimated, inferred or suspected in the past where the causes of the reduction may not have ceased OR may not be understood OR may not be reversible.		
A3	Population reduction, projected or suspected to be met in the future (up to a maximum of 100 years) [(a) cannot be used for A3]		
A4	An observed, estimated, inferred, projected or suspected population reduction where the time period must include both the past and the future (up to a max. of 100 years in future), and where the causes of reduction may not have ceased OR may not be understood OR may not be reversible.		
	<i>based on any of the following:</i> <ul style="list-style-type: none"> (a) direct observation [<i>except A3</i>] (b) an index of abundance appropriate to the taxon (c) a decline in area of occupancy, extent of occurrence and/or quality of habitat (d) actual or potential levels of exploitation (e) the effects of introduced taxa, hybridization, pathogens, pollutants, competitors or parasites 		

Evidence:

Insufficient data to determine eligibility

Population trends are difficult to ascertain for low density species, and there has been little survey effort in recent decades. The Semon's leaf-nosed bat population may be declining according to Duncan et al. (1999), based in part on comparison of relative numbers reported in the 1990s and during surveys of the Cape York Peninsula in the 1940s and 1950s (Tate 1952). There are no data available on why a decline may have occurred (Dennis 2012).

In more recent surveys, Reardon et al. (2010) noted that the species was regularly reported in their targeted searches of Cape York Peninsula. They considered that the species is relatively secure within the Cape York Peninsula portion of its range and the assumption of a decline may not be valid. In addition, rainforest in parts of the Iron Range area has expanded over recent decades due to the current fire regime (Russell-Smith et al., 2004).

However, over the last 60 years the range of the species in Australia has receded northwards by approximately 30 percent (Bonaccorso et al., 2008). Preliminary modelling has predicted that the species' preferred habitat of rainforest and riparian forest is likely to reduce in area over the next 50 years, particularly in the south of its range (Inkster pers. comm., cited in Woinarski et al., 2014).

Woinarski et al. (2014) consider that, if a decline in population size is occurring, it is likely to be at a rate of less than 30 percent over a 20 year period (approximately three generations).

The Committee considers that there is insufficient information to determine the eligibility of the species for listing in any category under this criterion. A decline is probably occurring but there are no data to demonstrate the rate of decline.

Criterion 2. Geographic distribution as indicators for either extent of occurrence AND/OR area of occupancy			
	Critically Endangered Very restricted	Endangered Restricted	Vulnerable Limited
B1. Extent of occurrence (EOO)	< 100 km ²	< 5,000 km ²	< 20,000 km ²
B2. Area of occupancy (AOO)	< 10 km ²	< 500 km ²	< 2,000 km ²
AND at least 2 of the following 3 conditions:			
(a) Severely fragmented OR Number of locations	= 1	≤ 5	≤ 10
(b) Continuing decline observed, estimated, inferred or projected in any of: (i) extent of occurrence; (ii) area of occupancy; (iii) area, extent and/or quality of habitat; (iv) number of locations or subpopulations; (v) number of mature individuals			
(c) Extreme fluctuations in any of: (i) extent of occurrence; (ii) area of occupancy; (iii) number of locations or subpopulations; (iv) number of mature individuals			

Evidence:

Eligible under Criterion 2 B2(a),(b)(iii) for listing as Vulnerable

The extent of occurrence is estimated at 162 008 km², and the area of occupancy is estimated at 128 km². These figures are based on the mapping of point records from 1976 to 2016, obtained from state governments, museums and CSIRO. The extent of occurrence was calculated using a minimum convex hull, and the area of occupancy calculated using a 2x2 km grid cell method, based on the IUCN Red List Guidelines 2014 (DotE 2015). Woinarski et al. (2014) considered that the calculated AOO, which they estimated to be 108 km², is a significant under-estimate due to limited sampling across the occupied range, and may be as high as 2000 km². Robust estimates of EOO and AOO are not possible due to insufficient survey effort.

However, the available information suggests that the AOO is limited or restricted, as it likely lies between 128 km² and 2000 km². There is a continuing decline in the area and extent of habitat (see Criterion 1). The species is not severely fragmented, and is present at more than 5 locations (Woinarski et al., 2014) but probably fewer than 10 locations. This indicates that the species likely meets the thresholds for Vulnerable, but not Endangered.

The Committee considers that the species meets the relevant elements of Criterion 2 to make it eligible for listing as Vulnerable.

Criterion 3. Population size and decline			
	Critically Endangered Very low	Endangered Low	Vulnerable Limited
Estimated number of mature individuals	< 250	< 2,500	< 10,000
AND either (C1) or (C2) is true			
C1 An observed, estimated or projected continuing decline of at least (up to a max. of 100 years in future)	Very high rate 25% in 3 years or 1 generation (whichever is longer)	High rate 20% in 5 years or 2 generation (whichever is longer)	Substantial rate 10% in 10 years or 3 generations (whichever is longer)
C2 An observed, estimated, projected or inferred continuing decline AND its geographic distribution is precarious for its survival based on at least 1 of the following 3 conditions:			
(a) (i) Number of mature individuals in each subpopulation	≤ 50	≤ 250	≤ 1,000
(a) (ii) % of mature individuals in one subpopulation =	90 – 100%	95 – 100%	100%
(b) Extreme fluctuations in the number of mature individuals			

Evidence:

Eligible under Criterion 3 C2(a)(i) for listing as Vulnerable

There are no robust estimates of population size or the size of subpopulations. The previous EPBC Act listing was based on a population size estimate of fewer than 2500 mature individuals. Several population estimates have been made since this decision:

- Based on more recent surveys at the Iron Range and McIlwraith Range regions on Cape York Peninsula, Reardon et al. (2010) considered that this figure is likely to be an underestimate and that it is likely ‘the population...exceeds 2500’, although it is ‘not abundant.’
- Woinarski et al. (2014) consider that the population size of Semon’s leaf-nosed bat is likely to be greater than 10 000 mature individuals, and the largest subpopulation is likely to contain less than 1000 mature individuals. They consider that the population may be declining, but probably at a rate of less than 10 percent over a three generation period. There is no information to suggest there have been extreme fluctuations in the number of mature individuals.
- The Australasian Bat Society Inc. (pers. comm., 2016) and K. Armstrong (pers. comm., 2016) consider that the population size of Semon’s leaf-nosed bat is likely to be less than 10 000 mature individuals, given that the species would probably utilise a relatively small proportion of habitat in its distribution, and that it occurs at low densities.

The Committee considers that the estimated total number of mature individuals of this species is likely to be between 2500 and 10 000 (i.e. limited), there is an inferred continuing decline in numbers (see Criterion 1), and the geographic distribution is precarious for the survival of the species as the number of individuals in each subpopulation is likely to be less than 1000. Therefore, the species meets the relevant elements of Criterion 3 to make it eligible for listing as Vulnerable.

Criterion 4. Number of mature individuals			
	Critically Endangered Extremely low	Endangered Very Low	Vulnerable Low
Number of mature individuals	< 50	< 250	< 1,000

Evidence:

Not eligible

The population is likely to be larger than 2500 based on all current population estimates. Therefore, the species does not meet this required element of this criterion.

Criterion 5. Quantitative Analysis			
	Critically Endangered Immediate future	Endangered Near future	Vulnerable Medium-term future
Indicating the probability of extinction in the wild to be:	≥ 50% in 10 years or 3 generations, whichever is longer (100 years max.)	≥ 20% in 20 years or 5 generations, whichever is longer (100 years max.)	≥ 10% in 100 years

Evidence:

Insufficient data to determine eligibility

Population viability analysis has not been undertaken.

Conservation Actions

Recovery Plan

A multi-species recovery plan is currently in place for three species of cave-dwelling bats including Semon's leaf-nosed bat. The *Recovery plan for cave-dwelling bats, Rhinolophus philippinensis, Hipposideros semoni and Taphozous troughtoni 2001–2005* (Thompson et al., 2001) was developed by the State of Queensland and adopted as a national recovery plan under the EPBC Act in 2007.

The recovery plan includes the following objectives:

- establish the status of poorly known species and to identify appropriate species management units within two years of implementation of the plan;
- gather the necessary biological data from current records and through new, targeted field work for the effective conservation management of the species;
- implement conservation strategies or on-ground conservation works in priority sites where the species occur to mitigate identified threatening processes; and
- identify trends in the species' abundance at priority sites across their distributional ranges after the instigation of conservation strategies or on-ground conservation works.

Previous and current studies, particularly regarding the biology of the species, have contributed towards meeting the objectives of the plan since its adoption (e.g. Reardon et al., 2010). However, further research is required to establish population trends, clarify threatening processes and develop appropriate management actions. The plan is scheduled to cease in 2017.

The Committee recommends that the existing recovery plan not be renewed after it ceases in 2017, as its continuation would not add significant benefit above an approved Conservation Advice. This Conservation Advice provides sufficient direction to implement priority actions, mitigate key threats and enable recovery of the species.

Primary Conservation Actions

1. Undertake targeted surveys to identify important subpopulations, roost sites and habitat requirements.
2. Protect all roost sites and important subpopulations.
3. Maintain the quality of habitat, particularly at roost sites.
4. Assess population size, trends in population and distribution, and the relative impacts of threats.

Further habitat loss from activities such as land clearing and mining, in areas which contain roost sites or important subpopulations, is likely to have a significant impact on the species. Prior to any clearing or development within the subspecies' distribution, targeted surveys for Semon's leaf-nosed bat should be undertaken.

Conservation and Management Actions

There are no specific management actions targeted at this species. Parts of its range are in conservation reserves where some threats are managed. There has been some management of abandoned mines within the species' range (Thomson 2002), but such actions are constrained by limited information about the roost preferences and locations of this species.

Recommended conservation and management actions are outlined in the table below (Woinarski et al., 2014).

Theme	Specific actions	Priority
Active mitigation of threats	Constrain actions that may lead to loss of critical roost sites.	High
	If needed, stabilise roost sites; and minimise disturbance.	Medium
	Reduce the frequency, extent and intensity of controlled burns.	Low-medium
	Implement broad-scale management of feral cats; or local-scale implementation at and around important subpopulations.	Low
Captive breeding	N/a	
Quarantining isolated populations	N/a	
Translocation	N/a	
Community engagement	Involve Indigenous ranger groups in survey, monitoring and management.	Medium
	Collaborate with landholders and other stakeholders to prevent loss and disturbance of roost sites.	Medium

Survey and monitoring priorities

Theme	Specific actions	Priority
Survey to define better distribution	Undertake fine-scale sampling to assess distribution and identify and circumscribe important subpopulations (or colonies) (and roost sites), and assess the population size of these.	High

Establish or enhance monitoring program	Design an integrated bi-annual monitoring program across its range (including at known roost sites) to determine population trends; surveys should be undertaken in both the wet and dry seasons.	Medium-high
	Implement an integrated monitoring program linked to an assessment of management effectiveness.	Medium-high

Information and research priorities

Theme	Specific actions	Priority
Assess relative impacts of threats	Assess the structural viability of all known roost sites.	Medium
	Assess potential threats (particularly human visitation) to all known roost sites.	Medium
	Identify the population-level responses to a range of fire regimes, and model population viability across all fire scenarios.	Medium
	Assess abundance of feral cats in the range of this species, and the impact of predation on population viability.	Low
Assess effectiveness of threat mitigation options	Assess options for gating or other management of roost sites.	Medium
	Assess efficacy and impacts of management options to reduce fire incidence, extent and intensity.	Medium
	Assess effectiveness of options for broad-scale control of feral cats; or of local scale control at sites with important populations.	Low
Resolve taxonomic uncertainties	Establish genetic structuring across subpopulations to identify extent of movement of individuals, and to identify populations that may be most genetically distinctive.	Medium
Assess habitat requirements	Characterise roosting requirements, including maternity and non-breeding roosts.	Medium
	Investigate seasonal and spatial patterning of foraging habitat use (of both sexes).	Low
Assess diet, life history	Assess the extent to which food availability may be affected by fire regimes.	Medium
	Investigate key components of diet (for both sexes).	Low

Recommendations

- (i) The Committee recommends that the list referred to in section 178 of the EPBC Act be amended by **transferring** from the Endangered category to the Vulnerable category:
Hipposideros semoni
- (ii) The Committee recommends that there not be a recovery plan for the species.

Threatened Species Scientific Committee

06/09/2016

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