

## Notice and reasons for the Final Determination

The NSW Threatened Species Scientific Committee, established under the *Biodiversity Conservation Act 2016* (the Act), has made a Final Determination to list the beetle *Promethis sterrha* Olliff, 1889 (Tenebrionidae) as a CRITICALLY ENDANGERED SPECIES in Part 1 of Schedule 1 of the Act. Listing of Critically Endangered species is provided for by Part 4 of the Act.

### Summary of Conservation Assessment

*Promethis sterrha*, a beetle, was found to be Critically Endangered in accordance with the following provisions in the *Biodiversity Conservation Regulation 2017*: Clause 4.3 (a) (d) (e iii). The main reasons for this species being eligible are: i) it has a very highly restricted geographic distribution and is only known from one location; and ii) there is inferred continuing decline as the habitat of the species is threatened by weeds, increasing aridity/storms and the introduction of predators.

The NSW Threatened Species Scientific Committee has found that:

1. *Promethis sterrha* was described by Olliff (1889) as "elongate, robust, black, shining, strongly convex; prothorax broadly transverse, slightly narrowed behind, with a distinct median line; elytra very broad behind, narrowed in front, strongly punctate-striate, the interstices broad and convex..... Length 23-25 mm; greatest width 10-11 mm." Olliff (1888: plate 6, fig. 1) provided an illustration of this insect. Olliff (1889) originally placed this species in *Nyctobates* but it was placed in *Promethis* by Kaszab (1988) and this combination is stable (Matthews & Bouchard 2008). *Promethis* is a large genus, found from Asia to Tasmania and the west Pacific. *Promethis sterrha* is one of very few flightless species in this genus. Olliff (1889) did not describe the larva, which is unknown for *Promethis*, but likely to be a typical tenebrionid wireworm (Matthews & Bouchard 2008). The pupa of *Promethis* is described by Bouchard and Steiner (2004).
2. *Promethis sterrha* is endemic to Lord Howe Island, New South Wales and was described in 1889. It is a typical stenochiine tenebrionid and therefore inhabits dead and rotting wood, which it feeds on as both adult and larva (Matthews & Bouchard 2008). Until recently, the species was only known from 29 specimens collected from Lord Howe Island and held in collections worldwide (Kaszab 1988), only one of which had any detailed information: 'on banyan' (Lea, in Kaszab 1988). Arthur Lea, in a survey of the island's beetles in 1916, was the last to collect specimens of the beetle from the main island of Lord Howe. All these collections were made before the accidental introduction of the black rat (*Rattus rattus*) to Lord Howe in 1918, and this rat was considered to have led to the extinction of *Promethis sterrha* (Bartlett 2009; Reid & Hutton 2018) on the main island.

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3. *Promethis sterrha* has recently been found on Blackburn Island, a small islet of 2.4 ha within the lagoon on the west side of the main Lord Howe Island (Reid *et al.* 2020). Rats have never been recorded from Blackburn Island (Carlile *et al.* 2018). In 2000, one *Promethis sterrha* adult was discovered during a general insect survey of Blackburn Island (Cassis *et al.* 2003) and fragments of four adults and one living female were found in later surveys (Reid *et al.* 2018; Reid and Hutton 2019; Reid *et al.* 2020). There is no evidence that Blackburn Island was sampled for beetles before the 1970s. The *Promethis sterrha* specimens were all found in rotten wood or in debris under trees and bushes (Reid *et al.* 2020). The species was mostly found under a stand of the mature trees on Blackburn Island, but fragments of individuals were also found under two large *Melaleuca* bushes on the southern slope. The amount of suitable habitat on Blackburn Island is very small, as there are only 12 mature trees, confined to the middle and eastern portion, and about 45 well-established but small *Melaleuca howeana* bushes and a single stunted *Lagunaria patersonia* on the steep southern slopes. The other vegetated and rodent-free islets off the main island of Lord Howe (Balls Pyramid, the Admiralty Islands and Mutton Bird island), have scattered *M. howeana* bushes, but lack trees. Balls Pyramid and Roach Island have been surveyed for beetles by the Australian Museum and *Promethis sterrha* has not been found. It is unlikely that the beetle occurs on these islets, due to paucity of suitable habitat.
4. *Promethis sterrha* has a very highly restricted geographic distribution. The area of occupancy (AOO) was estimated to be 4 km<sup>2</sup>, based on the species occupying a single 2 km x 2 km grid cell, the spatial scale of assessment recommended by IUCN (2022). The extent of occurrence (EOO) was also 4 km<sup>2</sup>. The EOO is reported as equal to AOO, despite the range of the species, measured by a minimum convex polygon containing all the known sites of occurrence, being less than the AOO. This is to ensure consistency with the definition of AOO as an area within EOO, following IUCN Guidelines (2022).
5. The life cycle of *Promethis sterrha* is unknown, but will be typical of tenebrionids, *i.e.* egg to larva to pupa to adult, although the duration of each stage is unknown. Adults of *P. sterrha* are flightless and xylophagous, with the wood probably requiring a fungal infestation. The adult of *P. sterrha* has been recorded on a large fig tree surface (Lea, in Kaszab 1988) and amongst dead wood and leaf litter on the ground (Reid & Hutton 2019; Reid *et al.* 2020). It is almost certainly nocturnally active and diurnally quiescent. Larvae of *P. sterrha* almost certainly feed on dead fungoid wood. Associated with the adult in rotting wood were larvae of the cerambycid *Agrianome howei*, and adults and larvae of the darkling beetles *Celibe exulans*, *Hydissus vulgaris* and *Metisopus curtulus*, and the predatory clerid *Cormodes darwini*, itself unique to Blackburn Island (Reid & Hutton 2019; Reid *et al.* 2020).
6. The main threats to *Promethis sterrha* are exotic rodents, weeds, introduction of predators or competitors and increasing aridity/storm severity under a changing climate. Mice (*Mus musculus*) were introduced to Lord Howe in the 1860s and Black Rats (*Rattus rattus*) in 1918. Both are thought to have preyed on *P. sterrha* and led to its extinction on the main island. A rodent eradication program has recently been

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undertaken on Lord Howe Island, and depending on the ongoing success of this program (some rats were found on the island in 2021), Lord Howe Island can be officially declared rodent free after two years with no rodents. Re-introduction of rodents remains an ongoing threat. Most of Blackburn Island (where a few individuals of *P. sterrha* were recently found) is covered in introduced grasses (predominately *Chloris gayana* (Rhodes Grass) (Sheringham *et al.* 2020) and ongoing weed control is needed to protect the remaining habitat of the species. There is a programme underway to restore the wooded vegetation of Blackburn Island for use as a nursery for the threatened Lord Howe Island phasmid. However, as the planting is being done from the main Island of Lord Howe careful quarantine measures are needed to ensure there is no inadvertent introduction of other invertebrates that are currently established on the main Island to Blackburn Island (where they currently do not occur). This includes exotic predators (that may prey on *P. sterrha*) and woodborers (that may compete with *P. sterrha*). Recent summers on Lord Howe Island have been very dry leading to drought impacts on a range of plants including, loss of the canopy leaves of the large fig on Blackburn Island. Ongoing drought stress may lead to the loss of trees on Blackburn Island and impact habitat suitability for *P. sterrha*. Increased storm severity and more southern tracking of cyclones may also impact on the survival of the small number of trees where *C. darwini* occurs. 'Predation by the Ship Rat *Rattus rattus* on Lord Howe Island', 'Invasion of native plant communities by exotic perennial grasses', and 'Anthropogenic Climate Change' are Key Threatening Processes under the Act.

7. *Promethis sterrha* Olliff, 1889 is eligible to be listed as a Critically Endangered species as, in the opinion of the NSW Threatened Species Scientific Committee, it is facing an extremely high risk of extinction in Australia in the immediate future as determined in accordance with the following criteria as prescribed by the *Biodiversity Conservation Regulation 2017*:

## Assessment against *Biodiversity Conservation Regulation 2017* criteria.

The Clauses used for assessment are listed below for reference.

### Assessment Outcome: Critically Endangered under Clause 4.3 (a) (d) (e iii)

#### Clause 4.2 – Reduction in population size of species

(Equivalent to IUCN criterion A)

Assessment Outcome: Data Deficient.

<b>(1) - The species has undergone or is likely to undergo within a time frame appropriate to the life cycle and habitat characteristics of the taxon:</b>			
	(a)	for critically endangered species	a very large reduction in population size, or
	(b)	for endangered species	a large reduction in population size, or
	(c)	for vulnerable species	a moderate reduction in population size.
<b>(2) - The determination of that criteria is to be based on any of the following:</b>			
	(a)	direct observation,	
	(b)	an index of abundance appropriate to the taxon,	

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	(c)	a decline in the geographic distribution or habitat quality,
	(d)	the actual or potential levels of exploitation of the species,
	(e)	the effects of introduced taxa, hybridisation, pathogens, pollutants, competitors or parasites.

### Clause 4.3 – Restricted geographic distribution of species and other conditions (Equivalent to IUCN criterion B)

**Assessment Outcome: Critically Endangered under Clause 4.3 (a) (d) (e iii).**

<b>The geographic distribution of the species is:</b>			
	(a)	for critically endangered species	very highly restricted, or
	(b)	for endangered species	highly restricted, or
	(c)	for vulnerable species	moderately restricted.
<b>and at least 2 of the following 3 conditions apply:</b>			
	(d)	the population or habitat of the species is severely fragmented or nearly all the mature individuals of the species occur within a small number of locations,	
	(e)	there is a projected or continuing decline in any of the following:	
		(i)	an index of abundance appropriate to the taxon,
		(ii)	the geographic distribution of the species,
		(iii)	habitat area, extent or quality,
		(iv)	the number of locations in which the species occurs or of populations of the species.
	(f)	extreme fluctuations occur in any of the following:	
		(i)	an index of abundance appropriate to the taxon,
		(ii)	the geographic distribution of the species,
		(iii)	the number of locations in which the species occur or of populations of the species.

### Clause 4.4 – Low numbers of mature individuals of species and other conditions

**(Equivalent to IUCN criterion Clause C)**

**Assessment Outcome: Data Deficient.**

<b>The estimated total number of mature individuals of the species is:</b>				
	(a)	for critically endangered species	very low, or	
	(b)	for endangered species	low, or	
	(c)	for vulnerable species	moderately low.	
<b>and either of the following 2 conditions apply:</b>				
	(d)	a continuing decline in the number of mature individuals that is (according to an index of abundance appropriate to the species):		
		(i)	for critically endangered species	very large, or
		(ii)	for endangered species	large, or
		(iii)	for vulnerable species	moderate,
	(e)	both of the following apply:		
		(i)	a continuing decline in the number of mature individuals (according to an index of abundance appropriate to the species), and	
		(ii)	at least one of the following applies:	

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		(A)	the number of individuals in each population of the species is:
		(I)	for critically endangered species
		(II)	for endangered species
		(III)	for vulnerable species
		(B)	all or nearly all mature individuals of the species occur within one population,
		(C)	extreme fluctuations occur in an index of abundance appropriate to the species.

**Clause 4.5 – Low total numbers of mature individuals of species  
(Equivalent to IUCN criterion D)**

**Assessment Outcome: Data Deficient.**

<b>The total number of mature individuals of the species is:</b>			
	(a)	for critically endangered species	extremely low, or
	(b)	for endangered species	very low, or
	(c)	for vulnerable species	low.

**Clause 4.6 – Quantitative analysis of extinction probability  
(Equivalent to IUCN criterion E)**

**Assessment Outcome: Data Deficient**

<b>The probability of extinction of the species is estimated to be:</b>			
	(a)	for critically endangered species	extremely high, or
	(b)	for endangered species	very high, or
	(c)	for vulnerable species	high.

**Clause 4.7 – Very highly restricted geographic distribution of species–  
vulnerable species (Equivalent to IUCN criterion D2)**

**Assessment Outcome: Vulnerable under Clause 4.7.**

For vulnerable species,	the geographic distribution of the species or the number of locations of the species is very highly restricted such that the species is prone to the effects of human activities or stochastic events within a very short time period.
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Chairperson  
NSW Threatened Species Scientific Committee

**Supporting Documentation:**

Reid C, Hutton I (2020) Conservation Assessment of *Promethis sterrha* Olliff, 1889 (Tenebrionidae). Australian Museum and Lord Howe Island Museum.

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## References:

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