

Candalides noelkeri Golden Rayed Blue Butterfly

Taxonomy

Candalides noelkeri Braby & Douglas, 2004

The taxon was FFG-listed as *Candalides heathi* 'Wimmera form' (SAC 2003), but in 2004 it was described by Braby and Douglas (2004) as *Candalides noelkeri* sp. nov. (Lepidoptera: Lycaenidae). It is in the *C. xanthospilos* taxon group, being most closely allied to and allopatric with *C. heathi*.

Current conservation status

Listed as threatened under the *Flora and Fauna Guarantee Act 1988* (SAC 2003).

Categorised as Endangered in the 2009 Advisory list of threatened invertebrate fauna in Victoria (DSE 2009).

Proposed conservation status

Endangered in Australia

Criterion B2ab(iii,v)c(i,iv)

Species Information

Description and Life History

The taxon is a small butterfly with an average wingspan of 25 mm. Females are distinguished from males by the reduced area of iridescent purple and the more extensive golden-brown area, especially in the apical and terminal regions, on the upper side of both wings.

Adults fly close to the ground and near their food plant (a prostrate form of *Myoporum parvifolium* (Myoporaceae) which grows as a low spreading ground cover plant, Braby and Douglas 2004), landing frequently to bask in the sun with their wings partially open, or to feed at flowers of their host plant. Eggs are laid singly on buds and young leaves upon which they feed. Young larvae graze the leaf surface whereas older larvae consume whole leaves. Larvae are well camouflaged and difficult to detect when they are resting under leaves. Pupation occurs near the base of the food plant or under litter on the ground. Pupae are attached to their substrate via cremastal hooks and a central silken girdle.

Generation Length

The generation length of *Candalides noelkeri* is estimated to be 5 to 12 months. The taxon is predominantly univoltine, but favourable seasons that invigorate the food plant in summer and autumn may result in a partial second generation. Some pupae develop directly and emerge as adults after a pupal duration of only two weeks in January and February, when adults of the previous generation are still emerging. The maximum pupal duration recorded was 12 months (Braby and Douglas 2004).

Distribution

The taxon is endemic to Victoria and restricted to the Wimmera district. Braby and Douglas (2004) recorded it from two breeding sites 3 km apart: Lake Wyn Wyn Wildlife Reserve and Olivers Lake Flora Reserve.

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Habitat

The taxon is restricted to flood plains bordering natural salt-lakes. At both Lake Wyn Wyn and Olivers Lake the breeding areas are confined to flood plains, a distinct ecological zone between the salt-lake edge and adjacent woodland on higher ground (now largely converted to farmland). In this zone, the larval food plant grows as a low spreading ground cover plant on Quaternary grey sandy-clay and may be subjected to intermittent saline flooding (Braby and Douglas 2004).

Threats

The most serious threat at the type locality is habitat change caused by the invasion of *Melaleuca halmaturorum*, which creates a dense shaded paperbark forest that reduces both the taxon's preferred open sunny microhabitat, and the extent of the larval food (Braby and Douglas 2004). The habitat at Lake Wyn Wyn is also threatened, to a lesser degree, by an invasion of exotic *Marrubium vulgare* L. (horehound) (Braby and Douglas 2004).

IUCN Criteria

Criterion A. Population size reduction. Population reduction (measured over the longer of 10 years or 3 generations) based on any of A1 to A4			
	Critically Endangered	Endangered	Vulnerable
A1	≥ 90%	≥ 70%	≥ 50%
A2, A3, A4	≥ 80%	≥ 50%	≥ 30%
<p>A1 Population reduction observed, estimated, inferred or suspected in the past and the causes of the reduction are clearly reversible AND understood AND ceased.</p> <p>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.</p> <p>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]</p> <p>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.</p>			
<p style="text-align: center;">based on any of the following:</p> <ul style="list-style-type: none"> (a) direct observation [except A3] (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:

Eligible under Criterion A2 as Vulnerable

The population reduction over the past 10 years is suspected to be 20 to 30%, based on (c) above.

The taxon appears to have contracted back to its original localities following unfavourable seasons.

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Criterion B. Geographic range in the form of either B1 (extent of occurrence) and/or B2 (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 B2 as Endangered

The Area of Occupancy (AoO) across the taxon's range is estimated to be 20 km², based on 2 x 2 km grids derived from accepted, post-1970 records in the Victorian Biodiversity Atlas.

It is estimated to have 1 location, as all key identified threats apply across its range and can rapidly affect all individuals of the taxon present. It has a continuing decline in (iii) and (v), due to invasion of native and exotic plants.

It is estimated to have extreme fluctuations in (i) and (iv) above. It expanded its range from areas at and around the type location in 2007/8 but appears to have contracted back to the original areas since 2011.

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Criterion C. Small Population size and decline				
		Critically Endangered	Endangered	Vulnerable
Number of mature individuals		< 250	< 2,500	< 10,000
AND at least one of C1 or C2				
C1	An observed, estimated or projected continuing decline of at least (up to a max. of 100 years in future):	25% in 3 years or 1 generation (whichever is longer)	20% in 5 years or 2 generations (whichever is longer)	10% in 10 years or 3 generations (whichever is longer)
C2	An observed, estimated, projected or inferred continuing decline AND least 1 of the following 3 conditions:			
(a)	(i) Number of mature individuals in each subpopulation	≤ 50	≤ 250	≤ 1,000
	(ii) % of mature individuals in one subpopulation =	90 – 100%	95 – 100%	100%
(b)	Extreme fluctuations in the number of mature individuals			

Evidence:

Ineligible under Criterion C

It is suspected that there are 100 to 1,000 mature individuals, but this qualifier is too weak and other thresholds under this criterion have not been met.

Criterion D. Very small or restricted populations				
		Critically Endangered	Endangered	Vulnerable
Number of mature individuals (observed or estimated)		< 50	< 250	< 1,000
D2. Only applies to the VU category Restricted area of occupancy or number of locations with a plausible future threat that could drive the species to critically endangered or Extinct in a very short time.		-	-	D2. Typically: AoO < 20 km ² or number of locations ≤ 5

Evidence:

Eligible under criterion D2 as Vulnerable

The taxon is suspected to be very restricted.

Criterion E (Quantitative Analysis) was not addressed as the taxon does not have a detailed Population Viability Analysis.

References

Braby, M.F. and F. Douglas. (2004). The taxonomy, ecology and conservation status of the Golden-rayed Blue: a threatened butterfly endemic to western Victoria, Australia. *The Linnean Society of London, Biological Journal of the Linnean Society*, 81, 275-299.



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