Threatened Species Assessment

Riekoperla darlingtoni
Mt Donna Buang Wingless Stonefly

Taxonomy

Riekoperla darlingtoni (Illies, 1968)

Current conservation status

Listed as threatened under the *Flora and Fauna Guarantee Act 1988*.

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

Proposed conservation status

Critically Endangered in Australia

Criteria A2bc+4bce; B1ab(iii,iv,v)

Species Information

Description and Life History

The Mount Donna Buang Wingless Stonefly is a cryptic insect. Members of the Plecoptera order are distinguished from other insects by their long cerci and the absence of a median tail filament. Aquatic immature stages and poor powers of dispersal mean that they are only found near freshwater. The 'wings' of this taxon are present only as tiny flaps which preclude flight and, no doubt, further limit dispersal.

Generation Length

The generation length of *Riekoperla darlingtoni* is estimated to be 30 to 32 months, based on the nymph life stage of up to 2.5 years (Hynes and Hynes, 1975). The adult life span of 3-6 weeks has been observed by Hynes (1974), who documented that females live for up to 20 days longer than males of the species.

Distribution

From all surveyed sites, the stonefly has so far been recorded between about 1000-1200m above sea level. Despite searches of several mountain forest habitats in Victoria and New South Wales (Illies 1968, Hynes and Hynes 1974), the taxon is known only from the vicinity of Mount Donna Buang within the Yarra Ranges National Park in the Victorian Central Highlands.

Habitat

The taxon is known to inhabit wet forests dominated by Alpine Ash (*Eucalyptus delegatensis*) and Shining Gum (*E. nitens*), with cool temperate rainforest patches characterised by Myrtle Beech (*Nothofagus cunninghamii*).

Threats

Populations and habitat are considered at risk from disturbances such as direct impact, physical habitat degradation, soil compaction, sediment release and increased sun radiation by vehicle tracks. Also weed invasion, possible outbreak of Myrtle Wilt, increasingly dry conditions from declining rainfall and consequent increase in severity and intensity of bushfires.

A probability of 1-2 bushfires every 100 years in the Victorian highlands is evident from published literature (Baker et al. 2012). Even a low intensity fire may result in extinction of this taxon. Similarly, a large oil spill at the visitor car park can cause an extinction of at least one of the populations.

The taxon has an extremely restricted distribution, highly specialised ecological requirements, and the proximity of its habitat to potential sources of disturbance and natural system modifications increase the risk of extinction.

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%

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.

based on any of the following:

(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 Critically Endangered

The population reduction over the past 10 years is estimated to be 80 to 90%, based on (b) and (c) above.

Annual surveys for the abundance of nymphs and adults at the type locality were carried out from 2005 to 2016, and in 2018 every August when water flow is at its highest and the nymphs begin to hatch. There was a 90% reduction in abundance from more than 50 nymphs/meter of stream to less than 10 nymphs/m in August 2006. A further reduction to less than 1 nymphs/m was observed in following years. The latest nymph counts are 0.5 nymphs/meter at the type locality. The observed number of adults has been reduced proportionally.

The consistent field observations showed a sharp decline, more than 25% of the population, in less than one generation. At least two of the three populations have less than 2,500 mature individuals.

The causes of the reduction may not have ceased, be understood or be reversible.

Eligible under Criterion A3 as Vulnerable

The population reduction over the next 10 years is estimated to be 5 to 30%, based on (b) and (c) above.

Future decline is assumed, based on the probability of 1-2 bushfires per 100 years in the Victorian Central Highlands.

Eligible under Criterion A4 as Critically Endangered

The population reduction over any 10 year period, including both past and future, is estimated to be 50 to 80%, based on (b), (c) and (e) above. The causes of reduction may not have ceased, be understood or be reversible.

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 km²	< 5,000 km²	< 20,000 km²
B2. Area of occupancy (AOO)	< 10 km²	< 500 km²	< 2,000 km²
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 B1 as Critically Endangered

The Extent of Occurrence (EoO) across the taxon's range is estimated to be 12 km², based on accepted, post-1970 records from the Victorian Biodiversity Atlas. The EoO has been made equal to the AoO.

The taxon is estimated to be severely fragmented. Although the populations are separated by a short distance, they are likely to be genetically diverse due to the adults being poor flyers, and the location of the populations within different stream catchments.

It is estimated to have between 1 and 3 locations, as each subpopulation may be variably affected by wildfire or stochastic events, but since they are close together, a single bushfire could potentially affect them all.

It is estimated to have a continuing decline in (iii), (iv) and (v) above, due to the physical habitat degradation, soil compaction, sediment release, increased sun radiation and the probability of bushfires.

Eligible under Criterion B2 as Endangered

The Area of Occupancy (AoO) across the taxon's range, based on 2 x 2 km grids derived from accepted, post-1970 records in the VBA, is estimated to be 12 km^2. As above, the taxon is severely fragmented, has 1 to 3 locations and has a continuing decline in (iii), (iv) and (v) above.

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 as Data Deficient

There is insufficient evidence to determine the number of mature individuals. The taxon has only a small number of records, it is likely to have a small population due to the habitat requirements and being a poor flyer (adults are apterous with very limited dispersal potential).

Criterion D. Very small or restricted population			
	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 km2 or number of locations ≤·5

Evidence:

Eligible under criterion D2 as Vulnerable

The taxon is estimated to be very restricted.

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

References

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