Threatened Species Assessment

Thaumatoperla alpina
Alpine Stonefly

Taxonomy

Thaumatoperla alpina Burns and Neboiss 1957

Current conservation status

Listed as Endangered under the *Environment Protection and Biodiversity Conservation Act 1999*.

Listed as threatened under the *Flora and Fauna Guarantee Act 1988* (SAC 1992).

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

Proposed conservation status

Endangered in Victoria

Criteria B1ab(i,v)+2ab(i,v)

Species Information

Description and Life History

There is little life history information about the taxon, however it is believed that it spends three to four years as a larva before emerging as an adult. The adult emergence periods are very synchronous across the Bogong High Plains through late January in West Kiewa, to early May in Mitta Mitta. The adult's life history is short, ranging from 2 - 4 weeks. The successful development of the eggs only occurs within a temperature range of 5-15 °C.

The Alpine Stonefly is omnivorous, and its diet includes nymphs and larvae of insect taxa, plant detritus, lichen, diatoms, and algae. Its flight capabilities are restricted, therefore, adults are generally found on riparian vegetation immediately beside the stream from which they have emerged. The adults are very cryptic, blending well into surrounding vegetation.

Generation Length

The generation length of *Thaumatoperla alpina* is estimated to be 3 to 4 years. This is based on the taxon's life cycle described by Hynes and Hynes (1975).

Distribution

The lowest record of the taxon is 750m of altitude, in the West Kiewa catchment. It is considered to occur above 700m across the Bogong High Plains in the major catchments of West Kiewa, East Kiewa, and Mitta Mitta catchments. Most known locations are in the East Kiewa catchments.

Habitat

The Alpine Stonefly inhabits high altitude areas, at least 760m above sea level, including areas above the tree line. The nymphs are most commonly found in steep, stony, cool streams, often below a cascade of water underneath cobblestones or detritus. The narrower streams of less than 1-2.5 m width are favoured and are typically 1 m wide and around 15 cm deep (McKay et al. 2005). Nymphs are often found under bigger boulders or stones at these sites. When the nymphs have reached adulthood, they leave the water and inhabit the rocks and vegetation beside the streams (Crowther et al. 2008). They are often found on the Silky Daisy (*Celmisia sericophylla*), a plant that is endemic to the Bogong High Plains.

Important habitat indicators for the Alpine Stonefly include streams with slower flows, narrower width, and high oxygen content in the water, a vegetation structure of open eucalypt or alpine treeless heath (but not alpine grassland), and the presence of mayflies (*Mirawara* spp. and *Archeophylax* spp.) (Bryce 2001 cited in Crowther et al. 2008). First order streams within the Kiewa River catchment, higher than 760 m above sea level have been identified as important habitat for the taxon.

Threats

Subpopulations and habitat of the taxon are considered at risk from predation by introduced fish taxa, degradation or destruction of habitat, climate change, increasingly dry conditions from declining rainfall, and a consequent increase in severity and intensity of bushfires.

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:

Ineligible under Criterion A

There is insufficient evidence to determine whether there has been or will be a reduction in population sufficient to meet any threshold for Criterion A.

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 Endangered

The Extent of Occurrence (EoO) across the taxon's range is estimated to be 166 km², based on accepted, post-1970 records from the Victorian Biodiversity Atlas (VBA).

The taxon is estimated to be severely fragmented, considering its limited dispersal ability, the barriers to dispersal, and the lack of habitat separating the individual subpopulations. Populations are relatively small and isolated, with little or no probability of recolonisation should subpopulations become extinct.

Alpine species tend to exist in variable-sized 'islands' of habitat within a matrix of lower-altitude forest. Fragmentation is of most concern for small outlying sub-populations, and each subpopulation may be variably affected by stochastic events, therefore there can be considered to be three locations.

It has a continuing decline in (i) and (v) above as a result of climate change and fragmentation.

Eligible under Criterion B2 as Endangered

The Area of Occupancy (AoO) across the taxon's range is estimated to be 36 km², based on 2 x 2 km grids derived from accepted, post-1970 records in the VBA. As above, the taxon is severely fragmented, has 3 locations, and has a continuing decline in (i) 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 no reliable estimate of the total population size of the species. The surveys conducted have focused on different life stages and have not been through the full distribution, this means extrapolating the survey numbers would be unrealistic.

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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