Threatened Species Assessment

Colubotelson searli
Freshwater isopod

Taxonomy

Colubotelson searli Nicholls, 1944

The taxon synonymised name is *Colubotelson joyneri searlei* Nicholls, 1944. The family level taxonomy adopted follows that of Boyko et al. (2008).

Current conservation status

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

Proposed conservation status

Critically Endangered in Victoria

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

There are no records of any specimens being collected since 1914, however there are also no records indicating that anyone has actually searched for it since it was first discovered. Because of the lack of targeted searches, it could be assessed as Data Deficient or Vulnerable D2, but a precautionary approach has been taken as its habitat is remote and isolated.

Species Information

Description and Life History

Isopods, which are sometimes referred to as aquatic sowbugs, have over 950 species, rivalling the amphipods in terms of diversity, ecological importance and distribution (Wellborn et al. 2015). This taxon belongs to the Family Phreatoicidae all of which are freshwater species and tend to be short, or small range endemics (Wilson and Johnson 1999, Wilson, 2008). The Australian phreatoicideans have significant endemism at the generic and higher levels, and it is considered highly likely that there could be at least an order of magnitude more species than currently identified.

Specific ecological and biological information is lacking for this taxon, with the following text relating to peracarid isopods in general. As with all the peracarid crustaceans, isopod embryos undergo direct development within the female brood pouch (marsupium), from which they emerge as juveniles, known as manca. Manca are essentially small replicas of adults but lack the last pair of thoracic legs. There is no pelagic larval stage among the isopods. There is a large amount of data which indicates that peracarids are very poor overland dispersers and are potentially limited to the crawling ability of the taxon, resulting in most species having highly restricted distributions and patterns of high endemism (Brusca, 1997, Wellborn et al. 2015).

Phreatoicidae typically reproduce multiple times over a lifetime (iteroparous life cycle). A related species, *Crenoicus buntiae*, occurs in sphagnum bogs in the highlands of NSW and Victoria, and reproduce year around with peaks during the warmer months which suggests temperature driven metabolism (Wilson and Ho 1986, Buz Wilson, pers. comm. 2019).

Generation Length

The generation length of *Colubotelson searli* is inferred to be 1 year, from the lifestyle of a similar species (Wilson and Ho, 1996).

Distribution

The species is only known from Mt Baw Baw, Victoria, collected in 1914. There are no records of any specimens being collected since 1914, however there are also no records indicating that anyone has actually searched for it since it was first discovered.

Habitat

The main habitat is described as bogs, marshes, swamps, fens, and peatlands, with the only known specimens collected from sphagnum moss. In general, phreatoicids are found in freshwater streams and lakes, and also burrow into moist soil and live in yabby burrows and ground water.

Threats

Crowther et al. (2008) stated that climate change, bushfires, and resort development are threats to the species. The findings of Hatley and Murphy (2016) indicate that habitat loss and/or fragmentation associated with environmental change will result in biodiversity reductions in alpine species, with species unlikely to shift their ranges in response to future climate change or recover rapidly from localised extinction events.

Alpine freshwater biota, including isopods, are adapted to cold temperatures, so increasing temperature is considered a stressor for alpine species with narrow altitudinal distributions such as *C. searli.* Therefore, these taxa are potentially susceptible to range reductions associated with climate change (Hatley and Murphy 2016 and references therein). Range shifting for freshwater biota is further complicated due to the need for hydrological connectivity (Hatley and Murphy 2016). Reduced snow and altered rainfall patterns are also likely stressors for this species, as is increased frequency and extent of bushfires. The vegetation within the distribution area is highly susceptible both to past and future stock impacts, on-going feral horse activity and possibly Sambar deer activity.

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 B as Critically Endangered

The Extent of Occurrence (EoO) across the taxon's range is estimated to be 4 km², based on one known record.

The Area of Occupancy (AoO) across the taxon's range is also estimated to be 4 km², based on 2 x 2 km grids derived from the one record.

It is suspected to have 1 location, as there is only one known record and the site is subject to the identified threats. It has a continuing decline in (i), (ii) and (v) above, as a result off climate change, increased temperatures, bushfires and resort development. Loss and continued degradation of habitat in marginal, lower-elevation areas is assumed based on current and future operating threats.

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

No reliable estimate of the total population size of the species is available. All specimens were collected from Mt Baw Baw in 1914. The original paper (Nicholls, 1944) did not provide any details on the exact location from which the specimens were collected. The number of specimens collected was also not recorded by Nicholls (1944). According to the Atlas of Living Australia (ALA) the Australian Museum holds four registered lots. It is noted on the ALA that one of these lots (P.654098) has "12 brooding females remaining". It is estimated that in 1914 no more than 20 specimens were collected. There are no records of any specimens being collected since 1914, however there are also no records indicating that anyone has actually searched for this species since it was first discovered.

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 suspected 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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