Threatened Species Assessment

Australatya striolata
Riffle Shrimp

Taxonomy

Australatya striolata (McCulloch & McNeill, 1923)

This taxon contains two highly divergent genetic lineages, corresponding to disjunct northern and southern populations (Cook et al. 2012). These lineages probably represent cryptic species. Only the southern lineage is present in Victoria, and as the type locality for the species is also within the range of the southern lineage, the Victorian populations will retain the species name *'striolata'* if a taxonomic revision is undertaken, with the northern lineage requiring a new species name.

Current conservation status

Listed as threatened under the *Flora and Fauna Guarantee Act 1988* (SAC 1995).

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

Proposed conservation status

Endangered in Victoria

Criterion B2ab(i,ii,iii,v)

The taxon is a migratory species restricted to coastal catchments in East Gippsland, with larval recruitment upstream from the estuary in freshwater upland adult habitat. There is a single subpopulation (based on genetic exchange) in a single location, and impacted by loss of habitat from increasingly dry conditions from declining rainfall and consequent increase in severity and intensity of bushfires leading to increased instream sedimentation in freshwaters, and potential degradation of larval rearing marine habitats due to warming.

Species Information

Description and Life History

The Riffle Shrimp is a migratory taxon (freshwater potandry); adults are found in freshwater rivers and migrate downstream to spawn. Juveniles migrate upstream, with some males transforming into females, with the period as a female longer than that as a male. Larvae have an estuarine/marine phase. They can climb over moist rock/concrete when out of the water, and have a strong swimming capability. Adults are primarily filter feeders, sweeping the stream substrate with their cheliped fan, and the predominant food is particulate organic matter.

Research on ecology was undertaken in Queensland (Smith 1987, 1994), and therefore some aspects of the taxon's ecology may be different in Victoria. Juvenile growth is rapid, (92 to 93 mm/61 days), and that of mature animals is slow (1 mm/870 days). Males are smaller than females, tending to be 9.5 to 10.5 mm Occipital Carapace Length (OCL) and females 12.5 to 14.5 mm OCL. Some individuals can become mature at smaller sizes (and earlier ages), e.g. males at 6.9 to 8.6 mm OCL, and females between 9.7 and 9.8 mm OCL Juvenile animals are smaller. Females, despite being larger, also possess a brood chamber, and males have an 'appendix masculina' on the second pair of pleopods (Smith and Williams 1982). Females must moult their carapace before they can breed and peak moult in Queensland occurs just before and after the breeding season. The breeding season can extend for 7 months between December and May, coinciding with the summer wet season, with eggs brooded for 1 to 2 months. Females can reproduce more than once a year, and some individuals can be hermaphroditic. Females carry between 2000 to 5000 eggs and the larvae released in freshwater. Most larvae drift downstream during the night: suggesting that flushes of stream water are required to get larvae downstream to estuaries (there is also the

possibility of adults migrating to lower elevations, closer to the coast, to release juveniles). The first larval stage (a zoea) required salinities less than 20 parts per thousand, and the yolk sac was found to allow downstream drift in freshwater streams to the estuary (8 to 17 days). The estuarine marine larval developmental stage is unknown, but a different species elsewhere takes 55 days for development. Upstream migrating juveniles may rest in rocky areas, feeding as they move upstream, being most common in streams between November and June. The upstream migration of juveniles to adult habitat can take 12 to 18 months, and adults live for more than 870 days (2.4+ years).

Generation Length

The generation length of *Australatya striolata* is estimated to be 1 to 3 years. This is based on data from Smith (1987, 1994) which demonstrated that the shrimp can live for more than 2.4 years.

Distribution

The taxon occurs in coastal catchments of eastern mainland Australia, predominantly Queensland and New South Wales. The Victorian distribution is the southern extent of its Australian range. It is only found in East Gippsland, and recorded to date from the Genoa River, the Snowy River system (Snowy River, Deddick River, Buchan River, Brodribb River), and more recently, from the Gippsland Lakes area near Bairnsdale (Forge Creek). It was recorded to 400 m in elevation in Victoria (Raadik unpublished data). It is difficult to know whether Victorian populations have been established for centuries, or are recently (decades) established due to random drift by larvae in ocean currents, or due to sea temperature rise due to climate change.

Habitat

Larvae occupy estuarine and marine environments, with juveniles migrating back into freshwater streams where they migrate upstream into higher elevation reaches, occupying large rivers and smaller creeks, in flowing water. They are usually found amongst rock substrate and often in very fast water. Upstream migrating juveniles prefer areas with rocks and large submerged snags.

Threats

Subpopulations and habitat in freshwater and estuaries are considered at risk from increasingly dry conditions from declining rainfall, and consequent increase in severity and intensity of bushfires, leading to increased instream sedimentation. Very small subpopulations are highly susceptible to stochastic events causing major decline or local extinction within a very short time frame. Impacts on the marine environment can be from increasing water temperature from climate change leading to increased mortality of juveniles, or changes in current patterns affecting recruitment.

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 Vulnerable

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

There has been a possible loss of individuals associated with adult habitat decline, based on climatic drying and increasing severity and intensity of bushfires.

Eligible under Criterion A3 as Vulnerable

The population reduction over the next 10 years is projected to be 20 to 40%, based on (c) above.

A future decline in population size is projected, based on an inferred decline in adult habitat based on climatic drying and increasing severity and intensity of bushfire.

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 B2 as Endangered

The Area of Occupancy (AoO) across the taxon's range is estimated to be 32 km², based on 2 x 2 km grids derived from accepted, post-1970 records in the Victorian Biodiversity Atlas, also on the very few detections from intensive field sampling across eastern coastal Victorian catchments.

It is estimated to have 1 location. It has a continuing decline in (i), (ii), (iii) and (v) above. There is expected to be a continuing loss of individuals, associated with continuing adult habitat decline which is based on climatic drying and increasing severity and intensity of bushfire (and increasing instream sedimentation).

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 for the taxon is available due to a lack of monitoring.

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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