

Threatened Species Assessment



Engaeus mallacoota Mallacoota Burrowing Crayfish

Taxonomy

Engaeus mallacoota Horwitz, 1990

Current conservation status

Listed as threatened under the *Flora and Fauna Guarantee Act 1988* (SAC 1993).

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

Proposed conservation status

Critically Endangered in Australia

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

Species Information


Description and Life History

The Mallacoota Burrowing Crayfish is a small terrestrial burrowing crayfish belonging to the southern hemisphere crayfish family Parastacidae. The species is separated from all other taxa in the genus by the combination of dimorphic chelae, intersexed, no pores on the lateral processes of the sternum, reduced spination on the uropods, and a short rostrum, and has a maximum recorded occipital carapace length of approximately 25 mm (Horwitz 1990). In the type locality the species builds burrow systems, into the banks of small creeks with silty/sandy soil free of vegetation in warm temperate rainforest (Horwitz 1990).

Burrowing crayfish spend most of their time underground and freshly excavated soil at burrow entrances is the most obvious sign of their presence. Surface activity is suspected to be nocturnal (Richardson and Swain 1980) and is linked to dispersal and foraging (Shaw 1996) and breeding (Van Praagh and Hinkley 1999). Activity is commonly related to seasonal rainfall (Morey and Hollis 1997, Van Praagh and Hinkley 1999). The cryptic behaviour of burrowing crayfish means little is known about their life history and ecology, including the Mallacoota Burrowing Crayfish. Poor dispersal, slow maturation and confinement to discontinuous habitats are common to short-range endemics (Harvey 2002) such as the Mallacoota Burrowing Crayfish. The diet of burrowing crayfish is predominantly plant-based and consists of roots, decomposing leaves and occasionally, small invertebrates (Lake and Newcombe 1975, Suter and Richardson 1977, Growns and Richardson 1988). Males surface during late spring and early summer to search for mates and then enter the burrows of females (Van Praagh and Hinkley 1999). Females incubate egg clusters under the abdomen and the juveniles hatch in late summer (Van Praagh and Hinkley 1999).

Generation Length

The generation length of *Engaeus mallacoota* is inferred to be 3 to 4 years. Life history and larval development studies on two Tasmanian species (*E. cisternarius* and *E. fossor*) suggest the life span may be 3-4 years for these species (Suter 1977). The Tasmanian species share some similarities with *E. mallacoota* so the generation length has been suggested as the same.



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Distribution

The 35 known species of the genus *Engaeus* are endemic to south-east Australia, with most occurring in Victoria and Tasmania (Horwitz 1994). The distribution of the Mallacoota Burrowing Crayfish is poorly known (DSE 2003). It has been recorded from only three sites near Mallacoota, one in the Double Creek catchment in Croajingolong National Park and two in the Davis Creek catchment in State forest.

Habitat

The Mallacoota Burrowing Crayfish occurs on the banks of small creeks (1-2 m wide) in Warm Temperate Rainforest where it constructs burrow systems in silty or sandy soils. The burrows consist of openings which are each capped with a conical soil chimney and descend into the bank at an oblique angle. They are complex, branching frequently, deep and are often filled with creek water (Horwitz 1990, DSE 2003).

Threats

All known habitat was impacted by the 2019-20 bushfires. The taxon is threatened by sediment and decline in water quality as result of fire, although the degree of damage is yet to be determined.

The major current and ongoing threat to this taxon is the decline in quality and quantity of habitat, both underground and at the surface. This can be caused by a range of threats, many of which are predicted to be exacerbated by climate change. These include declines in quantity and quality of groundwater and surface run-off as a result of drought, water extraction or alteration to stream flows; decline or loss of vegetation due to removal or disturbance (e.g. forestry operations, fire); soil disturbance (e.g. mechanical disturbance from forestry operations or fire suppression activities, and erosion during floods); sedimentation/smothering from overland debris flow during high rainfall events following soil disturbance; impact of chemicals during fire suppression activities; loss of areas of suitable soil profile in which to construct burrows and loss of food resources due to soil disturbance or loss of vegetation leading to various ecological changes. Changes to river discharge patterns can reduce the preferred adult macrohabitats and siltation from catchment erosion can smother the preferred spawning habitat (rocks).

Spatial analysis of likely habitat for the Mallacoota Burrowing Crayfish indicates that 68% occurs within the Comprehensive, Adequate and Representative (CAR) reserve system, including parks and reserves and special protection zones in State forest. Further areas are excluded from harvesting by prescription under the Victorian *Code of Practice for Timber Production 2014* (the Code). There are no species-specific protections for the taxon in the Code, however other more general prescriptions such as protection and buffering of rainforest, old growth forest and waterways also provide protection from timber harvesting.

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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>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 A3 as Vulnerable

The population reduction over the next 10 to 12 years is projected to be 40%, based on (c) above.

This figure is based on the assumption that climate change, principally through associated droughts and altered fire regimes, will continue to impact the taxon.

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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 B1 as Critically Endangered

The Extent of Occurrence (EoO) across the taxon's range is estimated to be 8 km², based on accepted, post-1970 records from the Victorian Biodiversity Atlas (VBA), and on the available records from field work. The EoO has been made equal to the AoO to ensure consistency with the definition of the AoO as an area within the EoO.

It is estimated to have one location, to have a continuing decline in (i), (ii), (iii) and (v), based on the assumption that the known threats will continue to impact the taxon, in particular climate change impacts (drought, fire).

Eligible under Criterion B2 as Critically Endangered

The Area of Occupancy (AoO) across the taxon's range is estimated to be 8 km², based on 2 x 2 km grids derived from accepted, post-1970 records in the VBA and on the available records from field work. As above, it is estimated to have 1 location to have a continuing decline in (i), (ii), (iii) and (v).

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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 as Data Deficient

There is insufficient evidence to determine the number of mature individuals.

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 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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