Threatened Species Assessment

Engaeus victoriensis
Foothill Burrowing Crayfish

Taxonomy

Engaeus victoriensis Smith & Schuster, 1913

Current conservation status

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

Proposed conservation status

Endangered in Australia

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

Species Information

Description and Life History

The Foothill Burrowing Crayfish is a small terrestrial burrowing crayfish belonging to the southern hemisphere crayfish family Parastacidae. The taxon is separated from all other taxa in the genus by the combination of: sternum without pores on LP 4th P, exopodite of third maxilliped either completely absent or reduced to very small movable tubercle, rostrum with upturned, apically sharp tip, antennal flagella not extending past posterior edge of carapace, rostral carinae usually conspicuously raised and 0.5-1.5 x rostral length, propodus and dactyl with tufts of small fine setae (which often give chelae a downy appearance) but without tufts of long bristle setae on dactyl (Horwitz 1990). Maximum recorded length (occipital carapace length) is about 39 mm, burrows are constructed, specimens are usually not intersexed, and more than one animal is usually present within burrow systems (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 Foothill Burrowing Crayfish. Poor dispersal, slow maturation and confinement to discontinuous habitats are common to short-range endemics (Harvey 2002) such as the Foothill 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 the Foothill Burrowing Crayfish is inferred to be 3 to 4 years. Life history and larval development studies on two Tasmanian taxa (*E. cisternarius* and *E. fossor)* suggest the life span may be 3 - 4 years for these taxa (Suter 1977). The Tasmanian taxa share some similarities with *E. urostrictus* in occupying wet forest habitats (Horwitz, 1990) 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 Foothill Burrowing Crayfish is found north-west, west, and south of the Dandenong Ranges, from Panton Hill in the north to Flinders in the south on the Mornington Peninsula, and has been recorded in the eastern suburbs of Melbourne (i.e. Box Hill, Croydon and Ringwood); these populations may be slowly eliminated. The populations at Dandenong and the Mornington Peninsula appear to be disjunct (Horwitz 1990). Much of its distribution is in areas of urban or semi-urban development, with only a small portion within parks or reserves.

Habitat

This taxon is found in the foothills of Melbourne where can be found in either type 2 or type 3 burrows in grey, clay-dominated soils in wet sclerophyll forest at the foot of the Dandenong Ranges, usually in the low lying parts of creeks (Horwitz 1990).

Threats

The major 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 decline in quantity and quality of groundwater, or surface run-off (from drought, water extraction, or alteration to stream flows); decline or loss of vegetation due to removal or disturbance (e.g. urban or agricultural development, fire); soil disturbance (e.g. mechanical disturbance from agriculture or fire suppression activities, and erosion during floods); sedimentation/smothering from overland debris flow during high rainfall events following soil disturbance; impact of chemicals from agriculture or during fire suppression activities; loss of areas of suitable soil profile in which to construct burrows; loss of food resources due to soil disturbance or loss of vegetation leading to various ecological changes; and trout predation. Changes to river discharge patterns can reduce the preferred adult macrohabitats, and siltation from catchment erosion can smother the preferred spawning habitat (rocks).

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 a reduction in population (criterion A2). The future population reduction does not meet the threshold for eligibility under criterion A3.

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 2,377 km², based on accepted, post-1970 records from the Victorian Biodiversity Atlas (VBA), and also based on the available records from field work.

It is estimated to have one location, based on the possibility of the main threats impacting all subpopulations at one time, notably climate change-induced impacts such as drought, fire, etc.

It has a continuing decline in (iii) and (v) above. Climate change impacts and urban/semi urban development are suspected to be causing the decline of this taxon. This decline is suspected to increase in the near future.

Eligible under Criterion B2 as Endangered

The Area of Occupancy (AoO) across the taxon's range is estimated to be 76 km², based on 2 x 2 km grids derived from accepted, post-1970 records in the VBA and on field records. As above, it is estimated to have 1 location and a continuing decline in (iii) 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.

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 inferred 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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