

**Advice to the Minister for the Environment, Heritage and the Arts  
from the Threatened Species Scientific Committee (the Committee)  
on Amendment to the list of Threatened Species under the  
*Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act)***

**1. Scientific name (common name)**

*Engaewa pseudoreducta* (Margaret River Burrowing Crayfish)

**2. Reason for Conservation Assessment by the Committee**

This advice follows assessment of information provided by a public nomination to list the Margaret River Burrowing Crayfish. The nominator suggested listing the species in the critically endangered category. The Committee provides the following assessment of the species' eligibility for inclusion in the EPBC Act list of threatened species.

This is the Committee's first consideration of the species under the EPBC Act.

**3. Summary of Conclusion**

The Committee judges that the species has been demonstrated to have met sufficient elements of Criterion 2 to make it eligible for listing as **critically endangered**.

The highest category for which the species is eligible to be listed is **critically endangered**.

**4. Taxonomy**

The species is conventionally accepted as *Engaewa pseudoreducta* (Margaret River Burrowing Crayfish) (Horwitz and Adams, 2000).

**5. Description**

The Margaret River Burrowing Crayfish is a small burrowing crayfish up to 50 mm in length. It is generally a pale to mid-brown colour with purplish-blue claws. Distinctive characteristics of burrowing crayfish include a narrow abdomen which may be shorter than the head and thorax, reduced eye size and large claws adapted to digging, with the fingers of the claws moving in a vertical plane.

The Margaret River Burrowing Crayfish is almost identical in appearance to closely related species such as *E. reducta* (Dunsborough Burrowing Crayfish) and *E. walpolea* (Walpole Burrowing Crayfish). Identification of the individual species can be determined by examining anatomical features under a microscope. Margaret River Burrowing Crayfish are distinguished from other *Engaewa* species by several anatomical differences including the absence of rostral carinae (raised ridges on the upper surface of the head) and the absence of pits or pores on the lateral processes (side projections) of the 3<sup>rd</sup> and 4<sup>th</sup> pereopods (walking legs). In the field, these species are more easily distinguished from each other by the river system in which they are found, as they have extremely limited capacity for dispersal and are geographically isolated (Horwitz and Adams, 2000).

**6. National Context**

The Margaret River Burrowing Crayfish is endemic to south-western Western Australia, and is only known from one area near Margaret River, 250 km south of Perth. The species occurs as two extant subpopulations in the headwaters of a small tributary of the Margaret River in a

section of State Forest that is informally reserved as a river and stream zone but has no formal protection (DEC, 2008). The two extant populations are now isolated due to severe habitat degradation.

The Margaret River Burrowing Crayfish is listed under the Western Australian *Wildlife Conservation Act 1950* as Schedule 1 Fauna (fauna that is rare or likely to become extinct) and ranked as critically endangered for management purposes.

## 7. Relevant Biology / Ecology

Habitat for the Margaret River Burrowing Crayfish is in the narrow creek tributaries of the Margaret River which are densely vegetated on heavy grey/yellow clay soils. Associated vegetation includes tall tea-trees (*Melaleuca* sp.) and eucalypts (*Eucalyptus* spp.). In these soils, Margaret River Burrowing Crayfish construct a complex burrow system that can be several metres deep, extending down to the freshwater watertable in drier months. At wetter times of the year burrows are marked by conspicuous chimneys of soil pellets (Burnham et al., 2007).

The existing populations of Margaret River Burrowing Crayfish and their habitat occur in State Forest. The majority of habitat formerly suitable for this species has been severely degraded by land clearing and cattle access.

It is likely that the Margaret River Burrowing Crayfish is a social species as multiple specimens have been collected from single burrows. This is consistent with the *Engaewa* spp. burrowing crayfish of eastern Australia, where adults and juveniles are known sometimes to occupy the same burrow (Burnham, 2005; Burnham et al., 2007).

The animals are difficult to study in the wild and details of diet and reproduction are not known. Other burrowing freshwater crayfish are believed to eat rotting wood, detritus, root material and occasionally animal material (Suter and Richardson, 1977; Gowns and Richardson, 1988; Bryant and Jackson, 1999). No egg-carrying specimens of Margaret River Burrowing Crayfish have been collected, however, the maximum recorded egg-count for the closely related *Engaewa similis* is 25 (Horwitz and Adams, 2000). *Engaewa* spp. burrowing crayfish may surface in extremely wet conditions, when watertables are rising and shallow surface water is present. This phenomenon is rare, and may be related to mate-searching and reproduction or avoidance of high groundwater levels and floodwaters.

The lifespan and age at sexual maturity for Western Australian burrowing crayfish species are unknown. The only published information that may be relevant is provided by Hamr and Richardson's study of the south-western Tasmanian burrowing crayfish species *Parastacoides tasmanicus tasmanicus*. This species attains sexual maturity at 3–5 years and has a life span of up to 10 years (Hamr and Richardson, 1994), providing a minimum generation length of six years. However, this slow growth rate and longevity is considered due to the coldness of the groundwater in south-western Tasmania (Hamr and Richardson, 1994); the generation length of Western Australian burrowing crayfish may be shorter given that the groundwater is likely to be warmer.

The burrowing crayfish species of Western Australia, including the Margaret River Burrowing Crayfish, have been described as ecosystem engineers due to their burrowing habits, which enhance the flow of oxygen, water and nutrients through soil profiles, and create permanent habitats or seasonal refuges for other organisms in the form of their burrows (Horwitz and Rogan, 2003).

## 8. Description of Threats

The main threat to the Margaret River Burrowing Crayfish is habitat loss caused by anthropogenic disturbance within the species' very limited range. Land clearing for agriculture and forestry has removed habitat for the species and may have increased salinity in habitats utilised by the species. Farm dam construction has flooded suitable habitat and has altered surface water and groundwater flows. Cattle grazing has physically destroyed burrows through trampling and soil compaction, has created serious erosion and has impaired soil permeability and water holding capacity (Burnham, 2005; Burnham et al., 2007).

Potential threats to the Margaret River Burrowing Crayfish include drainage for peat, sand mining or agriculture activities, which can desiccate the species' moisture-rich habitats, and water extraction from bores, which can lower water tables, desiccate moisture-rich habitats and potentially cause acidification and mobilisation of toxic metal ions in wetlands.

Feral pigs (*Sus scrofa*) are an additional potential threat, as feral pig numbers are increasing in south-western Western Australia due to illegal introductions by recreational pig hunters and subsequent reproductive success. Feral pigs may damage habitat through ground-rooting feeding behaviour and directly prey on crayfish during rare surfacing events (Spencer and Hampton, 2005).

Further threats that have not been quantified but may be detrimental to the Margaret River Burrowing Crayfish include fire, road and bridge construction, disease from introduced crayfish species, exposure and subsequent hydration of acid sulphate soils, use of pesticides, fertilisers or herbicides that contaminate or reduce water quality, and climate change reducing rainfall and wetland habitats (Burnham, 2005; Burnham et al., 2007).

## 9. Public Consultation

The nomination used in this assessment was made available for public exhibition and comment for 30 business days. No comments were received.

## 10. How judged by the Committee in relation to the criteria of the EPBC Act and Regulations

The Committee judges that the species is **eligible** for listing as **critically endangered** under the EPBC Act. The assessment against the criteria is as follows:

**Criterion 1: It has undergone, is suspected to have undergone or is likely to undergo in the immediate future a very severe, severe or substantial reduction in numbers.**

The Margaret River Burrowing Crayfish has only been recorded from three sites, with each site representing an isolated population due to severe habitat degradation preventing movement between sites. The species is presumed extinct at the site from which it was first collected. This site was dammed immediately prior to when the species was found and described in 1985. No specimens have since been found at this site despite repeated searches between 1989 and 2008 (DEC, 2008). This localised extinction represents a 33% decline in known populations and extent of occurrence over approximately four years. However, although substantial, this decline occurred approximately 20 years ago, which is likely to be longer than three generations of the species, and is therefore not within a biologically relevant timeframe. There are also insufficient data to determine whether the two extant populations have suffered a decline in numbers within a biologically relevant timeframe, or are likely to undergo a very severe, severe or substantial reduction in numbers in the immediate future. Therefore, the species has not been demonstrated

to have met the required elements of Criterion 1, and is **not eligible** for listing in any category under this criterion.

**Criterion 2: Its geographic distribution is precarious for the survival of the species and is very restricted, restricted or limited.**

The current area of occupancy for the two extant populations of Margaret River Burrowing Crayfish is less than 1 km<sup>2</sup> and has been calculated by measuring suitable habitat in the immediate vicinity of collected specimens. The Committee considers this area of occupancy to be very restricted. The two populations are isolated from each other, increasing the species' risk of extinction. The two populations are subject to a number of current threats (including land clearing for agriculture and forestry, farm dam construction and cattle grazing) and a number of potential threats (including drainage activities, feral pigs, groundwater extraction, road and bridge construction, fire and reduced rainfall from climate change) (Burnham, 2005; Burnham et al., 2007), which are likely to cause ongoing declines in numbers and area of occupancy. The Committee considers this geographic distribution to be precarious for the species' survival. Therefore, the species meets sufficient elements of Criterion 2 to make it eligible for listing as **critically endangered**.

**Criterion 3: The estimated total number of mature individuals is limited to a particular degree; and either**

- (a) **evidence suggests that the number will continue to decline at a particular rate; or**
- (b) **the number is likely to continue to decline and its geographic distribution is precarious for its survival.**

The Margaret River Burrowing Crayfish has a very restricted area of occupancy of less than 1 km<sup>2</sup> and is found in two isolated populations, increasing the species' risk of extinction. The number of mature individuals has not been quantified, but is likely to be small given its very restricted area of occupancy. Further, one of the three known populations of Margaret River Burrowing Crayfish has become extinct. The two populations are subject to a number of current threats (including land clearing for agriculture and forestry, farm dam construction and cattle grazing) and a number of potential threats (including drainage activities, feral pigs, groundwater extraction, road and bridge construction, fire and reduced rainfall from climate change) (Burnham, 2005; Burnham et al., 2007). However, there are no actual estimates of numbers of mature individuals, and consequently, data are inadequate to accurately quantify whether the number is limited to a particular degree. Therefore, the species has not been demonstrated to have met the required elements of Criterion 3, and is **not eligible** for listing in any category under this criterion.

**Criterion 4: The estimated total number of mature individuals is extremely low, very low or low.**

The number of mature individuals of Margaret River Burrowing Crayfish is likely to be small. However, there are no actual estimates of numbers of mature individuals, and consequently, insufficient data are available to accurately quantify whether they are extremely low, very low, low or not low. Therefore, the species has not been demonstrated to have met the required elements of Criterion 4, and is **not eligible** for listing in any category under this criterion.

**Criterion 5: Probability of extinction in the wild that is at least**

- (a) **50% in the immediate future; or**
- (b) **20% in the near future; or**
- (c) **10% in the medium-term future.**

No quantitative (statistical) analyses have been done to estimate a probability of extinction of the Margaret River Burrowing Crayfish in the wild over a relevant timeframe. Therefore, the species has not been demonstrated to have met the required elements of Criterion 5, and is **not eligible** for listing in any category under this criterion.

## **11. CONCLUSION**

### **Conservation Status**

*Engaewa pseudoreducta* (Margaret River Burrowing Crayfish) was nominated for inclusion in the list of threatened species referred to in section 178 of the EPBC Act. The nominator suggested listing in the critically endangered category of the list.

The Committee accepts that the current area of occupancy for the two extant populations is less than 1 km<sup>2</sup>, and judges this to be very restricted. The Committee also accepts that the two extant populations are isolated from each other, increasing the species' risk of extinction, and are subject to a number of current and potential threats. The Committee judges the species' geographic distribution to be precarious for its survival. Therefore, the species meets sufficient elements of Criterion 2 to make it eligible for listing as **critically endangered**.

### **Recovery Plan**

The approved conservation advice for the species now provides sufficient direction to implement priority actions and mitigate against key threats. Further actions are being implemented as described in the Western Australian Department of Environment and Conservation's 'Dunsborough Burrowing Crayfish (*Engaewa reducta*), Margaret River Burrowing Crayfish (*Engaewa pseudoreducta*) and Walpole Burrowing Crayfish (*Engaewa walpolea*) Recovery Plan 2007–2016. Interim Recovery Plan No. 41'.

A nationally adopted recovery plan is not considered to be necessary at this time.

## **12. Recommendations**

- (i) The Committee recommends that the list referred to in section 178 of the EPBC Act be amended by including in the list in the **critically endangered** category:

### ***Engaewa pseudoreducta* (Margaret River Burrowing Crayfish)**

- (ii) The Committee recommends that there should not be a recovery plan for this species at this time.

Associate Professor Robert J.S. Beeton  
Chair  
Threatened Species Scientific Committee

### 13. References cited in the advice

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