

**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 walpolea* (Walpole Burrowing Crayfish)

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

This advice follows assessment of information provided by a public nomination to list the Walpole Burrowing Crayfish. The nominator suggested listing the species in the vulnerable 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 **endangered**.

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

**4. Taxonomy**

The species is conventionally accepted as *Engaewa walpolea* (Walpole Burrowing Crayfish) (Horwitz and Adams, 2000).

**5. Description**

The Walpole 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 Walpole Burrowing Crayfish is almost identical in appearance to closely related species such as *E. pseudoreducta* (Margaret River Burrowing Crayfish) and *E. reducta* (Dunsborough Burrowing Crayfish). Identification of the individual species can be determined by examining anatomical features under a microscope. Walpole Burrowing Crayfish are distinguished from other *Engaewa* species by several anatomical features including a backward pointing tip on the keel of the sternum (a central ridge running between the leg attachment points on the underside of the thorax) and granulate carinae (bead-like ridges) on the underside of the propodus (penultimate leg segment). 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 Walpole Burrowing Crayfish is endemic to southern Western Australia, and is only known from three locations near Walpole, approximately 450 km south of Perth. The species has been collected from 25 sites within these three locations, and 24 of these sites are within Walpole-Nornalup National Park.

The Walpole 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 vulnerable for management purposes.

## 7. Relevant Biology/Ecology

The Walpole Burrowing Crayfish uses a variety of habitats that provide very moist soils and a shallow, very accessible watertable. These habitats include headwater seepages and broad drainage depressions. Soil types range from coarse gravelly sand, sandy loams and silty loams rich in organic material. The Walpole Burrowing Crayfish constructs burrows in these soils that extend down to the watertable. The burrows of Walpole Burrowing Crayfish are generally short and inconspicuous, and the soil pellet chimneys that are often characteristic of other *Engaewa* species' burrows are reduced or absent. Native vegetation types associated with these habitats are Karri (*Eucalyptus diversicolor*) woodlands, sedges, peatbogs and heathlands. One population is known from an area with non-native vegetation cover comprising introduced *Dicksonia* species (Burnham, 2005; Burnham et al., 2007).

It is likely the Walpole Burrowing Crayfish is a social species as multiple specimens have been collected from single burrows. This is consistent with the *Engaeus* 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; Grown and Richardson, 1988; Bryant and Jackson, 1999).

There is little data on the fecundity of Walpole Burrowing Crayfish. However one female has been collected carrying 15 juveniles, and two females have been collected carrying 8 and 15 eggs respectively. These egg counts are similar to the closely related *Engaewa similis*, in which egg counts of up to 25 have been recorded (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, providing a minimum generation length of six years (Hamr and Richardson, 1994). 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 Walpole 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 Walpole Burrowing Crayfish has been habitat loss and destruction caused by anthropogenic disturbance within the species' range. Land clearing for agriculture and forestry has removed habitat for 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). These processes have led to the extinction of one population and have likely led to other unrecorded, localised population extinctions. However, the species is now largely protected from the threat of anthropogenic disturbance as 24 out of 25 sites where the species is known to occur are located within Walpole-Nornalup National Park.

Potential threats to extant Walpole Burrowing Crayfish populations within Walpole-Nornalup National Park include reduced rainfall from climate change, feral pigs (*Sus scrofa*) and fire. Reduced rainfall from climate change may lead to the drying out and loss of swamp and drainage system habitats. 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). Fire can severely damage swamp habitats and destroy the organic content, structure and water absorption capabilities of soils found in those habitats. A further threat that has not been quantified but may be detrimental to the Walpole Burrowing Crayfish is disease from introduced crayfish species (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 **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 Walpole Burrowing Crayfish has been recorded from 25 sites within its known range, however it has been extirpated from the original site of discovery in 1981 following severe habitat degradation caused by clearfell logging and subsequent cattle grazing. This local extinction represents a decline in area of occupancy and numbers, although this decline has not been quantified. Much of the species' broader habitat has also been degraded, which is likely to have caused declines in area of occupancy and numbers, but these declines are also unquantified. 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 extent of occurrence of the Walpole Burrowing Crayfish has been estimated at approximately 55 km<sup>2</sup> based on the area encompassed by all known sites. The species' area of occupancy is estimated at 10 km<sup>2</sup> and has been calculated by measuring the area of vegetated swamp/drainage system habitats where the species has been collected. The Committee judges this geographic distribution to be restricted, noting 24 of the 25 extant populations of Walpole Burrowing Crayfish occur in Walpole–Nornalup National Park, where they are relatively secure from degrading land uses and appear to have some connectivity. The Committee further judges this geographic distribution to be precarious for the survival of the species, given the species' naturally limited, fragmented swamp habitats and potential threats such as reduced rainfall from climate change, feral pigs and fire. Therefore, the species meets sufficient elements of Criterion 2 to make it eligible for listing as **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 Walpole Burrowing Crayfish has a restricted area of occupancy of approximately 10 km<sup>2</sup> and is found at 25 sites within three locations. The three locations are suspected to represent three to four subpopulations. The number of mature individuals has not been quantified, but is likely to be small given the restricted area of occupancy. Further, one known population of Walpole Burrowing Crayfish has become extinct. The extant populations are subject to a number of potential threats, such as reduced rainfall from climate change, feral pigs and fire. 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 Walpole 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:**

- 50% in the immediate future; or**
- 20% in the near future; or**
- 10% in the medium-term future.**

No quantitative (statistical) analyses have been done to estimate a probability of extinction of the Walpole 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 walpolea* (Walpole 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 endangered category of the list.

The Committee accepts that the current area of occupancy for the species is estimated at 10 km<sup>2</sup>, and judges this to be restricted. The Committee also accepts the species' geographic distribution is precarious for its survival, given its naturally limited, fragmented swamp habitats and potential threats such as reduced rainfall from climate change, feral pigs and fire. Therefore, the species meets sufficient elements of Criterion 2 to make it eligible for listing as **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 **endangered** category:

### *Engaewa walpolea* (Walpole 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

- Bryant S and Jackson J (1999). Tasmania's Threatened Fauna Handbook Threatened Species Handbook. Parks and Wildlife Service Tasmania.
- Burnham QF (2005). The systematics of the *reducta* complex of the burrowing freshwater crayfish *Engaewa* Riek. Honours thesis, Edith Cowan University, Perth.
- Burnham QF, Koenders A and Horwitz P (2007). Field studies into the biology and conservation requirements of *Engaewa* species in the South-West and Warren DEC Regions. Final Report Prepared for DEC November 30, 2007.
- Growns IO and Richardson AMM (1988). The diet and burrowing habits of the freshwater crayfish *Parastacoides tasmanicus tasmanicus* Clark (Decapoda: Parastacidae). Australian Journal of Marine and Freshwater Research 39: 525–534.
- Hamr P and Richardson A (1994). Life history of *Parastacoides tasmanicus tasmanicus* Clark, a burrowing freshwater crayfish from south-western Tasmania. Australian Journal of Marine and Freshwater Research 45: 455–70.
- Horwitz P and Adams M (2000). The systematics, biogeography and conservation status of the species in the freshwater crayfish genus *Engaewa* Riek (Decapoda: Parastacidae) from south-western Australia. Invertebrate Taxonomy 14: 655–680.
- Horwitz P and Rogan R (2003). Aquatic macroinvertebrate and non-flowing wetland values of the Yarragadee (outcropping and subcropping) groundwater dependent systems of far south-western Australia. Final Report Stages 1 and 2. Centre for Ecosystem Management, Edith Cowan University.
- Spencer PBS and Hampton JO (2005). Illegal translocation and genetic structure of feral pigs in Western Australia. Journal of Wildlife Management 69: 377–384.
- Suter PJ and Richardson AMM (1977). The biology of two species of *Engaewa* (Decapoda: Parastacidae) in Tasmania. III. Habitat, food, associated fauna and distribution. Australian Journal of Marine and Freshwater Research 28: 95–103.