



**Habitat preferences and water requirements of  
the Mt. Arthur burrowing crayfish (*Engaeus  
orramakunna*) and the Scottsdale burrowing  
crayfish (*Engaeus spinicaudatus*)**

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#### **The Department of Primary Industries and Water**

The Department of Primary Industries and Water provides leadership in the sustainable management and development of Tasmania's resources. The Mission of the Department is to advance Tasmania's prosperity through the sustainable development of our natural resources and the conservation of our natural and cultural heritage for the future.

The Water Resources Division provides a focus for water management and water development in Tasmania through a diverse range of functions including the design of policy and regulatory frameworks to ensure sustainable use of the surface water and groundwater resources; monitoring, assessment and reporting on the condition of the State's freshwater resources; facilitation of infrastructure development projects to ensure the efficient and sustainable supply of water; and implementation of the *Water Management Act 1999*, related legislation and the State Water Development Plan.

## **Habitat preferences and water requirements of the Mt. Arthur burrowing crayfish (*Engaeus orramakunna*) and the Scottsdale burrowing crayfish (*Engaeus spinicaudatus*)**

Species of *Engaeus* are small (body length commonly <100 mm) freshwater crayfish that are characterised by their ability to burrow. Four burrowing crayfish (*Engaeus* spp.) which are endemic to Tasmania are of conservation concern due to their restricted distributions and several localised threats (Bryant & Jackson, 1999). The distributions of two of these species, Mt. Arthur burrowing crayfish (*E. orramakunna*) and Scottsdale burrowing crayfish (*E. spinicaudatus*), are confined to north-eastern Tasmania and both are known to occur in the Great Forester catchment. *Engaeus orramakunna* has an extent of occurrence of ~300 km<sup>2</sup> that is centred around Mt. Arthur and its distribution extends to near Lilydale, Nabowla and South Springfield, whereas *E. spinicaudatus* is found north of Scottsdale within an area of ~34.5 km<sup>2</sup> (Doran, 2000). *Engaeus orramakunna* is listed as 'vulnerable' under both the Tasmanian *Threatened Species Protection Act 1995* and Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* and 'endangered' on the 2006 *IUCN Red List of Threatened Species* (IUCN, 2006). *Engaeus spinicaudatus* is listed as 'endangered' under both of these statutes and on the *IUCN Red List* (IUCN, 2006). A distinctive fauna consisting of mainly crustaceans and insect larvae occupies the burrows created by burrowing crayfish (Horwitz, 1991); therefore, crayfish are also important to the biodiversity of the regions in which they occur.

Both *E. orramakunna* and *E. spinicaudatus* have recently been managed under DPIW threatened species recovery plans (Doran, 2000; Gaffney & Horwitz, 1992). The most recent recovery plan (Doran, 2000) provides a brief review of the known habitat requirements of these species and outlines management actions. Currently, DPIW routinely surveys the locations of proposed forestry coupes in areas of potential habitat for these species and is monitoring known *E. spinicaudatus* populations on a regular basis. However, several areas of the ecology of these species remain unknown, particularly associations between instream flows and groundwater fluctuations and their life cycles and habitat use. Despite these knowledge gaps, population surveys (Doran & Richards, 1996; Horwitz, 1990, 1991) have characterised the preferred habitats of *E. orramakunna* and *E. spinicaudatus*. Furthermore, some aspects of life history of both species have been determined (Horwitz, 1990). Based on this information, the following is a summary of the habitat preferences of these species, with a focus on direct and indirect requirements that relate to instream flows and groundwater:

- *Engaeus orramakunna* prefers moist flat swampy land near streams and rivers, but is also found in stream banks and anthropogenically modified habitats such as wet pasture, culverts and roadside drains (Doran & Richards, 1996; Doran, 2000). *Engaeus spinicaudatus* is primarily found in buttongrass and healthy plains, but also occurs in floodplains of creeks, creekbanks and wet pasture (Doran, 2000; Horwitz, 1991).
- The burrows of *E. spinicaudatus* can be classed as type 2 and *E. orramakunna* as type 2 and 3 according to the classification scheme of Horwitz & Richardson (1986). Type 2 burrows are found connected to the watertable and receive their water from both groundwater and surface run-off, whilst type 3 burrows are

independent of the watertable and derive their water from run-off only. *Engaeus orramakunna* burrows mostly occur in areas of high soil moisture and high clay content (Doran & Richards, 1996) and *E. spinicaudatus* burrows in peat-based soils which contain some clay in the vertical profile (Gaffney & Horwitz, 1992).

- Seasonal instream flows, especially high flows and flood events, are important for the maintenance of riparian habitats, including vegetation (Boulton & Brock, 1999). Because riparian areas are occupied by both *E. orramakunna* and *E. spinicaudatus*, instream hydrological cycles are important to these species. Native riparian vegetation helps stabilise substrates in bank and floodplain habitats and it also helps maintain groundwater levels. Soil moisture is very important to burrowing crayfish and can control the distribution of populations (especially distances from streams) (Doran & Richards, 1996). Therefore, the regulation of soil moisture content provided by vegetation cover may also be important to these species.
- Seasonal instream flows, especially high flows and flood events, are important for the maintenance of groundwater levels and the moisture content of soils in floodplains and nearby habitats. High flow events recharge soak areas and the timing of these events may provide important cues for stages in the life cycles of these species. *Engaeus orramakunna* breeds in late winter – spring (Doran & Richards, 1996; Horwitz, 1990) and *E. spinicaudatus* in late spring – summer (Horwitz, 1991).
- In most of the habitats occupied by *E. orramakunna* and in all of those occupied by *E. spinicaudatus*, access to groundwater is critical. For *E. spinicaudatus*, levels  $\leq 1$  m below the ground surface are thought to be important (Gaffney & Horwitz, 1992). For this reason, actions that alter groundwater levels (e.g. extractions) need to ensure natural levels and seasonal fluctuations are maintained in regions where these species occur.
- Seasonal instream flow regimes and healthy native riparian and terrestrial vegetation help maintain the quality of both surface water and groundwater and, therefore, are important to *E. orramakunna* and *E. spinicaudatus*.

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