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AUSTRALIA'S MOST DIVERSE CRAYFISH HABITAT?

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Abstract

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Labertouche Creek, a tributary of the Tarago River in West Gippsland, arguably has the most diverse freshwater crayfish assemblage in Australia. Six crayfish species are known from the creek, including the rare and vulnerable Warragul Burrowing Crayfish, *Engaeus sternalis*, the only known location of this species in Australia (Horwitz, 1990, 1992). Other species of burrowing crayfish found are *E. hemicirratulus*, *E. cunicularius*, and *E. quadrimanus*. Two species of *Euastacus* (Spiny Freshwater Crayfish) are also known from these waters, *Euastacus yarraensis* and *E. kershawi* (Gippsland Spiny Crayfish). A third species, *E. woiwuru*, is possibly present, as the creek is shown to be within this species' range.

Introduction

Labertouche Creek, a tributary of the Tarago River in West Gippsland, possibly has Australia's most diverse freshwater crayfish assemblage, with six species of freshwater crayfish (four species of burrowing crayfish of the genus *Engaeus* (Decapoda: Parastacidae) and two spiny crayfish of the genus *Euastacus* (Decapoda: Parastacidae) known to be present and a seventh species (*E. woiwuru)* suspected of being present, as the creek is within its range (Morgan, 1986). Adult burrowing crayfish are generally small, total length rarely exceeding 100 mm, whereas the adult spiny crayfish are considerably larger than 100 mm in total length.

A survey was conducted to confirm the presence of the Warragul Burrowing Crayfish, *Engaeus sternalis* (Clark), and determine the suitability of pitfall trapping as a survey technique for the species. *E. sternalis* has been classified as Endangered by the Department of Conservation and Natural Resources on the basis of its single confirmed location and as a 'taxa in danger of extinction in Victoria and whose survival is unlikely if the factors causing their decline continue operating' (CNR, 1993, IUCN, 1983). The species was listed under the Flora and Fauna Guarantee Act 1988 in March 1993 (SAC, 1993).

Specimens were collected in pit fall traps adjacent to the creek following heavy spring rain during this survey. Three pitfall lines, consisting of between 6 and 41 traps, constructed from 90 mm PVC tubing cut into 200 mm lengths, (with tin lids in the bottom), were established in grazing land adjacent to Labertouche Creek, 50 m downstream from the 1982 collection site of *E. sternalis* (Horwitz, pers comm). The pitfall traps were distributed at approximately 0.5 m intervals at a number of different locations at the study site to determine whether *E sternalis* utilises different areas along the creek. This included pitfall traps located along the bank of the creek (<1 m to edge), perpendicular to the creek (approx 10 m) and in the banks of the creek. Several traps installed in the banks of the creek were lost during floods. Trapping commenced on 26 Jun 1995 and continues to the present. A 200 mm high driftfence was erected between pitfall traps to act as a superficial barrier directing greater numbers into the pits than would otherwise occur. This driftfence however, was removed on 31 Jul 1995 due to the presence of cattle at the study site. Pitfall traps were checked mostly at 2–5 day intervals.

Results of pittfall trapping to mid-November are summarised in Table 1. No crayfish were caught in traps between 26 June and 8 August. All species were collected from September onwards, usually after rainfall, however *E. sternalis* was only captured after rainfall. *E. sternalis* and *E. cunicularius* have so far only been collected within 0.5 m to the creek bank, whereas *E. quadrimanus* and *E. hemicirratulus* were recorded along the bank and up to 8 m perpendicular to the bank within the cleared grazing area. The number of adults collected was almost the same as the number of juveniles (14 adults, 15 juveniles), indicating both age classes responded equally to, or took advantage of, the wet weather to disperse on the surface. It is still not known how *E. sternalis* reaches the surface, as none of its tunnel systems so far investigated has come to the surface (Horwitz, 1990a).

Table 1. *Engaeus* species collected in pitfall traps adjacent to Labertouche Creek 26 Jul to 20 Nov 1995. F = Female, M = Male, u = Sex unknown, ad = adult, juv = juvenile, E *quad/cunic* = unable to identify.

Date	*E sternalis*	*E hemicirratulus*	*E quadrimanus*	*E cunicularius*	*E quad/cunic*
8 Aug			1u (ad)	1u (ad)	
13 Sep	1F (ad)	2u (juv)			
21 Sep		1u (juv)			
24 Sep				1M (ad)	
8 Oct		1u (juv)			
14 Oct			2u (ad)	1M, 1F (ad)	5u (juv)
21 Oct	1F (ad)	1u (juv)	1F (ad)		
23 Oct			1F (ad)	1M (ad)	
29 Oct		1u (ad)			
10 Nov	1u (juv)	1M (ad)	1u(juv?)		3u (juv)
Total	**3**	**7**	**6**	**5**	**8**

Species encountered

Engaeus sternalis. Despite extensive searching, the only known location in Australia of this species is on Labertouche Creek and prior to this survey, was found in complex burrow systems in clayey soils in the creek bank (Horwitz, 1990a, 1990b). Nothing is known about its biology or ecology This species is easily identified by its pale yellow-grey colour, a covering of fine downy hairs on its carapace and dimorphic chelae, and very small eyes.

Engaeus hemicirratulus Smith and Schuster, is a common burrowing species easily identified by its bright orange claws, many stiff hairs and very short antennae. Their burrows typically have a fan shaped chimney, with tunnels descending obliquely to chambers which are occasionally just below the ground surface. Males and females are frequently found together in the same burrow and are usually accompanied by juveniles (Horwitz, 1990b). Burrows are typically in yellow-orange clay dominated soils, which was originally covered in dense wet forest. This species is common and widespread throughout its range in Gippsland, usually above an altitude of 100m.

Engaeus cunicularius (Erichson) is a common species, generally brown and with the top side of dactyl (the smaller movable part of the claw), slightly rough or granulated (Horwitz, 1990b). Often found in sympatry with *E quadrimanus*, and in similar habitat types (Horwitz, 1990b). It constructs burrows connected to the water table and/or to permanent water (Horwitz and Richardson, 1986; Horwitz, 1990b). *E. cunicularius* is found from near the Otways in western Victoria throughout south eastern Victoria, the Bass Strait islands and Tasmania (Horwitz, 1990b).

Engaeus quadrimanus Clark, another common species, is very similar to *E. cunicularius* but the dactyl is smooth. These two can only be distinguished from each other as adults; if total length (tip of claws to tip of tail) is 50–60 mm. It is considered a lowland species and found in a range of vegetation types from ferny gullies to near rainforest, and in swamps and creeks (Horwitz, 1990b). *E. quadrimanus* constructs burrows, usually with more than one opening and often with conical, pelleted chimneys, down to the water table (Horwitz, 1990b, Horwitz and Richardson, 1986). Distribution is from north of Melbourne to Mallacoota, near the Victoria-New South Wales border (Horwitz, 1990b).

Euastacus yarraensis (McCoy) is generally dark olive green with white and orange claws. The spines on the abdomen and some bumps on the carapace are orange with white tips/centres. Females mature at close to 40 mm Occipital Carapace Length, (the distance from the rear of the eye socket to the centre of the posterior of the carapace). Berried females have been collected in surveys in September through to November (Morgan, 1986). *E. yarraensis* is found from the Tarago River through to the Otways in south western Victoria.

Euastacus kershawi (Smith) (Gippsland Spiny Crayfish) is usually dark olive green, often with orange markings on the under-side, but with no white on the claws, and has sharp spines on the front legs and abdomen. It can grow large, although specimens over 120 mm carapace length are uncommon. Females are generally sexually mature at OCL greater than 85 mm, although some specimens appear to be sexually mature between 50 mm to 80 mm OCL (Morgan, 1986). Recent surveys by the first author indicate this species is very slow growing, averaging an annual increase of only 7 mm OCL. Specimens have occasionally been found many metres away from permanent water. Some individuals construct burrows of type 1*b* or 2 (Horwitz and Richardson, 1986), adjacent to river banksFound from the Tarago River to almost the New South Wales border in southerly flowing rivers and streams.

A third species of this genus, *Euastacus woiwuru* Morgan is possibly present, as the creek is within the species' range, (Morgan, 1986) but as yet has not been recovered during surveys. It is similar in size to *E yarraensis*, but relatively poorly spined (Morgan, 1986).

Prior to this survey, *E sternalis* was only found by destructive sampling of the creek bank, however results show that pitfall trapping is a feasible alternative of survey for this cryptic species, as well as for some other species of burrowing crayfish. It appears that *E. sternalis*, along with other sympatric species, respond to rainfall and increasing ground temperature for above ground dispersal.

Preliminary results confirm Horwitz's opinion that *E. sternalis* is confined to the creek bank, although no doubt the species could be found in adjacent damp areas with more extensive surveys. A community awareness program and site protection works are currently being undertaken to protect the habitat of *Engaeus sternalis*.

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