

Absence of the European shore crab, *Carcinus maenas*, from the Fremantle marine area, Western Australia

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The European shore crab, *Carcinus maenas* (Linnaeus, 1758) is an invasive species that was originally distributed along the coast of North Africa and Europe. It has been widely introduced to the east and west coasts of North America, South America, Australia, Asia, and South Africa (Ahyong 2005; Klassen and Locke 2007). The crab is a voracious feeder that consumes a wide variety of organisms. It is destructive and is regarded as a danger to commercial fisheries for molluscs, crustaceans and scalefish (Klassen and Locke 2007). The ecology of Australian populations of *C. maenas* has been studied by Thresher *et al.* (2003) and Ross *et al.* (2004). Concerns over the potential adverse effects of *C. maenas* led to the first international workshop on the demography, impacts and management of introduced populations of the European crab (Thresher 1997).

The first introduction of *C. maenas* in Australia has long been considered to have been to Victoria in 1900 (Fulton and Grant 1902) where the crab is thought to have arrived on the hull of a vessel or in discarded solid ballast. The species has been recorded from Gulf St Vincent and Coorong, South Australia, eastern Tasmania, and from Port Philip Bay, Victoria to Narooma in southern New South Wales. Ahyong (2005) recently extended the range along the NSW coast northwards as far as Sydney, based on specimens he collected and on personal observations. Specimens in the Macleay Museum had been collected from the Sydney area prior to 1891 but had been disregarded (Stephenson and Campbell 1960), probably because the Sydney area was far outside the known northern limit of the species. Ahyong (2005) believes the locality for the Macleay Museum specimens is valid meaning *C. maenas* arrived in Sydney earlier than in Melbourne.

The European shore crab is shown as a species of concern by the Western Australian Department of

Fisheries (DOF 2000) and is one of the target species for introduced marine pest monitoring listed by the National Introduced Marine Pests Coordination Group (NIMPCG 2006). In Western Australia, *C. maenas* is known from a single mature male 7.1 cm in carapace width collected by "Smith" at Blackwall Reach in the Swan River in 1965 (Zeidler 1978) (WAM C14833; Figure 1). The record was subsequently cited by Furlani (1996), Hass and Jones (2000), Pollard and Hutchings (1990), and Ahyong (2005). However, in a marine pest survey report for the port of Albany, CRIMP (1997) reported the Swan River specimen, but stated that no populations appear to have been established. The subsequent survey of the Port of Fremantle (CRIMP 2000) failed to find any specimens. However, the CRIMP survey was of the port area and included only the lower reaches of the Swan River. In their compilation of information on introduced marine species in WA, Huisman *et al.* (2008) listed *C. maenas* as not occurring in Western Australia.

As *C. maenas* is considered to be a high-risk species (DOF 2000), it is important to know if it has in fact been established in the Fremantle marine area. In late September and early October 2007 a detailed search was undertaken of 43 sites to search for four introduced species. This included *Carcinus maenas*, the European fanworm, *Sabella spallanzanii* (Gmelin, 1791), recorded in Cockburn Sound and Fremantle by Clapin and Evans (1995); the Asian date mussel *Musculista senhousia* (Benson in Cantor, 1842) recorded in the Swan River and at Fremantle by Slack-Smith and Brearley (1987); and the eastern Australian scallop *Scaechlamys lividus* (Lamarck, 1819) reported from Fremantle and Cockburn Sound by Morrison and Wells (2008). Results on *M. senhousia* are presented elsewhere (McDonald and Wells 2009), and a general survey report is available (McDonald and Wells 2008).

The search covered the full range of sites in the estuarine reaches of the Swan River, Fremantle inner harbour at the mouth of the Swan, Rouse Head, Owen Anchorage, and Cockburn Sound and also included a site in Warnbro Sound (Table 1, Figure 2). Subtidal visual searches were conducted by a team of two divers. Divers entered the water together and searched the shore or pilings as they descended to the seafloor where they would space themselves approximately 1–2 m apart, depending upon visibility, and available space. The divers then proceeded along the seafloor searching for all four species or any other species that could be mistaken for one of the target species. The search area thus included all available depths from the surface to the bottom. The region is microtidal, with a maximum tidal range over a year of about 1 m; the tidal variation on most days is about 0.3–0.4 m (Hodgkin and DiLollo 1958), so the study included the full tidal range. The search included Blackwall Reach, where the single known specimen of *C. maenas* was collected in Western Australia, and sites both further up and lower down on the Swan River.

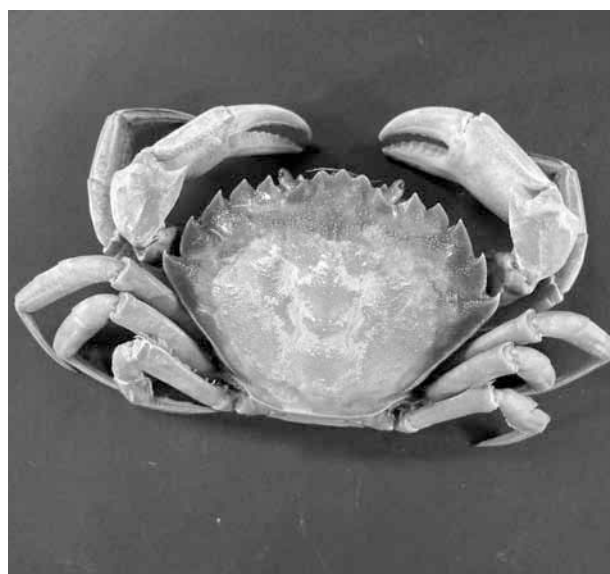


Figure 1 The European shore crab, *Carcinus maenas* from Blackwall Reach, Swan River, Western Australia (WAM C14833). Photo courtesy of Andrew Hosie.

Table 1 Sites targeted in the 2007 survey of the Fremantle marine area for introduced species. CR, Canning River; CS, Cockburn Sound; FIH, Fremantle inner harbour; LSR, Lower Swan River; PW, Perth Water; USR, Upper Swan River; WS, Warnbro Sound.

Site Number	Area	Location	Site Number	Area	Location
1	WS	Saxon Ranger wreck	23	CS	Success channel marker B
2	CS	Calista channel, port marker F	24	CS	Success Channel marker F
3	CS	Challenger Passage lead marker 2	25	CS	Wreck of the D9
4	CS	Garden Island Armaments Jetty	26	FIH	Fremantle Berth 2
5	CS	Garden Island, Navy Boats Harbour	27	FIH	Fremantle Berth 4
6	CS	Kwinana Bulk Jetty front	28	FIH	Fremantle Berth 5
7	CS	Kwinana Bulk Jetty shallow part	29	FIH	Fremantle Traffic Bridge (north side)
8	CS	Kwinana Bulk Terminal 2	30	LSR	Blackwall Reach
9	CS	North Mole wreck	31	LSR	Chidley Point
10	CS	Northern Lead S & P channel	32	LSR	Keanes Jetty
11	CS	Old submarine netting	33	LSR	Matilda Bay
12	CS	Rockingham L jetty	34	LSR	Rocky Bay Channel
13	CS	Rockingham middle jetty	35	LSR	Royal Freshwater Bay Yacht Club
14	CS	Rockingham CS wreck front dive store	36	CR	Canning Bridge (SW Side)
15	CS	Rous Harbour barge	37	CR	Deepwater Point
16	CS	Southern flats 1	38	CR	Shelley Bridge
17	CS	Southern flats 2	39	PW	Sir James Mitchell Park (South Perth)
18	CS	Southern flats 3	40	USR	Clarkson Reserve (Maylands)
19	CS	Southern flats 4	41	USR	Fish Market Reserve (Guildford)
20	CS	Southern flats 5	42	USR	Garrett Road Bridge (AP Hinds Reserve)
21	CS	Stirling channel marker 1	43	USR	Trinity College Foreshore
22	CS	Success channel marker 2			

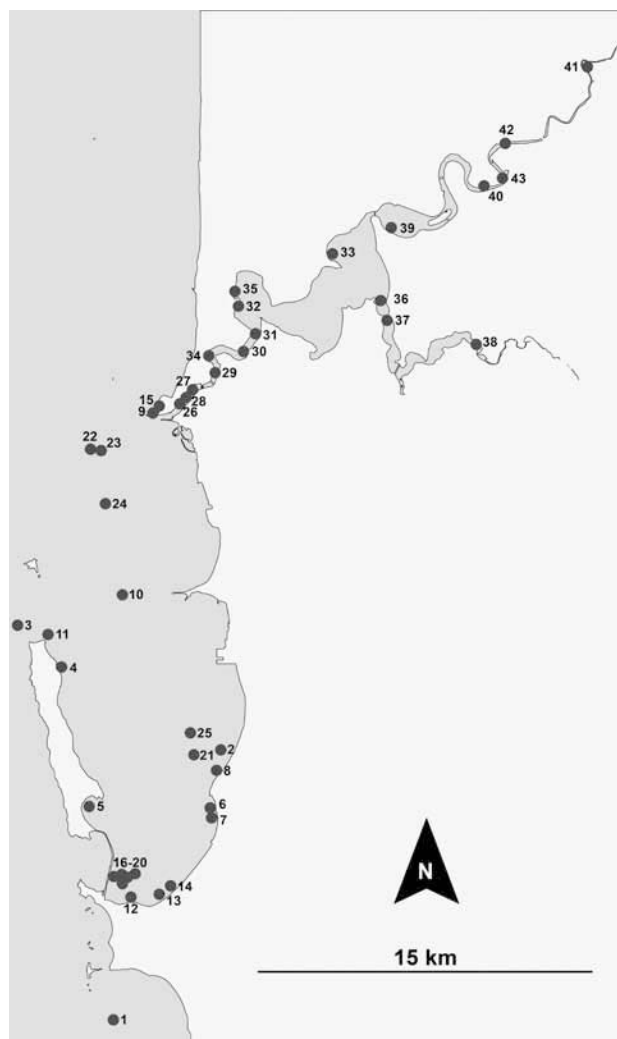


Figure 2 Sites surveyed for the European shore crab, *Carcinus maenas*, in the Fremantle marine area in September and October 2007.

No *C. maenas* were found in the present survey, which supports the findings in the CRIMP (2000) survey of a more restricted area. As surveys of this study cover a relatively large spatial and temporal sphere it is concluded that the species has not become established in the Fremantle marine area.

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