

West Coast Blue Swimmer Crab Fishery

Management Summary

Blue swimmer crabs (*Portunus pelagicus*) are found along the entire Western Australian coast and comprise the major portion of the State's inshore crab catches. Crabs may be targeted by a variety of fishing gear with crab traps and drop nets being the main methods used by commercial fishers. Crabs are also taken by trawl gear in several prawn and scallop trawl fisheries.

The principal management tool to ensure sustainability in the commercial crab fisheries is maintaining minimum size limits well above the size of sexual maturity of crabs. Blue swimmer crabs become sexually mature below 100 mm (carapace width) while legal minimum sizes range from 127 mm to 135 mm in the different commercial crab fisheries. Maintaining legal minimum sizes above the size at sexual maturity ensures adequate egg protection for blue swimmer crab stocks.

Additionally, commercial access to oceanic areas with blue swimmer crab stocks is controlled under a series of separate management arrangements which regulate the numbers of licensees, fishing methods and gear specifications, and seasonal and daily time restrictions. In Cockburn and Warnbro Sounds, access is managed via two separate management plans, while in other areas it is controlled by way of subsidiary legislation under the *Fish Resources Management Act 1994*, or through exemptions.

Recreational fishers also take significant quantities of crabs, particularly in the south-west of the State. While the sustainability of crab stocks is a primary concern, the commercial management arrangements have also been designed to ensure that any likely adverse impact on recreational fishing activities in the respective areas is minimised.

Management arrangements for the Mandurah and Swan/Canning Estuarine Fisheries have been reviewed and will be incorporated in the West Coast Estuarine Fishery (Interim) Management Plan, to be gazetted later in 2003. While gillnets will continue to be the main fishing method used in the Swan/Canning Estuarine Fishery, for the Mandurah Estuarine Fishery the management plan will formalise the use of crab traps, formerly utilised on a trial basis.

Management arrangements for the southern zone of the Mandurah-Bunbury Inshore Crab Fishery have now been finalised, with four exemptions issued to operate a total of 240 crab traps for a five-year period commencing in October 2002. After the five-year period a review will be undertaken to assess the viability and sustainability of the fishery and will consider if the fishery should progress to more formal management or should cease to operate. This timeframe will allow the appropriate research data to be collected and any wider impacts of the fishery to be considered. The access arrangement for the northern zone (Comet Bay) is currently also under review.

The Geographe Bay Crab Mediation Group has provided recommendations to the Minister for Fisheries who has agreed, in principle, with the recommendations. A discussion paper will be released for public comment in 2003.

Governing Legislation/Fishing Authority

Cockburn Sound (Crab) Management Plan 1995
Warnbro Sound (Crab) Management Plan 1995
Exceptions to the *Fish Traps Prohibition Notice 1990* and *Fish Traps Restrictions Notice 1994*
Exemptions under Section 7 of the *Fish Resources Management Act 1994*

Consultation Process

Department-industry meeting

Research Summary

Research monitoring of fishing activity for blue swimmer crabs was initially based on monthly returns and interviews with commercial crab fishers. Following a rapid increase in commercial catches during the 1990s, combined with the high level of participation by recreational fishers, additional research became necessary to address key biological parameters and collect additional fishery information required for future stock assessments. Consequently, a number of research projects were instigated during 1997/98, with funding from the FRDC, under the umbrella of the national collaborative blue swimmer crab research initiative. This research, which included the basic biology of crabs along the Western Australian coast, gear-catchability relationships, recreational catch surveys, commercial catch monitoring, discard mortality estimation and stock assessment modelling, was completed in 2000/01. The FRDC has funded a further three-year project to enable the development of stock allocation and assessment techniques in Western Australian blue swimmer crab fisheries. The following status report summarises the research findings for this fishery.

West Coast Blue Swimmer Crab Stock Status Report

Prepared by L. Bellchambers and D. Harris

FISHERY DESCRIPTION

Boundaries and access

Blue swimmer crabs inhabit coastal waters throughout Western Australia. The majority of commercially fished stock is concentrated in coastal embayments between Geographe Bay in the south and Port Hedland in the north. Blue swimmer crabs are found in a wide range of inshore and continental shelf areas, from the intertidal zone to at least 50 m in depth.

There are two managed commercial crab fisheries, namely the Cockburn Sound and Warnbro Sound (Crab) Managed Fisheries. The Cockburn Sound fishery includes all waters within a line drawn from South Mole at Fremantle to Stragglers Rocks, through Mewstone to Carnac Island and Garden Island, along the eastern shore of Garden Island and

back to John Point on the mainland. The Warnbro Sound fishery includes Warnbro Sound itself and adjacent waters, extending from Becher Point to John Point. The Warnbro Sound managed fishery supports a single licence. Currently, 11 licence holders have access to the Cockburn Sound managed fishery, sharing a total allocation of 840 crab traps. During 2002, however, the full allocation of traps was fished by just six vessels operating between 80 and 180 traps each.

Licence holders in the Exmouth Gulf Beach Seine Fishery, Shark Bay Beach Seine and Mesh Net Managed Fishery, and the west and south coast estuarine fisheries, are permitted to take blue swimmer crabs by drop net or set net. An exemption to fish the waters of Exmouth Gulf using crab traps in an experimental capacity is currently being formalised. Seven licence holders have been issued an exemption to take crabs using traps (40 traps each) in the waters of Geographe Bay. These exemptions expire on 31 December 2004. Two commercial fishers are permitted to take crabs by traps (80 traps each) in the waters of Comet Bay.

Development has continued in the Carnarvon Experimental Crab Trap Fishery (Shark Bay), where exemptions to operate are granted on an annual basis. A third licence to take crabs in this fishery was issued for the 2002 season. Each licence was also allocated an additional 100 traps, taking to 300 the maximum number of traps that can be used on each licence. Currently, however, the extra allocation has yet to be issued to one licence pending resolution of several matters. One Shark Bay beach seine fisher (200 traps) and one Cockburn Sound crab fisher (300 traps), with long-standing histories of targeting crabs in these waters, are also permitted to use traps to take crabs in Shark Bay.

During 2001/02, fishing for blue swimmer crabs commenced in the Pilbara region with the issue of two exemptions to fish between Onslow and Port Hedland. Exploratory fishing was undertaken by both exemption holders intermittently throughout the year.

Main fishing method

Purpose-designed crab traps.

RETAINED SPECIES

Commercial production (season 2001/02): 754 tonnes

Landings

The commercial catch of blue swimmer crab taken in Western Australian waters during 2001/02 was 754 t. This catch represented a 2.4% increase from 2000/01 (736 t), and fell within the acceptable range of 600–800 t.

Shark Bay recorded a 59% increase in catch (478 t compared to 301 t in 2000/01) as the Carnarvon Experimental Crab Trap Fishery continued to develop. Some 336 t were caught by dedicated crab fishermen using traps, with the Shark Bay trawl fleet taking 141 t (29% of the catch). Commercial catches decreased, however, in both Cockburn Sound (104 t, a 51% decrease) and Peel/Harvey Estuary (68 t, a 3% decrease) (Blue Swimmer Crab Figure 1). The catch in Cockburn Sound

was the lowest in eight years, well below the accepted range of 200–350 t. The low catch was most likely attributable to unfavourable environmental conditions experienced during the period between spawning and recruitment of juvenile crabs to the fishery. Experimental fishing in the Pilbara region during 2001/02 contributed 39 t to the total catch.

Fishing effort

The commercial crab catch is taken using a variety of fishing methods (Blue Swimmer Crab Figure 2). In the past year, traps accounted for 74% of the commercial catch, with the remainder taken primarily by trawling (22%), gillnetting (3.6%) and drop netting (0.4%). Overall fishing effort decreased by 4% for traps, while increasing by 1.9% for trawling, 2.3% for gillnets and 0.8% for drop nets in the last year.

Effort in Shark Bay increased during 2001/02, consistent with the ongoing development of the Carnarvon Experimental Crab Trap Fishery. Dedicated crab trap fishermen made 226,092 trap lifts over 856 fishing days, up from 140,430 trap lifts in 707 fishing days during 2000/01 (Blue Swimmer Crab Figure 3).

Effort in Cockburn Sound decreased considerably in 2001/02, with only three fishermen operating past March as the available commercial stock was substantially depleted well before the end of the season. During 2001/02, 156,497 trap lifts were reported from 1,471 fishing days, down from 222,970 trap lifts over 2,128 fishing days the previous year (Blue Swimmer Crab Figure 4).

Catch rate

Because of the variety of fishing methods used to take blue swimmer crabs and the diversity of areas that are fished, a single catch rate statistic has not been produced. Comparative rates are given here for the three areas contributing the majority of the blue swimmer crab catch for the past year. The trap catch rate in Cockburn Sound decreased significantly for the second year in a row, falling some 31% from 0.95 kg/trap lift in 2000/01 to 0.66 kg/trap lift for the 2001/02 season (Blue Swimmer Crab Figure 4). Trap catch rates in the Peel/Harvey Estuary dropped marginally from 1.41 kg/trap lift to 1.38 kg/trap lift in 2001/02, while the trap catch rate in Shark Bay also fell, down some 16% from 1.77 kg/trap lift to 1.48 kg/trap lift (Blue Swimmer Crab Figure 5).

Recreational component: 40% (approx.)

Recreational catches of blue swimmer crabs have been surveyed in the west coast bioregion, as reported in *State of the Fisheries 1999/2000*, and were estimated to be about 40% of the total catch at that time. The recreational take was dominated by the catch from the Peel/Harvey Estuary. A survey of recreational crabbing in Nickol Bay estimated a recreational blue swimmer catch of 20 t for the 2000 calendar year (Williamson et al., in prep.). Surveys quantifying recreational catch are currently being conducted in Cockburn Sound, Geographe Bay and along the south coast of Western Australia.

WEST COAST BIOREGION

Stock assessment completed: Preliminary assessment

A preliminary assessment has been made using trap catch rates for each of the three major blue swimmer crab fisheries in the State.

Shark Bay: Trap catches in Shark Bay (Blue Swimmer Crab Figure 3) show almost a five-fold increase since the commencement of the Carnarvon Experimental Crab Trap Fishery in 1998, while effort and catch per unit effort (CPUE) have only increased three and 0.5 times respectively. The increases in catch and effort reflect the more efficient fishing of blue swimmer stocks as the fishers' knowledge of the fishery has increased over time, with further sustainable increases in catch possible as the fishery continues to develop.

Cockburn Sound: Following the change from gillnets to purpose-designed traps in 1994/95, trap catches in Cockburn Sound increased until reaching a peak of 333 t in 1997/98 (Blue Swimmer Crab Figure 4), after which the catches declined. Similarly, effort peaked in 1997/98 but has subsequently declined due to industry buy-backs and latent effort in the fishery not being utilised. However, on an annual basis the catch, effort and CPUE in Cockburn Sound display significant variation.

Peel/Harvey: Blue swimmer catches in the Peel/Harvey Estuary (Blue Swimmer Crab Figure 5) have maintained fairly consistent levels in terms of catch, effort and CPUE since the implementation of traps in 1995/96, with a moderate increase in catch and CPUE evident in 2000/01.

Yield-per-recruit analysis has indicated that yields may be increased by lowering the legal minimum size or carapace width (CW) (Melville-Smith et al. 2001). Egg-per-recruit analysis indicated that as blue swimmer crabs mature at a small size ($CW_{50} = 86.2$ mm females and $CW_{50} = 96.8$ mm males in Cockburn Sound, Potter et al. 2001), even substantial reductions in the minimum legal size may not be detrimental to egg production per recruit (Melville-Smith et al. 2001). However, optimising the weight of catch in the fishery by reducing size (age) at first capture would not produce the best economic outcome because the market pays premium prices for animals > 130 mm CW. Similarly, catching smaller crabs with lower meat yields is unlikely to be satisfying to recreational fishers.

Length-frequency data gathered from ongoing monitoring programs in Shark Bay, Cockburn Sound and Port Hedland suggest that management controls currently in place are adequate in maintaining a sustainable level of catch and effort in the State's crab fisheries, while allowing exploitation of the available resource. Commercial catches from the various blue swimmer crab fisheries sampled since 1998 have returned consistent size distributions both between fisheries, and between years within a fishery. The development of appropriate mesh sizes for use on commercial crab traps has eliminated the catch of juvenile (< 80 mm) crabs and severely limited the catch of sub-adult (< 120 mm) crabs, without impacting on legal catches. Improved work practices have reduced the mortality of returned under-size and berried crabs caught in commercial traps to negligible levels.

Exploitation status:

**Fully exploited (Cockburn Sound, Peel/Harvey Estuary)
Not assessed (Shark Bay)**

Breeding stock levels:

Adequate

As the legal size at first capture (127 mm CW) is well above the size at maturity in all sectors of the fishery, the breeding stock levels are expected to be adequate to maintain stocks in all current fishing areas. The industry voluntarily applies a higher minimum size for marketing purposes, thus further increasing the level of spawning prior to capture.

NON-RETAINED SPECIES

Bycatch species impact:

Low

The shift from using gillnets to traps in most areas has resulted in a substantial reduction in bycatch from crab fishing. Discarded bycatch from trawl fisheries taking crabs as a by-product is dealt with in those specific reports.

Protected species interaction:

Negligible

The crab trap longline system utilised in the targeted crab fisheries has little possibility of interacting with protected species. Bycatch reduction devices are currently being implemented in Western Australian trawl fisheries, mainly to reduce the take of sharks and rays, which damage the quality of the target catch, but also to prevent the capture of turtles occasionally taken by conventional trawls.

ECOSYSTEM EFFECTS

Food chain effects:

Low

As the commercial take of crabs represents a relatively small portion of the biomass, which is effectively renewed annually, secondary food chain effects are likely to be minimal in these fisheries.

Habitat effects:

Negligible

Fishing with traps results in limited habitat disturbance, with only minor dragging of traps on the bottom during trap retrieval. Sand and associated biota do not get brought to the surface in commercial blue swimmer crab traps as the mesh used on traps is sufficiently large to allow the escape of any sand-dwelling macrobenthos. Although seagrasses are occasionally brought to the surface with the trap, the infrequent nature of this occurrence, and the small amount of living seagrass removed, results in minimal habitat damage.

SOCIAL EFFECTS

During 2001/02, approximately 48 people were employed as skippers and crew on vessels fishing for blue swimmer crabs at various locations along the west coast, from Geographe Bay in the south to Port Hedland in the north. Additional employment is also being created in the Gascoyne and Pilbara regions, where development of post-harvest processing of the crab catch is occurring.

ECONOMIC EFFECTS

Estimated annual value (to fishers) for year (2001/02):
\$3.4 million

The state blue swimmer crab catch for the 2001/02 season was valued at approximately \$3.4 million, representing a small increase on the \$3.1 million generated in 2000/01. Beach prices varied between \$4.50/kg and \$6/kg live weight. While the majority of the product was sold through local and interstate markets, several Shark Bay fishermen have been exploring the viability of accessing markets in south-east Asia.

FISHERY GOVERNANCE

Acceptable catch range: **600–800 tonnes**

Commercial catches are expected to be in the range 600–800 t, based on catches in the years 1997/98 to 2001/02. For the managed fishery in Cockburn Sound, the commercially acceptable range for the current management regime is approximately 200–350 t. This range is based on catches in the five-year period from 1995/96 to 1999/2000, after the fishing effort was converted to trapping and effort stabilised.

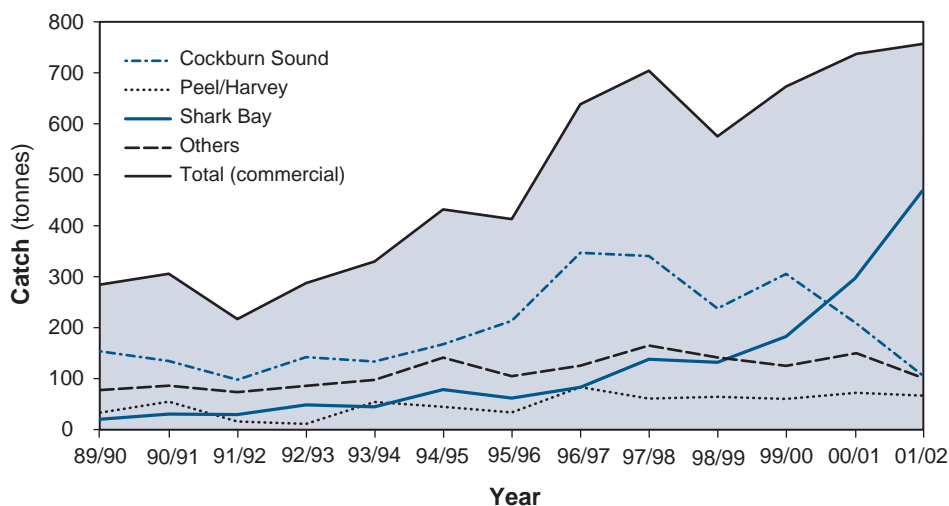
The blue swimmer crab fishery is expanding into currently unexploited grounds such as Exmouth Gulf and Nickol Bay in the north, and the coastal zone between Mandurah and

Bunbury (excluding the key recreational areas) in the south. Acceptable catch rates for these areas are not available as yet due to the lack of a sufficient time series of commercial fishery data to allow ranges to be set.

EXTERNAL FACTORS

The commercial fishery has expanded since 1995/96, when the main commercial sectors converted from set nets to dedicated crab traps, and there is still potential for future commercial expansion in more remote areas not currently exploited. Currently, new commercial fishing grounds are being explored along the State's northern coastline. This will allow the further expansion of blue swimmer crab catches without impacting on the more heavily fished south-western areas of the State where recreational and commercial competition remains a concern. The commercial pressure on stocks in these areas, together with increasing demand from the recreational sector, has resulted in a number of management changes to maintain catch shares between the two sectors, such as the Cockburn Sound catch share arrangement. Given the pressure from both the commercial and recreational sectors of this fishery, catch allocation has become a major issue and there is research under way to provide an information basis to review these arrangements in both Cockburn Sound and Geographe Bay.

Blue Swimmer Crab Catch by Fishing Area



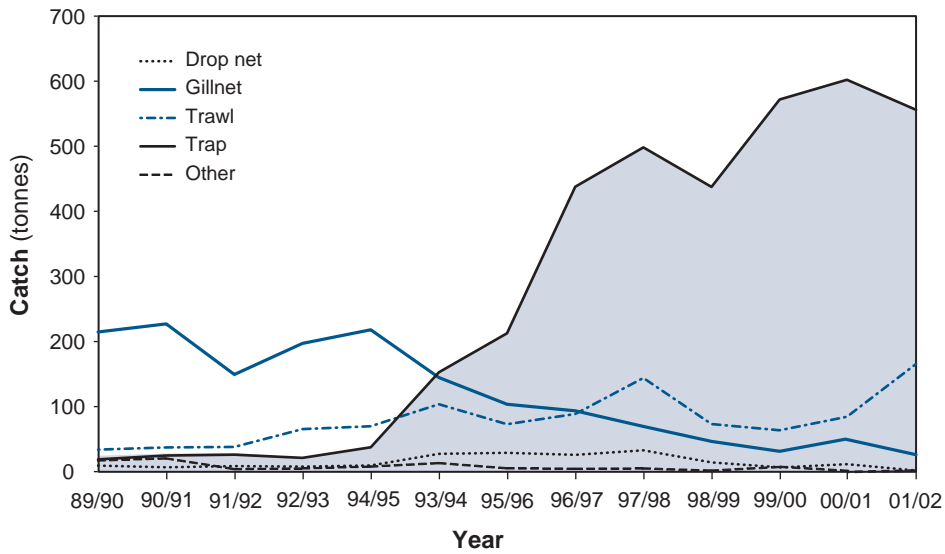
BLUE SWIMMER CRAB FIGURE I

Commercial catch history for the blue swimmer crab (*Portunus pelagicus*) in Western Australia between 1989/90 and 2001/02, indicating main regions of commercial catches.



WEST COAST BIOREGION

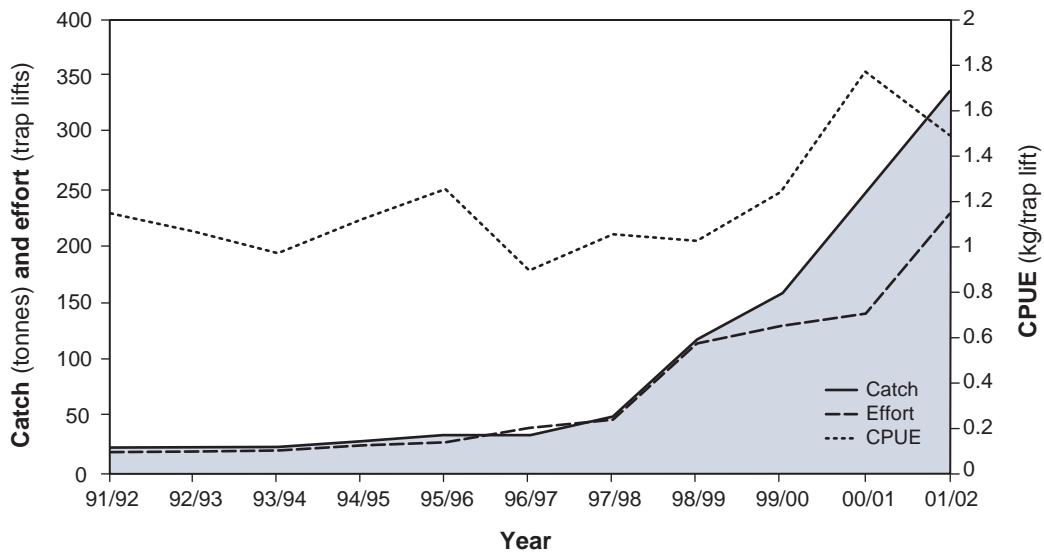
Blue Swimmer Crab Catch by Gear Type



BLUE SWIMMER CRAB FIGURE 2

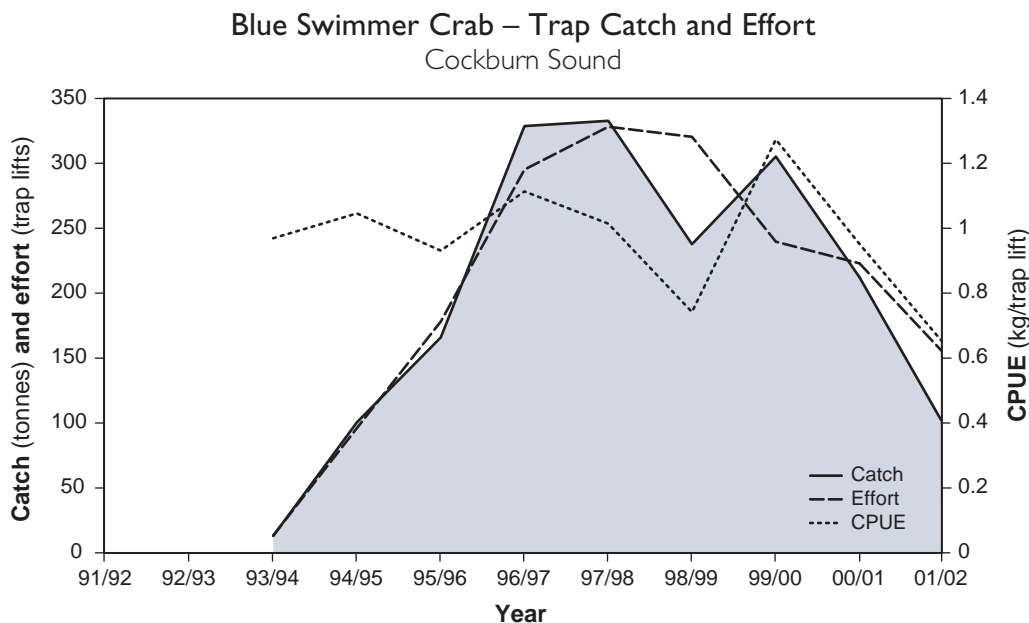
Blue swimmer crab catch taken by different gear types in Western Australia during the period 1989/90 to 2001/02.

Blue Swimmer Crab – Trap Catch and Effort Shark Bay



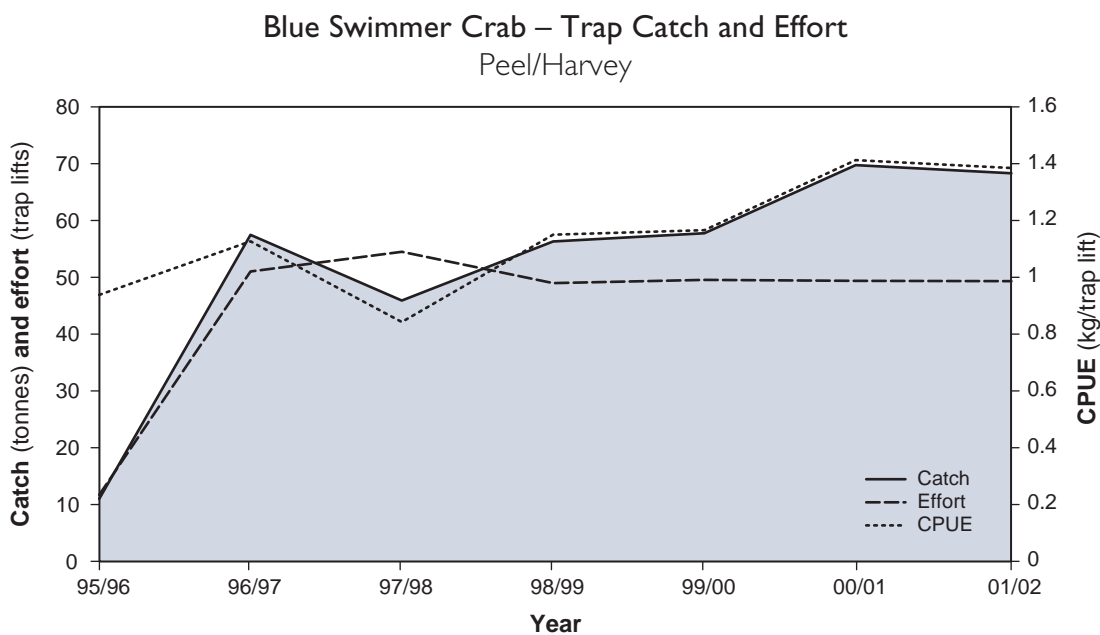
BLUE SWIMMER CRAB FIGURE 3

Blue swimmer crab catch (t), effort (traplifts × 1,000) and catch per unit effort (kg/traplift) in Shark Bay during the period 1991/92 to 2001/02 using traps.



BLUE SWIMMER CRAB FIGURE 4

Blue swimmer crab catch (t), effort (traplifts x 1,000) and catch per unit effort (kg/traplift) in Cockburn Sound during the period 1991/92 to 2001/02 using traps.



BLUE SWIMMER CRAB FIGURE 5

Blue swimmer crab catch (t), effort (traplifts x 1,000) and catch per unit effort (kg/traplift) in the Peel/Harvey Estuary during the period 1995/96 to 2001/02 using traps.