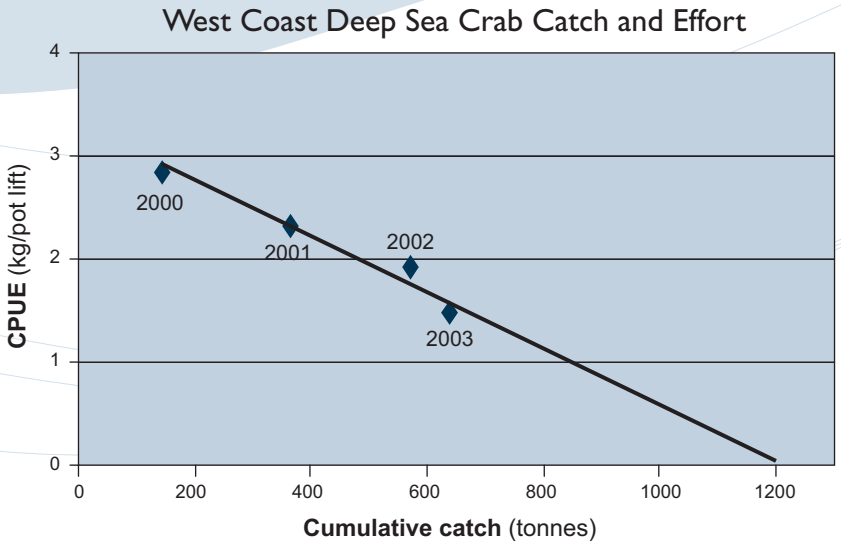



WEST COAST DEEP SEA CRAB FIGURE 2

CPUE for 2000–2003 for crystal crabs, plotted against the cumulative annual catch.

# West Coast Estuarine Fisheries Status Report

*Prepared by K. Smith and G. Nowara, with management input by K. Saville*

## FISHERY DESCRIPTION

The West Coast Estuarine Managed Fishery (WCEF), which operates in the Swan/Canning and Peel/Harvey Estuaries, is a multi-species fishery targeting many finfish species. The Hardy Inlet fishery, while not included in the WCEF management plan implemented during 2003, is also reported here as it shares the characteristics of the west coast estuaries.

The main fishing methods used are gillnets and haul nets, though crab pots are also used in the Peel/Harvey Estuary.

### Governing legislation/fishing authority

**Swan/Canning and Peel/Harvey Estuaries**

West Coast Estuarine Fishery (Interim) Management Plan 2003

**Hardy Inlet**

Closed Waters and Permitted Gear Orders under Section 43 of the *Fish Resources Management Act 1994*

Condition 19 on a Fishing Boat Licence

Condition 17 on a Commercial Fishing Licence

Directions to Licensing Officers

### Consultation process

Department–industry meetings

### Boundaries

*Swan/Canning and Peel/Harvey Estuaries:* The management plan encompasses all estuaries on the west coast between 27° S and 33°11′ S. However, the plan incorporates a broad range of closures, so that in general terms (but with some exceptions) the only areas open to fishing are:

- The Swan and Canning rivers upstream of a line connecting Point Resolution to the Point Walter jetty, to:
  - (in the Swan) a line from Plain Street running 100 m off the tip of Heirisson Island to the southern bank of the river; and
  - (in the Canning) a line connecting the northern extremity of Second Avenue, Rossmoyne to the southern extremity of Sulman Avenue.

The exceptions relate to closures around Canning Bridge, waters around a number of jetties and some areas of Perth Water.

- The Peel/Harvey Estuary, with a complex series of closures that effectively limit the fishery to the main body of the estuary.

Note: The closures in both the Swan/Canning and Peel/Harvey Estuaries are complex, so the management plan, related legislation and regulations should be referred to for details.

*Hardy Inlet:* Areas open to fishing are all waters of Hardy Inlet and the Blackwood River upstream of a line connecting Point Irwin to the Irwin Street boat ramp to a line drawn across the river from the eastern boundary of Sussex Location 133 (approximately Great North Road).

### Management arrangements

The west coast estuarine fisheries are managed primarily through input controls in the form of limited entry and gear restrictions, as well as seasonal and time closures, area closures and size limits. The main fishing methods are gillnets and haul nets, but crab pots are also used in the Peel/Harvey estuary.

### Research summary

Research monitoring of fisheries and fish stocks in the west coast estuaries is primarily based on monthly CAES returns

provided by industry. These data are interpreted using the extensive scientific knowledge of the fish stocks in estuaries derived from research by Department of Fisheries and Murdoch University scientists since the 1970s. This database from commercial fishermen has provided a valuable and consistent source of information for monitoring recreationally important stocks where they are harvested by both sectors.

Reduced levels of fishing activity have occurred in recent years as a result of voluntary buy-back of commercial access. This will almost certainly render these valuable long-term commercial catch and effort data sets less useful in assessing the status of estuarine species in future years.

This will necessitate far greater reliance on the recreational sector and/or independent surveys to provide data that can be used to determine the status of our important estuarine fish and crustaceans. In addition, even greater co-operation will be required from the remaining commercial fishers to provide information on targeted fishing effort and catches needed to develop a catch curve for these species.

Where only a small number of fishers are actively involved in a particular fishery, the data are subject to the Department of Fisheries' confidentiality policy as it relates to the *Fish Resources Management Act 1994* and are not reported separately. While not able to be published, these confidential data are however used by the researchers to monitor the status of stocks and provide advice to management.

This report presents some information for three key finfish species from the west coast estuaries, namely black bream (*Acanthopagrus butcheri*), cobbler (*Cnidoglanis macrocephalus*) and King George whiting (*Sillaginodes punctata)*. These stocks are not subject to species-specific management plans, but are fished under each estuary's licence arrangement.

## RETAINED SPECIES

### Commercial production (season 2003): 211 tonnes

#### Landings

The total landings from west coast estuaries of 211.2 t during the 2003 season include the following catches of key target species:

| | | |
|---|---|---|
| Sea mullet | *Mugil cephalus* | 68.7 t |
| Blue swimmer crabs | *Portunus pelagicus* | 53.5 t |
| Yellow-eye mullet | *Aldrichetta forsteri* | 33.8 t |
| Western sand whiting | *Sillago schomburgkii* | 18.2 t |
| Perth herring | *Nematalosa vlaminghi* | 11.2 t |
| Australian herring | *Arripis georgianus* | 6.5 t |
| King George whiting | *Sillaginodes punctata* | 6.2 t |
| Tailor | *Pomatomus saltatrix* | 2.6 t |
| Cobbler | *Cnidoglanis macrocephalus* | 1.6 t |
| Other species | | 8.9 t |

*Swan/Canning:* The 2003 catch level was similar to that of 2002. The catch level trend has been stable since 2000, following a generally declining trend throughout the 1990s (actual figure not available owing to the small number of operators). The catch from the Swan/Canning Estuary during 2003 was composed primarily of blue swimmer crab, Perth herring and sea mullet with small quantities of black bream and yellow-eye mullet.

*Peel/Harvey:* Reported catches in the Peel/Harvey Estuary over the past 25 years are shown in West Coast Estuarine Figure 1. While there was little variation in the catches during the early 1990s when the catch was about 350 t, a dramatic decline to 200 t occurred between 1998 and 2000. Since 1999, the catch has declined at a more gradual rate. The total catch declined from 172 t in 2002 to 158 t in 2003. Approximately 26% of the total 2003 catch consisted of blue swimmer crabs, with sea mullet and yellow-eye mullet making up 78% of the finfish catch.

*Hardy Inlet:* The 2003 catch increased by approximately 5 t from the 2002 catch level (actual figure not available owing to the small number of operators). The catch level trend has been stable since 1996. The majority of the catch was composed of western sand whiting and sea mullet with small quantities of black bream and yellow-eye mullet. There were no reported catches of blue swimmer crabs in 2003.

**Key species**

*Black bream:* Catches of black bream were reported from the Swan/Canning Estuary and the Hardy Inlet during 2003. The reported catches from the Swan/Canning of 2.7 t showed a minor decrease from the 2002 catches, and there was a minor increase in catches from the Hardy Inlet.

*Cobbler:* Minor catches of cobbler were reported from all three estuaries during 2003. The reported catches of cobbler in the Swan/Canning Estuary have been declining from the late 1980s. Since 2001, catches have been negligible (< 100 kg). The 2003 catch in the Peel/Harvey Estuary was 1.4 t, which is also at the lower end of historical catches. A small catch of cobbler was reported from the Hardy Inlet in 2003.

*King George whiting:* King George whiting catches for 2003 were reported from the Peel/Harvey Estuary (4.8 t) and the Hardy Inlet. While catches increased slightly from 2001 to 2002 and again from 2002 to 2003, they were still much lower than the exceptionally high catches reported during the late 1990s.

#### Fishing effort/access level

| | |
|---|---|
| Swan/Canning: | level of access – 4 units |
| Peel/Harvey: | level of access – 8 units |
| Leschenault: | level of access – no commercial access |
| Hardy Inlet: | level of access – 1 unit |

The levels of access listed above are as at June 2003. Unit holders in the three west coast estuaries open to commercial fishing are endorsed to fish a single estuary system only.

Fishing effort is reported as the average number of boats fishing per month. This measure of effort provides a general indication of effort changes over time. In most of these fisheries, the general licence buy-back scheme applied to commercial fishing licences has resulted in a decline in effort and hence reduced catches.

*Swan/Canning:* The general trend in effort has been a decrease in the mean monthly number of fishing units from around 25 in the mid-1970s to 3 in 2003.

*Peel/Harvey:* Fishing effort remained at fairly constant levels during the 1990s after a rapid decline during the 1970s and 1980s (West Coast Estuarine Figure 1). More recently there has been a pronounced decline in the number of boats actively fishing, from approximately 16 fishing units in 1998 to the current level of 7 in 2003.

*Hardy Inlet:* Fishing effort (mean monthly number of fishing units) in the Hardy Inlet has declined from 3 in the 1970s to the current level of only one unit operational in 2003.

### Catch rate

*Swan/Canning:* Annual values of the catch per unit effort for the finfish fishery in the Swan/Canning Estuary have varied over the past 15 years, with a declining trend from 1990 to 2000 and an increasing trend from 2000 to 2003. While targeted fishing effort cannot be determined for individual stocks from the CAES compulsory monthly fishing returns, the general stability of the overall CPUE during the past several years suggests the total abundance of the suite of species that make up the majority of the catch has remained constant. However, the proportion of estuarine-dependent species (particularly those that depend on the estuary for spawning or nursery habitats) in the catch has decreased in recent years.

*Peel/Harvey:* During the 1980s, the catch rate followed the downward trend in catches in this fishery. After 1990, the catch and effort continued to decline but the CPUE increased, particularly after 1997. While targeted fishing effort cannot be determined from the CAES compulsory monthly fishing returns, the general stability of the overall CPUE over this period suggests the abundance of the suite of species that make up the majority of the catch has remained constant since 1990, though apparently at a significantly lower level than during the period 1975–1985.

*Hardy Inlet:* Since the early 1990s the trend in the CPUE has generally followed the fluctuations in the catches. The CPUE increased from 2002 to 2003.

### Recreational component: 30–75%

In 2000/01, the National Recreational and Indigenous Fishing Survey (Henry and Lyle 2003) collected data on all target species. From this survey, the recreational finfish catch was estimated to be similar to the commercial catch in the Swan/Canning Estuary, about 50% of the commercial catch in the Peel/Harvey Estuary and about three times the commercial catch in the Hardy Inlet/Blackwood River.

With the cessation of commercial fishing in Leschenault Inlet in 2002, the recreational sector now takes all of the catch.

## STOCK ASSESSMENT

### Assessment complete: Preliminary

The status of the fishery in each west coast estuary is reviewed annually.

Basic assessments have been undertaken previously for select species (black bream, cobbler and King George whiting). Annual monitoring of stock status is undertaken using catch and effort indicators. It must be acknowledged that for species such as black bream and cobbler, that exhibit an estuarine-dependent life history, factors other than fishing, e.g. algal blooms, can cause high mortality and may necessitate changes to management.

*Black bream:* Black bream populations are genetically unique within each west coast estuary. A preliminary yield-per-recruit stock assessment was developed for the black bream stock in the Swan River using biological data for the Swan River population from research by Sarre (1999), previously presented in the *State of the Fisheries Report 1999/2000*. Since the mid-1990s, the catch rates for the Swan River and Hardy Inlet stocks have increased slightly. In April–June 2003, a bloom of the toxic dinoflagellate *Karlodinium micrum* killed numerous black bream and other species in the Swan/Canning Estuary. Precise estimates of mortality were not obtained at the time of the kill. However, no declines in commercial and recreational catch rates were observed after this event, suggesting that stock abundance was not strongly affected. An age-based population model is currently being developed for black bream in the Swan River, in collaboration with Murdoch University. The model will assist in future stock assessments, including the assessment of any future fish kill impacts.

*Cobbler:* Cobbler populations are genetically unique within each west coast estuary. A preliminary yield-per-recruit stock assessment was developed for the cobbler stock in the Swan River using biological data for Swan River cobbler from research by Nel (1983), previously presented in the *State of the Fisheries Report 1999/2000.* In 2003, catches of cobbler in the Swan/Canning and Peel/Harvey Estuaries remained very low relative to historic levels, despite continued market demand for this species. The decline in catch of this once important species appears to be the result of both fishery and fishery-independent factors, including loss of breeding habitats.

*King George whiting:* King George whiting spend the early part of their life history (1–3 years) in estuaries before migrating to offshore reef areas at about age 4 where they grow to maturity and breed. They are most vulnerable to capture while residing in the estuaries. The results of a preliminary yield-per-recruit stock assessment, which was conducted for King George whiting along the lower west coast using biological data from research by Hyndes et al. (1998) and Potter et al. (1997), were previously presented in the *State of the Fisheries Report 1999/2000.* The lower catches of King George whiting from 2000 to 2003, compared with the late 1990s, appear to be due to lower recruitment and the maturing and offshore movement of the abundant cohort of fish previously recruited into the estuaries in the late 1990s.

### Exploitation status: Fully exploited

### Breeding stock levels: Not assessed

*Black bream:* A preliminary egg-per-recruit model was developed for the black bream stock in the Swan River using

biological data for the Swan River population from research by Sarre (1999), previously presented in the *State of the Fisheries Report 1999/2000.* Because the size at maturity is less than the legal minimum length, breeding stock levels are believed to be adequate. Black bream possess different growth rates in different estuaries. In all cases, the legal minimum length is set above the length at maturity. An age-based population model is currently being developed for black bream in the Swan River, in collaboration with Murdoch University. The model will provide an estimate of breeding stock levels.

*Cobbler:* A preliminary egg-per-recruit model was developed for the cobbler stock in the Swan River using biological data for the Swan River population from research by Nel (1983), previously presented in the *State of the Fisheries Report 1999/2000.* Cobbler exhibit different growth rates depending on the estuary in which they reside. In all cases the size at maturity is less than the legal minimum total length, which would normally afford protection to the breeding stock. However, breeding stock levels in the three west coast estuaries are likely to be very low as a result of environmental factors and the low fecundity of the species.

*King George whiting:* The age of King George whiting at first capture is 2+ to 3+ years at approximately 250 mm length. The length at 50% maturity is 413 mm for females. King George whiting breed in the open ocean at age 4+, and juveniles use estuaries and coastal waters as nursery habitats for the first few years of their life. Although the legal minimum length is considerably less than the size at maturity, a downward adjustment in the number of commercial fishers in estuaries and coastal waters is likely to have reduced the inshore fishing pressure on this stock. However, targeted recreational fishing for these fish will need to be monitored to ensure overall fishing mortality does not reduce breeding stocks below safe limits.

## NON-RETAINED SPECIES

**Bycatch species impact:** Low

These small-scale, multi-species fisheries using mesh nets are unlikely to generate significant impacts such as discarding, as virtually all species taken are marketed in the greater metropolitan area.

**Protected species interaction:** Negligible

No protected species occur in these fisheries that are susceptible to capture by the fishing gear used.

## ECOSYSTEM EFFECTS

**Food chain effects:** Not assessed

**Habitat effects:** Low

The operation of gillnets and haul nets over predominantly sand and mud bottoms is unlikely to have any impact on the habitat of these estuaries.

## SOCIAL EFFECTS

In 2003, there was an average of 18 fishers operating in west coast estuarine fisheries, largely supplying fresh fish to meet demand for locally caught product.

## ECONOMIC EFFECTS

**Estimated annual value (to fishers) for year 2003:** $570,900

## FISHERY GOVERNANCE

**Acceptable catch range for next season:** 75–220 tonnes (Peel/Harvey only)

Under the current management regime, the acceptable range for total catch in the Peel/Harvey fishery is 75–220 t. This range was derived by a statistical quality control chart using catch data from 1978 to 2002. Catch ranges are designed to allow catch levels to fluctuate in response to normal fluctuations in stock abundance. If annual catches fall outside acceptable ranges, an investigation into the cause will be triggered which, if required, may lead to changes in the management arrangements.

Acceptable catch ranges for the Swan/Canning and Hardy Inlet fisheries cannot be assessed at this time given the very small number of commercial fishers operating in these estuaries and the limited data available.

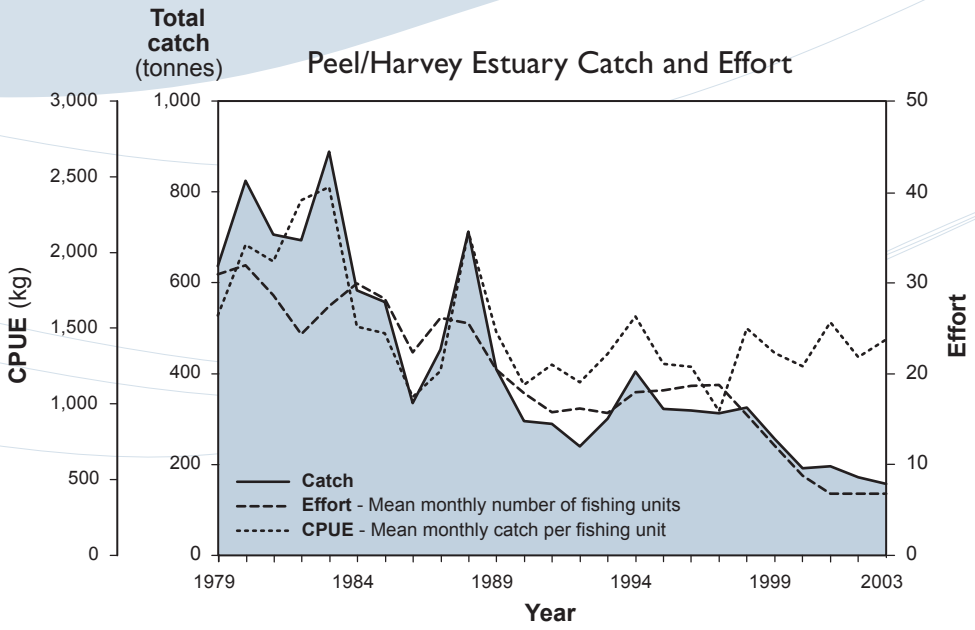
### New management initiatives (2003/04)

An interim management plan for the Swan/Canning and Peel/Harvey Estuaries was gazetted on 31 October 2003 and commenced operation on 8 November 2003.

During 2003, there was an extensive review of commercial fishing operations in the Hardy Inlet (Fisheries Management Paper no. 169). However, at the time of preparation of this report, an outcome of the review had not been determined.

## EXTERNAL FACTORS

Declines in catches of some species are likely to reflect changing environmental factors. The abundance of many species targeted by this fishery is affected by the quantity and quality of estuarine habitats that are available for spawning, feeding and/or nursery areas. The future sustainable management of such estuarine-dependent species will require a collaborative effort between fishery and habitat managers.




WEST COAST ESTUARINE FIGURE 1

The annual catch, effort and catch per unit effort (CPUE) for the total fishery of the Peel/Harvey Estuary over the period 1978–2003.

# Cockburn Sound Finfish Fisheries Status Report

*Prepared by G. Nowara and R. Lenanton, with management input by H. Greif*

## FISHERY DESCRIPTION

There are four managed fisheries that operate wholly and two managed fisheries that operate partly within Cockburn Sound. The Cockburn Sound (Mussel), (Crab), (Fish Net) and (Line and Pot) Managed Fisheries operate entirely within Cockburn Sound, while the West Coast Beach Bait and the West Coast Purse Seine Managed Fisheries operate partly within Cockburn Sound.

The catches reported here are for finfish only and are mainly from the Cockburn Sound (Line and Pot) and the Cockburn Sound (Fish Net) Managed Fisheries.

Separate status reports are given elsewhere in this volume for the West Coast Beach Bait, West Coast Purse Seine, mussel and crab fisheries (see pp. 42-44, 45-47, 67-68 and 24-29 respectively).

*Cockburn Sound (Fish Net) Managed Fishery:* Fish are taken in this fishery by gillnet, beach seine and haul net with the main targeted species being garfish and Australian herring. Other fish species, including shark, whiting and mullet are taken opportunistically.

*Cockburn Sound (Line and Pot) Managed Fishery:* The fishing methods employed include handline, longline and squid jigging; the pots used are unbaited octopus pots. Recreational fishers also target many of the species targeted by this fishery, e.g. garfish, herring and pink snapper.

### Governing legislation/fishing authority

Cockburn Sound (Fish Net) Management Plan 1995
Cockburn Sound (Line and Pot) Management Plan 1995
Subsidiary legislation under the *Fish Resources Management Act 1994*

### Consultation process

Department–industry meetings

### Boundaries

The Cockburn Sound fisheries operate in '*the waters of the Indian Ocean bounded by a line commencing at a point on the high water mark at the western extremity of the South Mole at the entrance to Fremantle Harbour and extending westerly to the southern most rock of the Straggler Rocks; thence south easterly to the high water mark on the northern most point of Mewstone; thence generally southerly along the high water mark on the eastern shore of Mewstone to its southern most point; thence southerly to the high water mark on the northern most point of Carnac Island; thence generally southerly along the high water mark on the eastern shore of that island to its southern most point ; thence southerly to the high water mark at Entrance Point on Garden Island; thence generally southerly along the high water mark on the eastern shore of that island to the south west point; thence southerly to the high water mark at John Point on the mainland; thence along the high water mark to the commencing point.*'

### Management arrangements

The Cockburn Sound line and pot and fish net fisheries are managed through input controls in the form of limited entry, gear restrictions and closed areas. Over the past 10 years the number of licences in the two fisheries has been reduced