

## Estuarine Fisheries

### MANAGEMENT OVERVIEW

There are five restricted entry estuarine fisheries operating in the metropolitan and southern regions of the Western Australian coastline, as follows:

- Swan-Canning Estuarine Fishery
- Peel-Harvey Estuarine Fishery
- Leschenault Inlet Estuarine Fishery
- Hardy Inlet Estuarine Fishery
- South Coast Estuarine Fishery (includes Princess Royal Harbour)

Management of these fisheries is by a number of orders issued under Section 43 of the *Fish Resources Management Act 1994*. Management arrangements include gear restrictions, seasonal and time closures, area closures and boat restrictions. Many of the seasonal and time closures are designed on a resource-sharing basis to provide an equitable sharing arrangement for both space and resource access.

Estuarine fishing areas, fishing practices and resource-sharing issues are increasingly becoming the subject of community interest. In order to maintain a basic level of commercial production while effecting a resource shift towards the recreational sector, specific estuarine Voluntary Fisheries Adjustment Schemes were activated for a brief period in 1998, allowing fishers to negotiate surrender of their estuarine endorsement. A total of 24 estuarine fishing units were removed by this process in 1998. Following this success, the schemes were reactivated in June 1999.

A discussion paper on the South Coast Estuarine Fishery was released for public consultation in May 1999. It is anticipated that revised management arrangements will be implemented in the year 1999/2000.

**Estuarine Table 1** Number of independent fishing units for each estuarine fishery at June 1998 and June 1999, after the implementation of the Fisheries Adjustment Schemes.

Fishery	No. of fishing units		
	June 1998	Oct 1998	June 1999
Swan-Canning	9	6	5
Peel-Harvey	19	14	14
Leschenault Inlet	6	6	6
Hardy Inlet	4	2	2
South Coast	36	33	32

## COMPLIANCE AND COMMUNITY EDUCATION OVERVIEW

Compliance within the commercial South Coast, Hardy Inlet, Leschenault, Swan-Canning and Mandurah (Peel-Harvey) Estuarine Fisheries was generally good, although a constant level of interference with commercial fishing gear is reported from Mandurah during the peak season. Fisheries Officers monitor licences, gear restrictions, closed-water boundaries, fish size limits and setting and retrieval limits in these fisheries. Two breach reports were submitted, both related to activities in the South Coast Estuarine Fishery. A major review of management arrangements within the South Coast Estuarine Fishery may lead to further compliance requirements in 1999/2000. A major education campaign for all stakeholders will also be implemented to ensure all new management arrangements are well understood and accepted.

### RESEARCH OVERVIEW

Research monitoring of fish stocks in the south-west estuaries is primarily based on CAESS returns provided by industry. These data are interpreted utilising the extensive scientific knowledge of the fish stocks in estuaries derived from research by Fisheries WA and university scientists over the 1970s and 1980s. This database from commercial fishermen provides a valuable and consistent source of information for monitoring recreationally important stocks where they are harvested by both groups.

The following status report summarises the research findings for this fishery.

## West Coast Estuarine Fisheries Status Report

### Main Features

#### Stock assessment complete:

*Preliminary assessments for select targeted species only (black bream, cobbler and King George whiting)*

#### Exploitation status:

##### Target species:

*Black bream* Not assessed  
*Cobbler* Over-exploited in Swan-Canning, Peel-Harvey and Leschenault estuaries  
*King George whiting* Not assessed

#### Breeding stock levels:

##### Target species:

*Black bream* Not assessed  
*Cobbler* Recovering in Peel-Harvey estuary, low in Leschenault  
*King George whiting* Not assessed

*continued over*

**Previous catch projections for year 1998:**

Swan-Canning	66-92 tonnes
Peel-Harvey	224-424 tonnes
Leschenault	61-103 tonnes
Hardy Inlet	Data not available for publication (fewer than five operators)

**Catch current season (1998):**

Swan-Canning	75.6 tonnes (includes fish and crustaceans)
Peel-Harvey	325.8 tonnes (includes fish and crustaceans)
Leschenault	88.1 tonnes (includes fish and crustaceans)
Hardy Inlet	Data not available for publication (fewer than five operators)

The above totals include the following catches of key target species:

Black bream	2.6 tonnes
Cobbler	2.9 tonnes
King George whiting	20.6 tonnes

**Estimated annual value (to fishers) for 1998:**

Swan-Canning	\$209,000 (includes fish and crustaceans)
Peel-Harvey	\$711,000 (includes fish and crustaceans)
Leschenault	\$194,000 (includes fish and crustaceans)
Hardy Inlet	Data not available for publication (fewer than five operators)

**Catch projections next year (1999):**

Swan-Canning	63-85 tonnes
Peel-Harvey	240-420 tonnes
Leschenault	67-108 tonnes
Hardy Inlet	Data not available for publication (fewer than five operators)

**Boundaries and Access**

Swan-Canning	Commercial block 9501: Level of access - 9 units
Peel-Harvey	Commercial block 9502: Level of access - 19 units
Leschenault	Commercial block 9503: Level of access - 6 units
Hardy Inlet	Commercial block 8501: Level of access - 4 units (1 conditional)

The levels of access listed above are as at June 1998. Unit holders in the four west coast estuaries are endorsed to fish a single west coast estuary system only.

The status of the fishery in each of the above estuaries is reviewed annually. This report presents data for the most important estuarine fisheries and/or those fisheries which appear to be experiencing problems. Please note, where fewer than five fishers are involved in a particular fishery, the data are subject to the

confidentiality provisions of the *Fish Resources Management Act 1994* and cannot be reported.

**Black bream fishery:** The black bream stocks are not subject to specific management, but are exploited as part of a larger estuarine fishery. Along the west coast, the catch is concentrated in the Swan-Canning estuary.

**Cobbler fishery:** The cobbler stocks are not subject to specific management, but are exploited as part of a larger estuarine fishery. Along the west coast, the catch is concentrated in three west coast estuaries, the Swan-Canning estuary, Peel-Harvey estuary and Leschenault Inlet. In a number of estuaries, special regulations specific to the target fishing of cobbler have been introduced to protect spawning aggregations and areas.

**King George whiting fishery:** The King George whiting stocks are not subject to specific management, but are exploited as part of a larger estuarine and inshore marine fishery. The catch is concentrated in two west coast estuaries, the Peel-Harvey estuary and Leschenault Inlet.

**Annual Production****Main fishing method**

Gillnet/haul net.

**Landings**

**Swan-Canning:** Reported catches in the Swan-Canning estuary over the last 25 years are shown in Estuarine Figure 1. The 1998 catch showed a slight decrease from the 1997 catch figures and continued an overall decline in catches during the 1990s.

**Peel-Harvey:** Reported catches in the Peel-Harvey estuary over the past 25 years are shown in Estuarine Figure 2. The total catch for 1998 showed a slight increase from the 1997 catch figures. The reported total catches have shown only slight variation during the 1990s.

**Leschenault:** The total catch for 1998, 88.1 tonnes, was very similar to the 1997 catch. While the overall total catches over the past 25 years display a declining pattern, the catches during the past decade have remained fairly stable.

**Hardy Inlet:** Data not available for publication (fewer than five operators).

**Black bream:** The reported catch of black bream in the Swan-Canning estuary in 1998 was 2.6 tonnes and continued its decline from the record high catch in 1996.

**Cobbler:** The reported catches of cobbler in the Swan-Canning estuary have been declining from the late 1980s, with 1998 being the lowest on record. The 1998 catches in the Peel-Harvey estuary have declined from 1997 levels. In the Leschenault Inlet, there has

been a sharp decline in the reported catch from the 1997 level. The actual reported catches from individual estuaries are confidential due to the small number of boats involved in taking this species.

*King George whiting:* The King George whiting catches for 1998 reported from the Peel-Harvey estuary continued the increase of the previous three years, probably due to the more marine nature of the Peel-Harvey system since the opening of the Dawesville Channel. Catches have not been this high since the early 1970s. A different pattern was seen in the Leschenault Inlet with declining catches throughout the 1990s. The current 1998 reported catch is the lowest since 1969. The actual reported catches from individual estuaries are confidential due to the small number of boats involved in taking this species.

#### Fishing effort

Fishing effort has been reported as the average number of boats fishing per month. This measure of effort gives only a very general indication of effort changes. The number of days fished is also recorded, but it is difficult to determine targeted effort from this measure.

*Swan-Canning:* The fishing effort has tracked alongside the catches in this fishery (Estuarine Figure 1). The general trend has been a decrease in the number of fishing units since the mid-1970s; currently the mean monthly number of boats fishing is six.

*Peel-Harvey:* Fishing effort has remained at fairly constant levels during the 1990s after a rapid decline during the 1970s and 1980s (Estuarine Figure 2). Currently there are, on average, 16 boats actively fishing in the fishery each month.

*Leschenault:* The general overall trend is for a decline in fishing effort in this fishery. Between 1993 and the present, the fishing effort has remained stable at an average of five boats per month.

*Hardy Inlet:* Data not available for publication (fewer than five operators).

#### Catch rate

*Swan-Canning:* While the annual values of the catch rate (CPUE) for the finfish fishery in the Swan-Canning estuary have varied over the past 15 years, the overall catch rate trend generally has been stable.

*Peel-Harvey:* The catch rate has followed the catches in this fishery. The 1998 CPUE has increased from the 1997 CPUE.

*Leschenault:* The overall trend since the late 1980s has been a stable catch rate, with some annual variation, generally following the fluctuations in catches. The 1998 CPUE has increased from 1997 CPUE levels.

*Hardy Inlet:* Data not available for publication (fewer than five operators).

#### Stock Assessment

*Black bream:* A preliminary yield-per-recruit stock assessment was conducted for the black bream (*Acanthopagrus butcheri*) fishery in the Swan River. Biological data were incorporated for the Swan River population from research by Sarre.<sup>1</sup> An evaluation of the status of this fishery cannot be achieved until there is an understanding of the level of targeted fishing effort or a catch curve for this species.

*Cobbler:* A preliminary yield-per-recruit stock assessment was conducted for the cobbler (*Cnidogobius macrocephalus*) fishery. Biological data were incorporated for Swan River cobbler from research by Nel.<sup>2</sup> Detailed evaluation of the status of this fishery cannot be achieved until there is an understanding of the level of targeted fishing effort or a catch curve for this species.

*King George whiting:* A preliminary yield-per-recruit stock assessment was conducted for the King George whiting (*Sillaginodes punctata*) fishery. Biological data were incorporated from research by Hyndes et al.<sup>3</sup> and Potter et al.<sup>4</sup> for King George whiting from the west coast. An evaluation of the status of this fishery cannot be achieved until there is an understanding of the level of fishing effort or a catch curve for this species.

#### Breeding Stock Levels

*Black bream:* A preliminary eggs-per-recruit model was conducted for the black bream fishery in the Swan River. Biological data were incorporated for the Swan River population from research by Sarre.<sup>1</sup> An evaluation of the status of breeding stock levels of this species cannot be achieved until there is an understanding of the level of fishing effort or a catch curve for this species.

*Cobbler:* A preliminary eggs-per-recruit model was conducted for the cobbler fishery. Biological data were incorporated for Swan River cobbler from research by Nel.<sup>2</sup> Detailed evaluation of the status of breeding stock levels of this species cannot be achieved until there is an understanding of the level of fishing effort or a catch curve for this species.

*King George whiting:* A preliminary eggs-per-recruit stock assessment was conducted for the King George whiting fishery. Biological data were incorporated from research by Hyndes et al.<sup>3</sup> and Potter et al.<sup>4</sup> for King George whiting from the west coast. An evaluation of the status of breeding stock levels of this species cannot be achieved until there is an understanding of the level of fishing effort or a catch curve for this species.

### Catch Projection for Year 1999

The catch projections are given in the summary at the beginning of this section. The projections are derived by double exponential smoothed forecasting of the past annual catches and the variation of observations around the predictions. The confidence intervals are set at 80%.

### Product Value for Year 1998

The value of the fisheries in each of the estuaries is given in the summary at the start of this section.

### General Comments

To enhance the stock assessment of the key estuarine species, there is a need to gain a better understanding of targeted fishing effort and to gather the data to be able to develop a catch curve for these species.

#### Cobbler

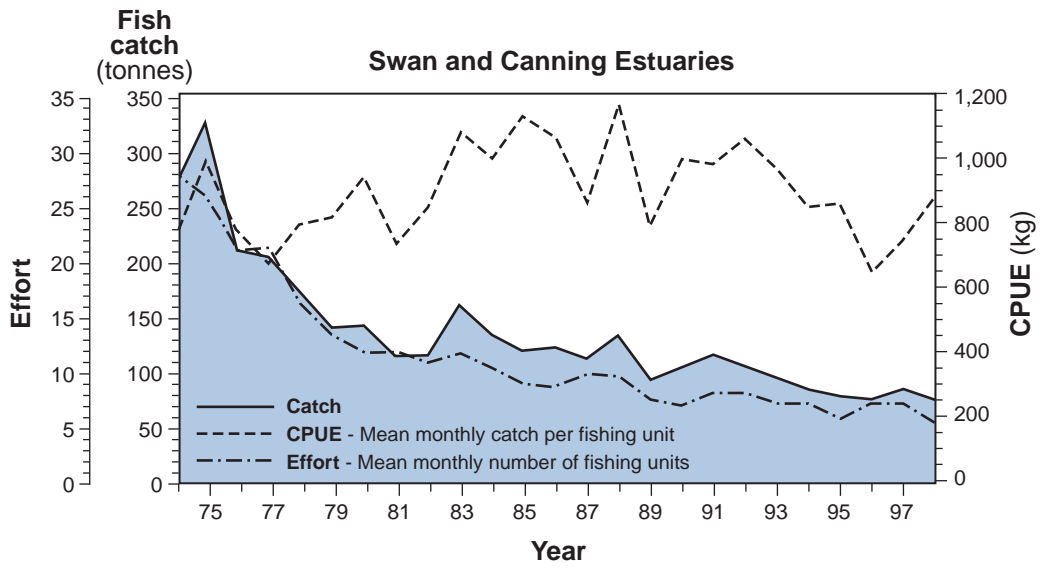
*Management changes:* The legal minimum size at capture has been increased to 430 mm total length for both recreational and commercial fishers. A seasonal closure to the 'bunting' (netting) of cobbler during the period September to October has been introduced in the Peel-Harvey system to protect cobbler when they aggregate to breed. However, it is stressed that a total ban on the capture of cobbler during the breeding season between August and November would be more effective. In view of its prominence as a key recreational target species in recent years and as a bycatch in both recreational fish gillnets and recreational prawn nets, it is important that all restrictions apply equally to both recreational and commercial sectors.

*Biological assessments:* Recent research results have shown quite clearly that cobbler stocks in each of the south-west estuaries are quite discrete, with virtually no exchange between adjacent stocks. They have also revealed that the historical legal minimum size at first capture was well below the mean size at maturity. The present decline in cobbler catches from many estuaries and embayments, and concerns for the declining quality of estuarine environments, have raised questions over the effect of these environmental factors on the availability of traditional nesting sites and hence breeding success. It was feared that breeding stock levels had dropped to very low levels in each of these three west coast estuaries and that under the present management regime, the stocks had little likelihood of recovering.

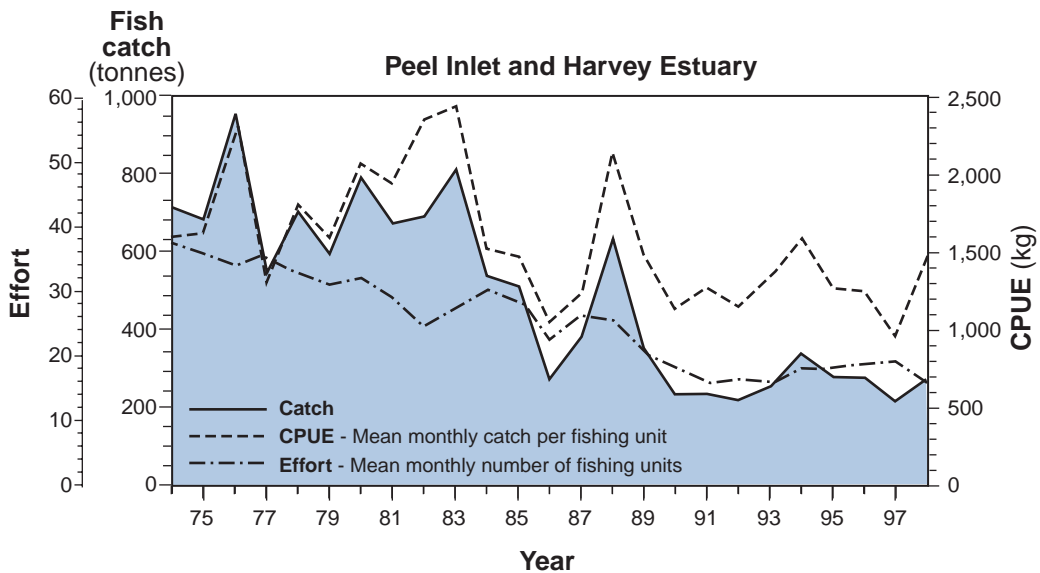
However, a number of factors may contribute to the recovery of these stocks in the future. For example, the entrance channel areas of both the Swan-Canning and Peel-Harvey estuaries are closed to commercial fishing. Secondly, the increasing development of rock walling and other bank stabilisation, particularly associated with the Dawesville Channel and canal development in the Peel-Harvey system, appears to have provided alternative nesting and nursery habitats to replace those located in degraded areas in the estuary proper.

The changes to the management regulations and habitat for cobbler are likely to have confounded the interpretation of the commercial catch data. In particular, changes to the minimum legal size, and the prohibition on taking cobbler during the spawning periods, may reduce the commercial cobbler catch in the short term, but should allow the stocks and catch to recover in future years.

1. Sarre, G. Unpublished data. PhD thesis, Murdoch University.
2. Nel, S. 1983. The ecology of two species of catfish (*Cnidogobius macrocephalus* and *Paraplotosus albilabris*) in the Swan estuary. Honours thesis, Murdoch University.
3. Hyndes, G.A., Platell, M.E., Potter, I.C. and Lenanton, R.C.J. 1998. Age composition, growth, reproductive biology, and recruitment of King George whiting, *Sillaginodes punctata*, in coastal waters of south-western Australia. *Fishery Bulletin* 96: 258-270.
4. Potter, I.C., Platell, M.E. and Lenanton, R.C.J. 1997. Biological data for the management of competing commercial and recreational fisheries for King George whiting and black bream. Fisheries Research and Development Corporation report, FRDC project 93/82.



**Estuarine Figure 1** The annual catch, effort and catch per unit effort (CPUE) for the total fishery of the Swan-Canning estuary over the period 1974-1998.



**Estuarine Figure 2** The annual catch, effort and catch per unit effort (CPUE) for the total fishery of the Peel-Harvey estuary over the period 1974-1998.

## South Coast Estuarine Fishery Status Report

### Main Features

#### Stock assessment complete:

*Preliminary assessment for black bream*

#### Exploitation status:

*Target species:*

<i>Black bream</i>	<i>Current information is inadequate</i>
<i>Cobbler</i>	<i>Current information is inadequate</i>
<i>King George whiting</i>	<i>Current information is inadequate</i>

#### Breeding stock levels:

*Target species:*

<i>Black bream</i>	<i>Current information is inadequate</i>
<i>Cobbler</i>	<i>Stable in Wilson Inlet</i>
<i>King George whiting</i>	<i>Current information is inadequate</i>

#### Previous catch projections for year 1998:

*South coast estuaries 280-480 tonnes*

#### Catch current season (1998):

<i>South coast estuaries</i>	<i>365 tonnes (includes fish, molluscs and crustaceans)</i>
<i>Black bream</i>	<i>9.4 tonnes</i>
<i>Cobbler</i>	<i>79.0 tonnes</i>
<i>King George whiting</i>	<i>55.8 tonnes</i>

#### Estimated annual value (to fishers) for 1998:

*South coast estuaries \$1,151,000 (includes fish, molluscs and crustaceans)*

#### Catch projections next year (1999):

*South coast estuaries 220-480 tonnes*

### Boundaries and Access

The following estuaries and inlets located between Cape Beaufort and the WA/SA border are reported under the South Coast Estuarine Fishery (SCEF): Oyster Harbour (commercial block 9505), Wilson Inlet (9506), Irwin Inlet (9507), Broke Inlet (9508), Princess Royal Harbour (9509), Parry's Inlet (8502), Beaufort Inlet (8503), Wellstead Inlet (8504), Gordon Inlet (8505), Dempster Inlet (8506), Hamersley River (8507), Culham Inlet (8508), Oldfield River (8509), Torradup River (8510), Stokes Inlet (8511) and Jerdacuttup (8512). The level of access decreased during 1998, from 40 units in January to 33 in October.

South coast licensees have access to each of the individual south coast estuaries, except Beaufort Inlet (8503) where only three licensees a year are granted entry.

The status of the fishery in each of the above estuaries is reviewed annually. This report presents data for the most important estuarine fish stocks, particularly those which are showing significant variations.

*Black bream fishery:* The black bream stocks are not subject to specific management, but are exploited as part of a larger estuarine fishery. During the past five years the catch has been concentrated in Stokes Inlet, Beaufort Inlet and Oldfield Inlet.

*Cobbler fishery:* The cobbler stocks are not subject to specific management, but are exploited as part of a larger estuarine fishery. The catch is concentrated in two south coast embayments/estuaries, the Princess Royal Harbour and Wilson Inlet. In a number of estuaries, special regulations specific to the target fishing of cobbler have been introduced to protect spawning aggregations and areas.

*King George whiting fishery:* The King George whiting stocks are not subject to specific management, but are exploited as part of a larger estuarine and inshore marine fishery. The catch is concentrated in two south coast embayments/estuaries, Oyster Harbour and Wilson Inlet.

### Annual Production

#### Main fishing method

Gillnet/haul net.

#### Landings

The reported catch from south coast estuaries shows a stable history between 1993 and 1997, with an increase to the present 1998 figures (Estuarine Figure 3). In 1998, Beaufort Inlet, Gordon Inlet, Oldfield River, Parry's Inlet and Stokes Inlet reported decreased catches from 1997 levels. Increased catches from 1997 levels were recorded in Broke Inlet, Irwin Inlet, Oyster Harbour, Wellstead Inlet and Wilson Inlet. No fishing was reported in Culham Inlet, Dempster Inlet, Hamersley River, Jerdacuttup Lakes or Torradup River.

In order to more accurately reflect the finfish catches from the South Coast Estuarine Fishery, the method of reporting the commercial catch has changed this year. Prior to 1993, no separate fishing block existed for Princess Royal Harbour and King George Sound, so both were included in the south coast estuarine catch figures, even though King George Sound was not part of the SCEF. After that time, Princess Royal Harbour and King George Sound catches were recorded under separate fishing blocks by fishers, and these catches were included in the annual south coast estuarine catch, in order to provide continuity of reporting with previous years. This year the reporting format has been altered to exclude King George Sound while continuing to incorporate Princess Royal Harbour catches (Estuarine Figure 3). This change provides a

more accurate reflection of the production from this fishery for future management purposes.

*Black bream:* In south coast estuaries, the catches of black bream continued to decline from the high 1992 reported catch (Estuarine Figure 4). High overall catch figures reported during the early 1990s were attributed to the large catches in the Culham Inlet (64 tonnes in 1992).

*Cobbler:* The 1998 catches from the Wilson Inlet have increased from 1997 levels by 22.3 tonnes (Estuarine Figure 5).

*King George whiting:* The King George whiting catches from Wilson Inlet for 1998 continued to increase over 1997 values and are the highest catches reported for 25 years (Estuarine Figure 6).

### Fishing effort

Fishing effort has been reported as the average number of boats fishing per month. This measure of effort gives only a very general indication of effort changes. The number of days fished is also recorded, but it is difficult to determine targeted effort from this measure.

Since 1993, the fishing effort in the SCEF has declined in most commercially fished estuaries between Albany and Augusta (Estuarine Figure 3). In particular, Broke Inlet, Princess Royal Harbour and Oyster Harbour are reporting effort declines for 1998. East of Albany, the major estuarine system regularly fished each year is Stokes Inlet. In this system, fishing effort increased in 1995 and 1996 and has declined for the past two years. Increasing fishing effort has been reported during 1998 from Irwin Inlet and Wilson Inlet, to the west of Albany.

### Catch rate

CPUE has closely followed the trend in catches overall in south coast estuaries. The catch rate for the south coast estuaries increased in 1998.

### Stock Assessment

*Cobbler:* The multi-species/targeting aspects of the effort data from Wilson Inlet make a formal assessment of the State's major cobbler fishery in this estuary difficult. However, the current level of catch, at the upper end of the historical range and average catch per vessel operating, indicates that this valuable stock is in a reasonable condition.

*King George whiting:* As noted above, formal stock assessment of the King George whiting stock in Wilson Inlet is not possible, however some conclusions can be drawn from the data. The overall effort level in this estuary, although at the maximum end of the historical range, has been relatively steady over recent years and does not account for the five-fold increase in catch of this species. Secondly, as the breeding stock for this species is generally outside of the estuary, the recent improvement in catch is most likely related to a

substantial increase in recruits entering the estuary over the past two to three years.

*Black bream:* A preliminary yield-per-recruit stock assessment was conducted for the black bream (*Acanthopagrus butcheri*) fishery in the Wellstead estuary. Biological data were incorporated for the Wellstead estuary population from research by Sarre.<sup>1</sup> An evaluation of the current status of this fishery cannot be achieved until there is an understanding of the level of targeted fishing effort or a catch curve for this species.

### Breeding Stock Levels

*Cobbler:* The breeding stock for cobbler in the important Wilson Inlet fishery is contained within the estuary. Given the recent levels of catch in this fishery, the breeding stock is considered to be adequate.

*King George whiting:* Breeding King George whiting occur in the open ocean which, together with the recent exceptional levels of recruitment in Wilson Inlet, indicates that the breeding stock for this area of the south coast is adequate.

*Black bream:* A preliminary eggs-per-recruit model was conducted for the black bream fishery in the Wellstead estuary. Biological data were incorporated for the Wellstead estuary population from research by Sarre.<sup>1</sup> An evaluation of the current status of breeding stock levels of this species cannot be achieved until there is an understanding of the level of fishing effort or a catch curve for this species.

### Catch Projection for Year 1999

The predicted catch for 1999 is between 220 and 480 tonnes. This projection is derived by double exponential smoothed forecasting of the past annual catches and the variation of observations around the predictions. The confidence intervals are set at 80%.

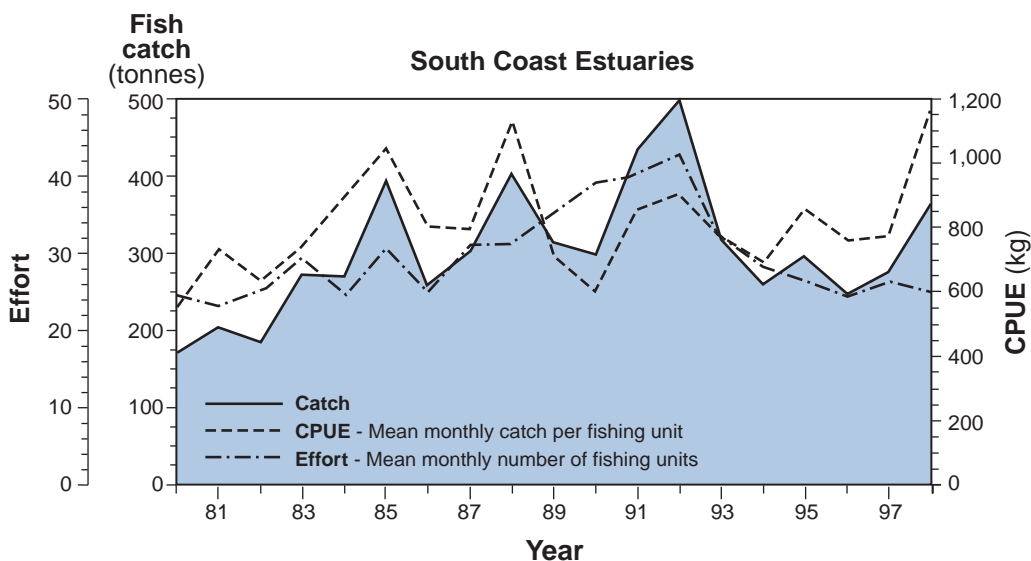
### Product Value for Year 1998

The 1998 value of the fisheries in the south coast estuaries is \$1,151,000.

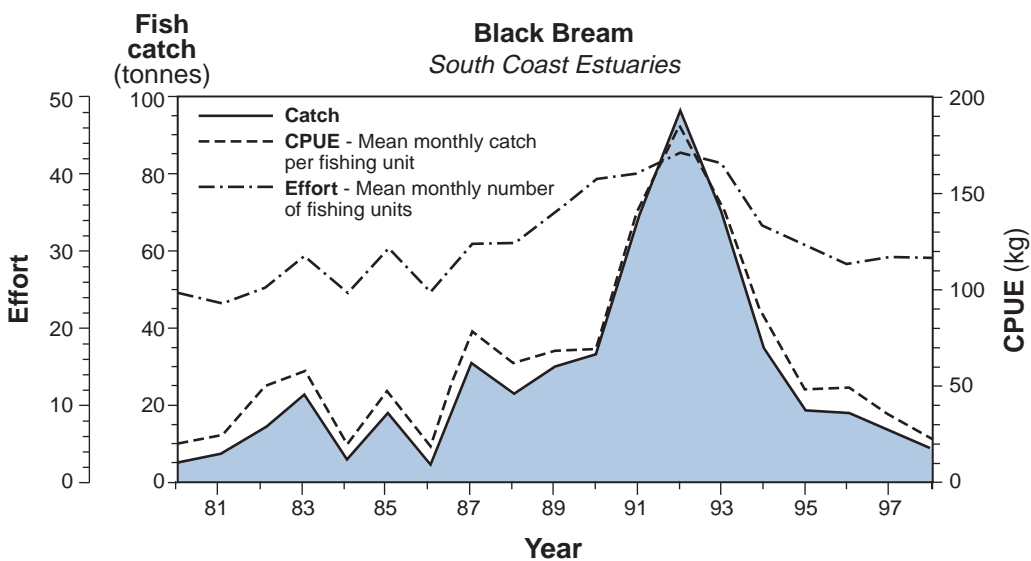
### General Comments

To improve the stock assessment of the key estuarine species, there is a need to gain a better understanding of targeted commercial fishing effort and to gather the data to be able to develop a catch curve for these species which are important to both the commercial and recreational sector.

1. Sarre, G. Unpublished data. PhD thesis, Murdoch University.

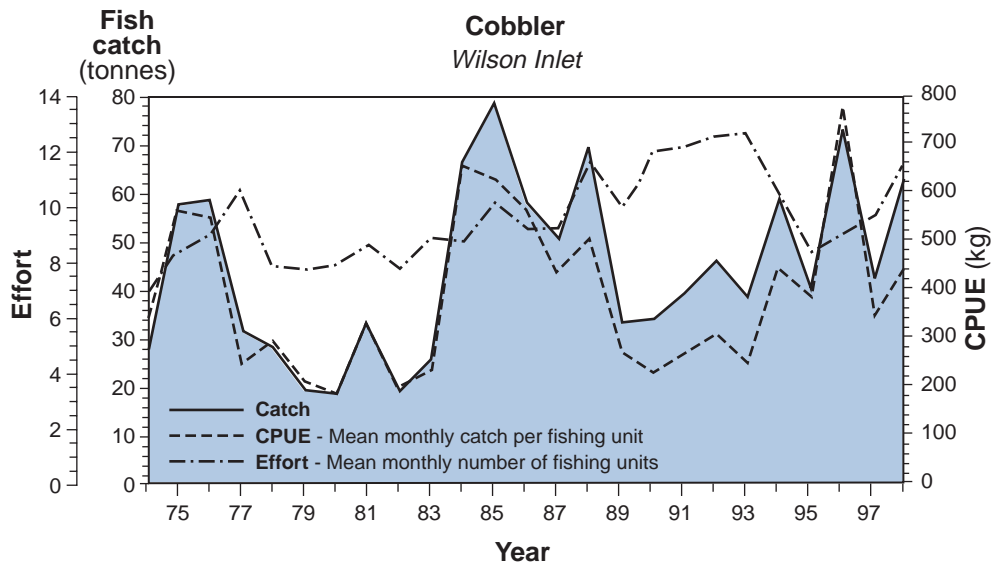


**Estuarine Figure 3** The annual catch, effort and catch per unit effort (CPUE) for the South Coast Estuarine Fishery over the period 1980–1998. Prior to 1993, no separate fishing block existed for Princess Royal Harbour and King George Sound, so both were included in the south coast estuarine catch figures, even though King George Sound was not part of the SCEF. After that time, Princess Royal Harbour and King George Sound catches were recorded under separate fishing blocks by fishers. This year, catches between 1993 and the present have been recalculated to include catches from Princess Royal Harbour only in the SCEF.

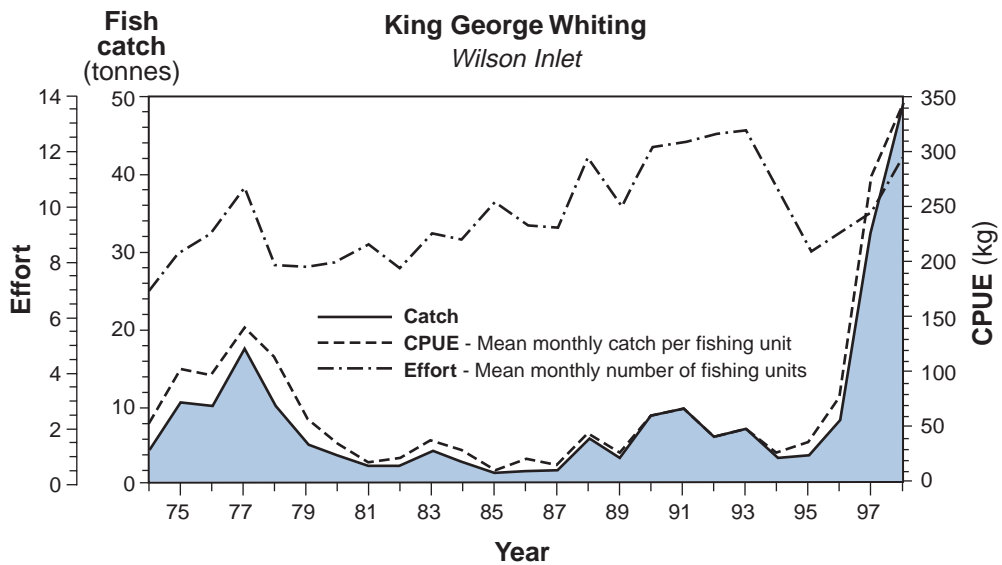


**Estuarine Figure 4** The annual catch, effort and catch per unit effort (CPUE) for the black bream (*Acanthopagrus butcheri*) fishery in south coast estuaries over the period 1980–1998.





**Estuarine Figure 5** The annual catch, effort and catch per unit effort (CPUE) for the cobbler (*Cnidogobius macrocephalus*) fishery of Wilson Inlet over the period 1974-1998.



**Estuarine Figure 6** The annual catch, effort and catch per unit effort (CPUE) for the King George whiting (*Sillaginodes punctata*) fishery of Wilson Inlet over the period 1974-1998.