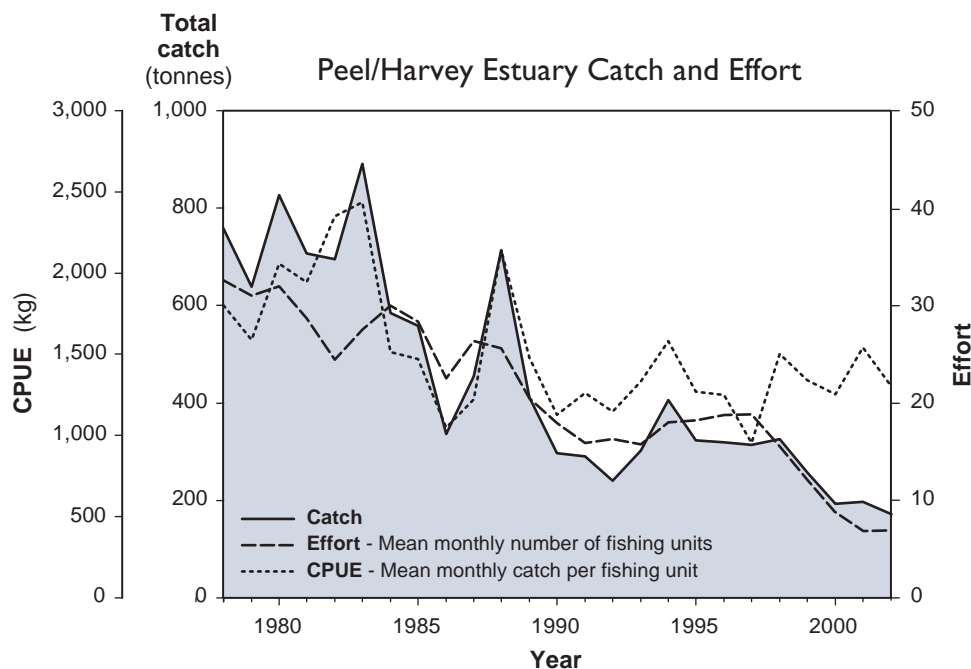


data sets less useful in assessing the status of estuarine species in future years.

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 cooperation 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.



#### 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 1978–2002.

## Lower West Coast Beach and Embayment Fisheries

### Management Summary

Within this sector there are five managed fisheries focused mainly in the Cockburn Sound area, details of which are listed below.

*West Coast Beach Bait Managed Fishery:* The fishery primarily targets small pelagic fish by the beach seine method within the coastal waters between Moore River and Tim's Thicket, south of Mandurah. The major target species is whitebait, with small quantities of other species being taken.

Continued beach access remains the main management issue relevant to this fishery, particularly where coastal developments restrict vehicle access. A Voluntary Fisheries Adjustment Scheme (VFAS) was implemented during 2002/03 which reduced the number of fishing units from 11 to 3. Consideration will be given to the feasibility of moving to a purse-seine-based fishery in 2003/04.

The review of beach seine fishing in the south-west has prepared recommendations for future management arrangements for consideration by the Minister for Fisheries. Increased development, tourism and marine recreational activities in the area have led to increased resource-sharing pressure and a need to introduce more formal fishery management. A VFAS is also being considered to address some of the resource-sharing issues.

The major target species for the beach seine fisheries is whitebait, with small quantities of other species being taken. As the whitebait stock in the south-west of Western Australia is found mainly in a thin coastal strip close to the coast and the stock size is relatively small, it is considered that the exploitation rate by commercial fishers should not be permitted to increase above current levels.

*Cockburn Sound (Crab) Managed Fishery:* See West Coast Blue Swimmer Crab Fishery, p. 20.

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

fish species, including shark, whiting and mullet, are taken opportunistically.

The catch of garfish and Australian herring has been rising steadily since the 1970s. The rate at which the catch of these two species is increasing is of some concern as they are both also important recreational species. The implementation of a VFAS in 2002/03 withdrew one licence from the fishery.

*Cockburn Sound (Mussel) Managed Fishery:* Fishing activity in this wild-capture fishery continues to be minimal due to the integration of the fishery with the mussel aquaculture operations in Cockburn Sound.

*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.

The management arrangements for the fishery are being reviewed to introduce transferability while maintaining catch and effort at historical levels. A Voluntary Fisheries Adjustment Scheme was implemented in 2002/03 which withdrew 12 licences from the fishery. There remains considerable latent effort in the fishery that needs to be considered in the management review.

#### **Governing Legislation/Fishing Authority**

West Coast (Beach Bait) Management Plan 1995  
Cockburn Sound (Crab) Management Plan 1995  
Cockburn Sound (Fish Net) Management Plan 1995  
Cockburn Sound (Mussel) Management Plan 1995  
Cockburn Sound (Line and Pot) Management Plan 1995  
Warnbro Sound Crab Management Plan 1995  
Subsidiary legislation under the *Fish Resources Management Act 1994*

#### **Consultation Process**

Department–industry meeting

## Research Summary

Data for monitoring the status of the various coastal stocks exploited in the southern half of the west coast bioregion are obtained primarily from the CAES records provided by industry. These data, together with biological knowledge from historical research, provide the basis for the following two status reports.

## Cockburn Sound Finfish Fisheries Status Report

*Prepared by S. Ayvazian and G. Nowara*

### FISHERY DESCRIPTION

#### **Boundaries and access**

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 in this report are for finfish only and are mainly from the Cockburn Sound (Line and Pot) and the Cockburn Sound (Fish Net) Managed Fisheries. As at May 2002 there were 2 licensees in the fish net fishery and 25 licensees in the line and pot fishery.

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. 35–37, 38–40, 184 and 20–25 respectively).

#### **Main fishing method**

Gillnet (set net), haul net, handline, beach seine and purse seine.

### RETAINED SPECIES

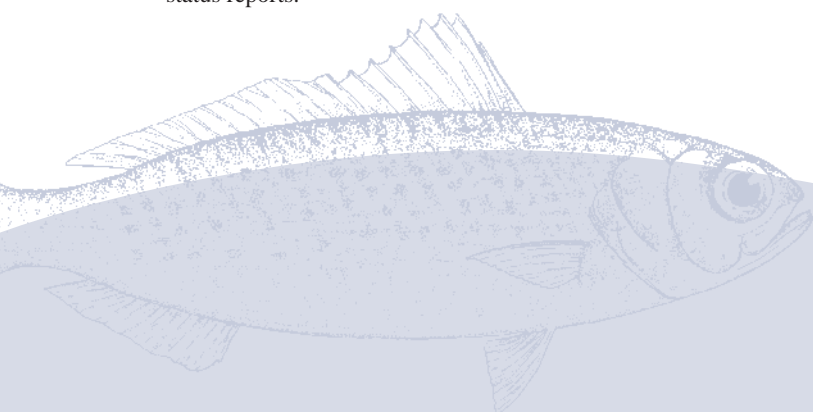
**Commercial production (season 2002): 61.4 tonnes**

#### **Landings**

The total catch of finfish from Cockburn Sound reported here excludes bait fish (whitebait, pilchard, scaly mackerel, anchovy and blue sprat), molluscs and crustaceans. The reported catch is primarily from the Cockburn Sound (Line and Pot) and the Cockburn Sound (Fish Net) Managed Fisheries; however, the figures include the catch of finfish, other than those five species mentioned above, recorded from the West Coast Beach Bait and the West Coast Purse Seine Managed Fisheries, which conduct part of their respective operations within Cockburn Sound.

Over the past 10 years, the finfish catches have generally declined from the peak catch in 1992. The 2002 catch of 61.4 t of finfish is, however, an increase over the 2001 catch by 15 t (Cockburn Sound Figure 1). The composition of the 2002 catch included about 20 finfish and elasmobranch species. As found in previous years, over 90% of the total catch consisted of Australian herring (*Arripis georgianus*), sea garfish (*Hyporhamphus melanochir*), pink snapper (*Pagrus auratus*), sea mullet (*Mugil cephalus*) and skates and rays.

Australian herring catches showed a steady increase from 1980, reaching a peak in 1994 (around 50 t). Since the second half of the 1990s, catches have declined to a lower level fluctuating between 15 and 30 t per year. The catch for 2002 was 22 t (Cockburn Sound Figure 2).



The catch of sea garfish increased steadily from 1980 to a high level in 1994, after which time the catch declined, with a bigger drop in 1997. The catch peaked again in 1999; however, the current catch has declined (actual figures are not able to be reported as there are fewer than five operators catching this species).

The contribution of the catch of skates and rays to the total landings has increased from 2.5% in 2001 to 5.6% in 2002.

### Fishing effort

Fishing effort is measured as the number of fishing boat days for finfish catches (excluding purse seine and pot catches) from the Cockburn Sound (Line and Pot) and the Cockburn Sound (Fish Net) Managed Fisheries. This only provides an indication of the overall usage of the area by the commercial sector, which is composed of a number of different fisheries and various fishing methods.

The fishing effort peaked during the early 1990s at 1,400–1,600 boat days. It subsequently declined to 882 boat days in 1997, but rose to 1,562 boat days in 1999. Since then, it has again declined to its current level of 722 boat days for 2002 (Cockburn Sound Figure 1).

### Catch rate

The catch rate for the different fisheries and the various fishing methods has averaged around 80 kg/boat day during the past 10 years (Cockburn Sound Figure 1). The peak catch rate during the 1990s was 118.5 kg/boat day in 1992 and the lowest reported catch rate was 49 kg/boat day in 2001. The 2002 catch rate was 85 kg/boat day. The 2002 catch rate for Australian herring was 30.9 kg/boat day (Cockburn Sound Figure 2).

### Recreational component: **56% (approx.)**

The most recent Cockburn Sound recreational shore- and boat-based fishing survey data are from a creel survey conducted between September 2001 and August 2002. Catch and effort data collected as a part of this survey reported 57 finfish species and six invertebrate species in Cockburn Sound and Owen Anchorage, with the key recreational finfish species being 31 t of Australian herring, 19 t of whiting and King George whiting (*Sillaginidae*), 5 t of tailor (*Pomatomus saltatrix*), 4 t of pink snapper, 4 t of garfish, 3 t of skipjack trevally (*Pseudocaranx dentex*) and 2 t of silver bream (*Rhabdosargus sarba*). (This species composition is similar to that reported for the Cockburn Sound area during the Augusta to Kalbarri recreational boat-based fishing survey during 1996/97.) During the calendar year 2002, the commercial catch of these same species was approximately 53 t. Thus the recreational fishery takes approximately 56% of the combined recreational and commercial catch of these key recreational finfish species. This proportion appears to have increased since the 1996/97 creel survey for the same region, but the increase may be due in part to the more extensive survey of recreational fishers which included morning and night fishing for pink snapper.

### Stock assessment completed: **Not assessed**

For an assessment of Australian herring stocks, see p. 126.

### Exploitation status: **Not assessed**

For an assessment of Australian herring stocks, see p. 126.

### Breeding stock levels: **Not assessed**

For an assessment of Australian herring stocks, see p. 126.

## NON-RETAINED SPECIES

### Bycatch species impact: **Low**

This small-scale, multi-species fishery using line and mesh nets to target primarily surface species is unlikely to generate significant impacts such as discarding, as virtually all species taken are marketed in the metropolitan area.

### Protected species interaction: **Not assessed**

## ECOSYSTEM EFFECTS

### Food chain effects: **Not assessed**

### Habitat effects: **Low**

The fishing methods used in this fishery do not impact on the habitat.

## SOCIAL EFFECTS

During 2002, the average number of crew fishing for finfish in the Cockburn Sound (Line and Pot) Managed Fishery and Cockburn Sound (Fish Net) Managed Fishery was approximately 18. Production supplies restaurant and retail sectors in the metropolitan area.

## ECONOMIC EFFECTS

### Estimated annual value (to fishers) for year (2002): **\$138,000**

While relatively limited in overall value, the production from the commercial fishery provides a valuable input to the metropolitan fresh fish market.

## FISHERY GOVERNANCE

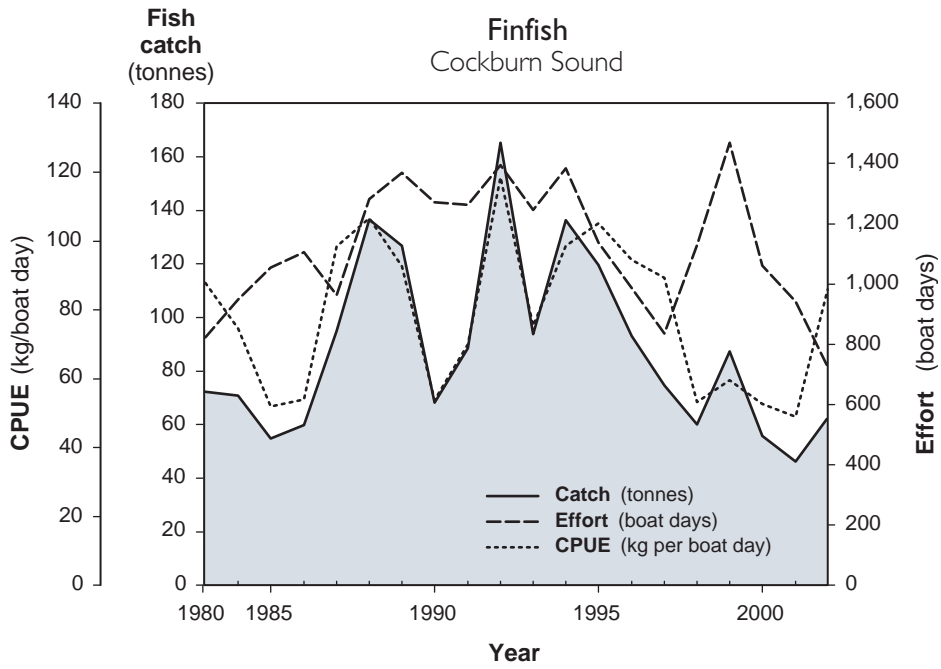
### Acceptable catch range: **40–95 tonnes**

The expected catch range under the current management regime is 40–95 t of finfish. This projection is derived by double exponential smoothed forecasting of the annual catches to 1998 and the variation of observations around the predictions. The confidence intervals are set at 80%. The current annual catch of 61.4 t is in the middle of the acceptable catch range.

## EXTERNAL FACTORS

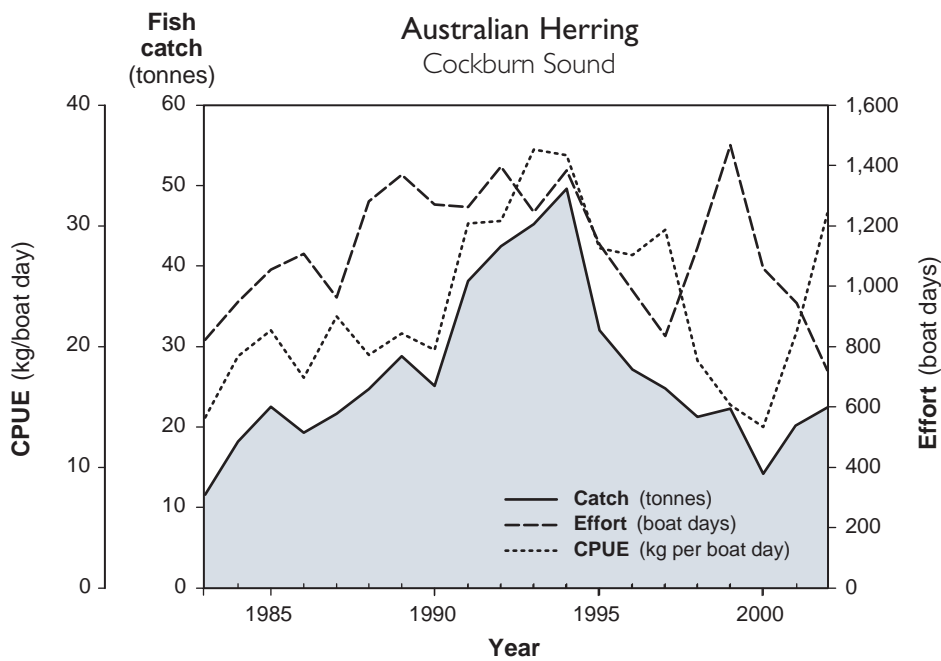
Catch information from the small commercial sector provides a valuable input to the research database for monitoring the abundance of these stocks, which are also important to recreational fishing. However, the gradual decline in numbers of commercial fishers in recent years may render the catch statistics less useful in future.

# WEST COAST BIOREGION



**COCKBURN SOUND FIGURE 1**

The annual catch, effort and catch per unit effort (CPUE) for finfish (excluding bait fish) for the Cockburn Sound fisheries over the period 1980–2002.



**COCKBURN SOUND FIGURE 2**

The annual catch, effort and catch per unit effort (CPUE) for Australian herring (*Aripis georgianus*) in the Cockburn Sound fisheries over the period 1980–2002.

## West Coast Beach Bait Managed Fishery Status Report

Prepared by D. Gaughan and T. Leary

### FISHERY DESCRIPTION

#### Boundaries and access

The West Coast Beach Bait Managed Fishery primarily targets whitebait (*Hyperlophus vittatus*). Because this species is also the primary target south of the managed fishery boundary, the catches of the as yet unmanaged south-west beach seiners have been included in this status report.

The West Coast Beach Bait Managed Fishery extends from the mouth of the Moore River, north of Perth, to Tim's Thicket in the south, with access currently via managed fishery licence. A Government-funded Fishery Adjustment Scheme has reduced the fishery from 11 to 3 licences.

The south-west beach seine fishing activities, which also target whitebait, occur from Tim's Thicket south to Point D'Entrecasteaux, with activity typically concentrated in Geographe Bay (Cape Naturaliste to Preston Beach). While the management arrangements for this 'fishery' have yet to be finalised, a discrete group of fishers is endorsed to operate in this area using similar methods to the managed beach bait fishers in the metropolitan and Mandurah areas.

#### Main fishing method

Beach seine net.

### RETAINED SPECIES

#### Commercial production (season 2002):

All species 310 tonnes  
Whitebait 183 tonnes

#### Landings

The main target species in this fishery is whitebait, of which 183 t were caught in the 2002 season. The catches of all other species landed in this fishery, which amounted to 107 t, were dominated by sea mullet, blue sprat, yellow-eye mullet, western sand whiting and buffalo bream (West Coast Beach Bait Tables 1 and 2).

Catches of whitebait are discussed here according to the region in which they were landed. Metropolitan and Mandurah landings form part of the West Coast Beach Bait Managed Fishery, while Bunbury landings are from the 'south-west beach seine fishery'.

*Metropolitan:* The catch of whitebait for the metropolitan region during 2002 was 16 t, similar to catches in 2001 (11 t) and 1999 (11.1 t).

*Mandurah:* The whitebait catch at Mandurah was just over 2 t, an order of magnitude lower than catches for the previous two years (2001: 32.1 t, 2000: 33.6 t).

*Bunbury:* The Bunbury catch was similar to the past two years, with 165 t caught in 2002 compared with 197 t in 2001 and 175 t in 2000.

#### Fishing effort

Given the schooling behaviour of whitebait (and most of the other retained species), the fishers' methods of targeting schools and the way the effort data is recorded on the monthly returns, the data provided by this fishery is not a reliable measure of effort applied to the whitebait stock.

#### Catch rate

See 'Fishing effort' above.

#### Recreational component:

Nil

There is no recreational fishery for whitebait. Only a small number of the other retained species are caught recreationally (see p. 148).

#### Stock assessment completed:

Yes

The annual assessment for the whitebait stocks utilises the total catch as an indicator of abundance, on the reasonable assumption that catchability remains stable but that fishing effort adjusts so as to take a similar proportion of the available stock in all years. On this basis, abundance in 2002 remained at moderately high levels which is consistent with the above-average Leeuwin Current in 2001.

The 2002 catch of 183 t falls within the acceptable range for total catch but is lower than expected, underlining the need for further work on the Leeuwin Current/whitebait model. Although there have been licence buy-backs in the northern, managed part of the fishery, the remaining licence holders have expressed the desire to take up purse seining rather than beach seining as the preferred fishing method. Such a major shift in fishing practice would require a substantial change to the management of the fishery and the method of assessment.

#### Exploitation status:

Fully exploited

#### Breeding stock levels:

Adequate

Previous modelling and plankton sampling indicate that the typical stock size of whitebait is probably less than 1,000 t for the entire west coast. The cyclical nature of the fishery, whereby very good catches (usually related to a strong Leeuwin Current during the previous year) are often followed by one to two years of low catches, suggests that breeding stocks may become a limiting factor in years following environmentally driven low recruitment. Therefore this fishery needs to be carefully monitored.

### NON-RETAINED SPECIES

#### Bycatch species impact:

Low

There is typically no bycatch in the targeted whitebait fishery. Where multi-species schools occur, for example of mixed whitebait and juvenile pilchards, catches are released because of the difficulty of sorting.

#### Protected species interaction:

Low

No protected species occur in the fishing area which could be caught by the beach seine gear.

# WEST COAST BIOREGION

## ECOSYSTEM EFFECTS

### Food chain effects:

Low

The highly variable recruitment cycle of whitebait, apparently related to oceanographic effects, means that predatory birds and fish cannot rely on the availability of whitebait as a major food source in all years. Furthermore, the constraints of the beach seine gear and fishing method largely limit fishing to within 80 m of the shore, whereas the fish stock is more widely distributed, suggesting that natural predators have greater access to the stock than does the fishery. There may be competition in years of low whitebait abundance between fishermen and the little penguins that breed on Penguin Island and feed in the metropolitan and Mandurah regions of the whitebait fishery. Although the links between little penguins and whitebait are now clear, the impact of any such interaction is still not understood. The ecological impact of the fishery has previously been considered to be low and the reduced number of licences would indicate that this should continue. If, however, there is a move towards purse seining for whitebait this may change the relationship so potential food chain and direct impacts would need to be investigated.

### Habitat effects:

Negligible

All fishing occurs over sandy substrate and the impact of the relatively small amount of very light fishing gear would be negligible.

## SOCIAL EFFECTS

Approximately 32 fishing units involving about 72 fishermen and crew worked in the whitebait industry in 2002.

## ECONOMIC EFFECTS

**Estimated annual value (to fishers) for year (2002):**  
**\$476,000**

The price for whitebait has risen slightly in recent years to a current average of \$2.60/kg. Total catch value was about \$476,000.

## FISHERY GOVERNANCE

**Acceptable catch range:** Whitebait 106–331 tonnes

The range provided for whitebait reflects catches achieved since 1990 by the limited numbers of operators with access to these stocks. It should be noted however that the major portion of the whitebait catch is taken from the Bunbury sector, which does not yet have a formal management plan in place.

## EXTERNAL FACTORS

Annual catches in this fishery will most likely continue to exhibit large fluctuations under the influence of environmental factors. The fishery will therefore continue to be regulated through limited entry access and gear restrictions, and is partway through the process of becoming fully managed to ensure that appropriate effort levels are maintained. Further research into the Leeuwin Current/whitebait relationship is needed, and will be undertaken when time becomes available.

Ongoing urbanisation of Western Australia's south-west region may have implications for this fishery, as sectors of the community press to restrict access to beaches by the four-wheel-drive vehicles needed to transport the beach seining gear and catches.

## WEST COAST BEACH BAIT TABLE 1

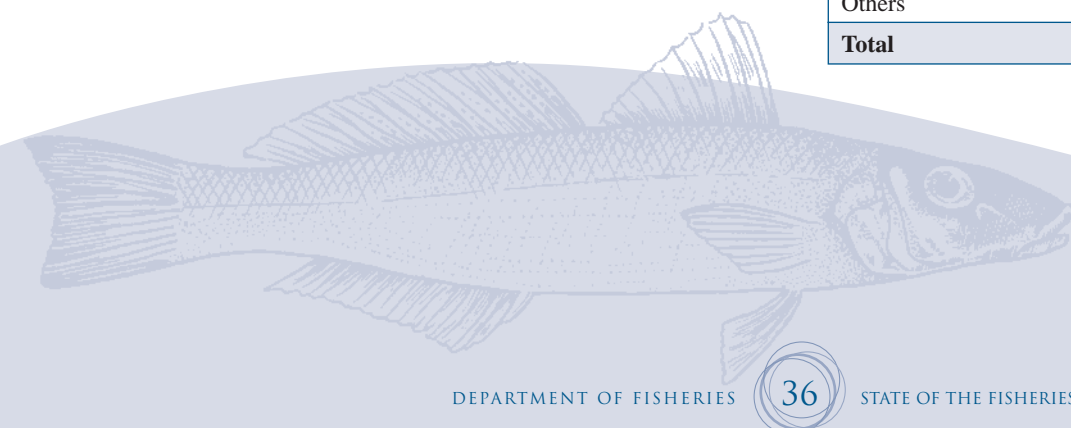
Catches in 2002 of retained species other than whitebait from the West Coast Beach Bait Managed Fishery. Numbers in brackets indicate that part of the catch taken from Cockburn Sound.

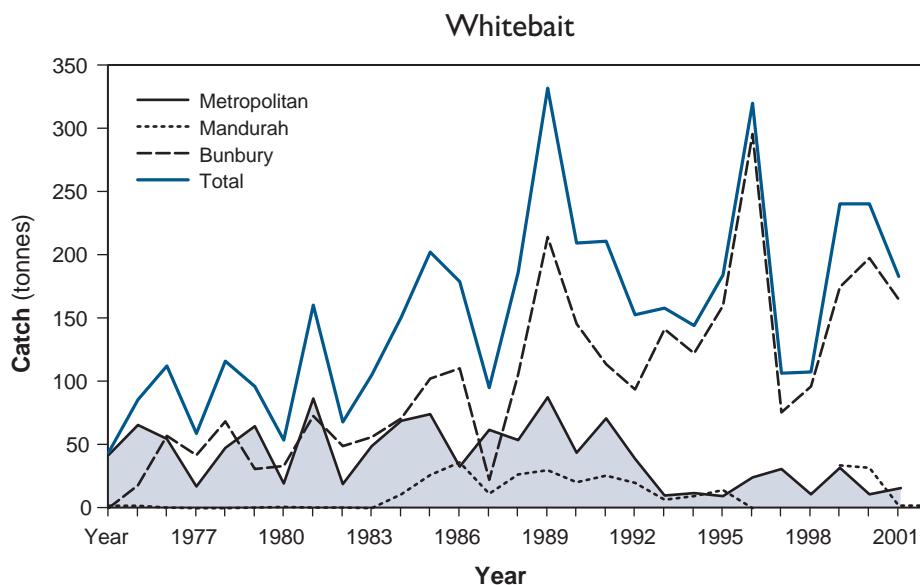
SPECIES	CATCH (tonnes)
Mullet, sea <i>Mugil cephalus</i>	17.6 (2.2)
Sprat, blue <i>Spratelloides robustus</i>	9.2 (9.2)
Whiting, western sand <i>Sillago schomburgkii</i>	2.6 (0.3)
Mullet, yellow-eye <i>Aldrichetta forsteri</i>	2.3 (0.2)
Mackerel, scaly <i>Sardinella lemuru</i>	1.4 (1.2)
Others	0.7 (0.7)
<b>Total</b>	<b>33.8 (13.8)</b>

## WEST COAST BEACH BAIT TABLE 2

Catches in 2002 of retained species other than whitebait from the south-west beach seining sector.

SPECIES	CATCH (tonnes)
Mullet, sea <i>Mugil cephalus</i>	38.4
Whiting, western sand <i>Sillago schomburgkii</i>	13.9
Sprat, blue <i>Spratelloides robustus</i>	10.6
Bream, buffalo <i>Kyphosus sp.</i>	4.8
Garfish, sea <i>Hyporhamphus melanochir</i>	2.6
Mullet, yellow-eye <i>Aldrichetta forsteri</i>	2.3
Others	1.1
<b>Total</b>	<b>73.7</b>





**WEST COAST BEACH BAIT FIGURE 1**

Total annual catch of whitebait for each sector from 1975 to 2002.

## West Coast Purse Seine Managed Fishery

### Management Summary

This fishery is based primarily on the capture of pilchards (*Sardinops sagax*) and the tropical sardine *Sardinella lemuru* (previously called scaly mackerel, hereafter referred to as sardinella) by purse seine boats in the waters off the west coast of Western Australia. However, the management plan also covers the take of Perth herring (*Nematalosa vlaminghi*), yellowtail scad (*Trachurus novaezelandiae*), Australian anchovy (*Engraulis australis*) and maray (*Etrumeus teres*). The product has a variety of uses, being sold for human consumption, angling bait, commercial bait, tuna grow-out food and pet food. The tuna feed market is the main consumer of sardinella, and human consumption the major end user for pilchards.

As in the South Coast Purse Seine Managed Fishery, the spread of a *Herpesvirus* through the west coast in 1995 and again in 1998/99 had a serious impact on the pilchard stock. The possibility of a further outbreak represents a real threat to the fishery.

The fishery operates between 33° S latitude and 31° S latitude and there are also two purse seine development zones currently operating north and south of this area. The Southern Development Zone consists of three operators who operate purse seine nets in the waters between 33° S latitude and Cape Leeuwin. The Northern Development Zone covers the waters between 31° S latitude and 22° S latitude and consists

of one active operator (whose catch is not currently reported for confidentiality reasons). While the managed fishery and the Southern Development Zone mainly target pilchards, the Northern Development Zone targets sardinella.

The fishing season runs from 1 April to 31 March of the following year. The pilchard catch allocation (cap) for the 2002/03 licensing period remained set at 720 t. For 2003/04, following recovery of the stock, the pilchard catch cap has been increased to 1,000 t, and there is also a limit of 1,500 t on the take of other small pelagic fish permitted to be taken by licensees. Ninety per cent of the allocation of the available catch has been apportioned to holders of a managed fishery licence, 3% is provided for supplementary access endorsement holders and 7% for operators in the Southern Development Zone. The Northern Development Zone continues to have an informal trigger catch cap of 2,700 t for sardinella.

The determination of a pilchard and other small pelagic fish catch cap and the process for allocation among licensees is considered to be a temporary measure until more formal output controls are implemented in the fishery. Management arrangements are currently based on limited entry, capacity setting and controls on gear and boat size; however, it has been accepted for some time that the fishery should be managed under an individually transferable quota (ITQ) arrangement.

The framework that would see the change to ITQ management has been developed in consultation with stakeholders and is close to being finalised. The new management plan proposes to include the Northern and Southern Development Zone operators.