

THE SOUTH COAST ESTUARINE FISHERY

A DISCUSSION PAPER

by
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FISHERIES MANAGEMENT PAPER No. 126



FISHERIES
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SUBMISSIONS TO THIS DISCUSSION PAPER:

This *Discussion Paper for the South Coast Estuarine Fishery* is designed to inform the fishing (commercial and recreational) community and general public about the issues and management proposals relating to the South Coast Estuarine Fishery. Fisheries WA encourage comment about the issues raised and the proposed management recommendations in this report. Summaries of all submissions will be made available in full to other parties on request.

Points To Consider For Submissions

To ensure that your comments are as effective as possible, please:

- clearly and briefly describe each separate subject you wish to discuss,
- assist us by referring to the different section/s and page numbers and recommendations in the paper,
- tell us whether you agree or disagree with any or all of the recommendations or issues identified under each heading,
- clearly state your views and quote sources of information where appropriate, and
- suggest alternative ways to resolve any of the issues you have raised.

Responses to Submissions

All submissions will be acknowledged by mail. The submissions will be summarised and all people or groups sending submissions will receive a summary of submissions. The results of the submission phase will be considered when making final management recommendations for the Fishery.

Where and When to Send Your Submission

The closing date for submissions is August 31st 1999. Please send your submission before this date, along with your full name, address, and association details (if applicable) to:

The Executive Director
Attention: Regional Programs Officer - South
Southern Regional Office
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PREFACE

Western Australian estuaries are recognised by many user groups for their unique environmental qualities, and their suitability for a number of commercial and recreational activities including commercial and recreational fishing, and tourism.

Their locations vary from being on the doorstep of populated areas to remote natural protected areas surrounded by National Parks. However, wherever located, long term sustainable management of these fisheries is critical.

The South Coast Estuarine Fishery (the Fishery) encompasses some of the most spectacular, diverse and popular estuarine systems in Western Australia. Many of these estuaries have been commercially fished since the mid-19th century and are the focus of many regional family-based fishing enterprises, some having been fished by an individual family through three or four generations.

This commercial fishing link with the estuaries is still very much a part of many south coast regions sharing the areas in which it is based with other user groups. These estuaries and the areas in which they are located are also attracting many alternative regional industries, based around the opportunities and recreational qualities that they provide.

The increasing use of our estuaries has intensified the focus on the estuarine environment, the fish resources contained within it, and the need for sustainable management and equitable resource sharing arrangements for the benefit of all user groups.

This discussion paper proposes a way for the South Coast Estuarine Fishery to address issues relating to the long-term sustainable management and sharing of the fish resource.

1.0 INTRODUCTION

The increased focus on estuaries has led both commercial and recreational fishers to question whether the current management regime for Western Australia's Estuarine Fisheries is adequate to ensure long-term sustainability and equity in sharing of the fish resource. Current commercial and recreational management arrangements regulate fishing effort and control the catch, although it must be noted that natural and other man made impacts exert forces that affect fish recruitment, survival and fish population levels. South coast estuaries are subject to intra-annual environmental fluctuations such as sudden changes in salinity and oxygen levels by flooding and droughts, which can have major effects on fish populations.

In recognition that estuaries are of social, economic and biological importance the number of commercial fishermen permitted to fish in estuaries and the manner in which they operate is restricted. Although the number of recreational fishers is not restricted, fishing effort is controlled through a suite of management arrangements including bag limits, closed seasons and gear restrictions. These recreational restrictions are reviewed through a variety of consultative mechanisms and in future will be addressed through Regional Recreational Fishing Management Plans, to ensure that, with the proposed revised commercial fishery management arrangements, estuary fish stocks are managed sustainably into the future.

In addition to direct controls on fishing, over the last decade government (through Fisheries WA) has been facilitating a reduction in the number of commercial participants who are permitted to fish the estuaries. This has been achieved through acquisition of licences under fisheries adjustment schemes, and management arrangements that have seen a number of fishermen leaving the fishery through natural attrition (including retirement). Through these schemes and management measures, reductions in effort (including latent effort) in each of the Estuarine Fisheries has been achieved by reducing the total number of participants. In 1987 the South Coast Estuarine Fishery consisted of 66 fishing units. The reduction to the present number of 33 fishing units has been achieved through the surrender of 29 fishing units to Fisheries Adjustment Schemes and four units retiring.

Under current levels of fishing effort, there are no identified short term sustainability concerns provided the combined commercial and recreational catches remain within historic levels. However, under the current management arrangements, there is potential for commercial fishing effort to significantly increase as it is considered there is a lack of appropriate effort control mechanisms. This increase in effort, particularly on species such as cobbler and black bream, could provide some sustainability concerns.

Activation of effort could result from;

- changes such as fishery restructures occurring in other fisheries which are part of an estuarine unit holders diverse fishing package;
- low recruitment and/or abundance in other fishing operations leading to an increase of effort in estuaries;

- low recruitment and/or abundance of particular targetted fish species leading to an increase of effort particular species such as black bream or cobbler;
- estuarine unit holders selling or leasing parts of their fishing, and
- transferability (without adequate management measures).

An increase in estuarine fishing effort could have a significant impact on the estuarine resource and in the long term may lead to sustainability concerns and an escalation of resource sharing issues.

These latent effort concerns, the need to consolidate the benefits of the recent Fisheries Adjustment Schemes and the necessity for equitable resource sharing arrangements amongst user groups prompted an agency review of current management arrangements relating to all the Estuarine Fisheries in Western Australia.

This led to the development of a number of management proposals which are based on the following objectives;

1. consolidate the benefits gained by the Fisheries Adjustment Schemes,
2. ensure long term sustainability of the fish resources,
3. provide equitable, quality fishing opportunities for all user groups,
4. address the requirements of the non fishing consumers of fish products by maintaining an optimum number of commercial fishermen in estuarine fisheries and
5. ensure cost effective, efficient and consistent management across estuarine fisheries in Western Australia.

The review concluded that the process for developing strategies aimed at achieving the objectives should consist of three stages:

- 1) Introduction of consistent legislation and management to effect structural adjustment such as;
 - a) legislation consistent with the *Fish Resources Management Act 1994*;
 - b) effort controls which are consistent across all estuarine fisheries; and
 - c) access to Fisheries Adjustment Schemes.
- 2) Determining the optimum number of commercial fishing units for the Fishery and mechanisms for achieving transferability.
- 3) Consideration of issues and options for area specific management and further resource sharing.

While the preliminary internal Fisheries WA review focussed on all estuaries, this discussion paper involves a management review of the South Coast Estuarine Fishery, primarily due to the differences in management of this fishery, and its composition and geographical boundaries. Unlike other estuarine fisheries this fishery spans a number of estuaries, rivers, inlets and harbours across a large geographical distance.

No formal fishery or public consultation has been undertaken since the Draft Report of the South Coast Estuarine Fishery Working Group in 1995 (Fisheries Management Paper 76). However management issues and proposed management strategies considered in this discussion paper have been developed taking that process into account, together with current issues and concerns raised by some members of the commercial and recreational fishing sectors, other user groups and agency staff.

2.0 FISHERY OVERVIEW:

The geographical area for the fishery is defined as the waters of the estuaries on the south coast of Western Australia between Cape Beaufort and the WA/SA border (129° east) including Princess Royal Harbour and Oyster Harbour.

A total of 33 fishing units are authorised to participate in the Fishery catching a variety of fish including: silver bream, black bream, cobbler, flathead, flounder, garfish, herring, leatherjacket, mullet, whiting (King George and other species) and crabs.

Fish are taken by a number of methods, including set nets, haul/seine nets, crab drop nets, hand-lines and by hand-gathering. While there are lawful net notices which mainly refer to minimum mesh sizes, there is no broad legislation that defines the permitted gear and methods that may be used in the fishery. For example, legislation does not limit the quantity of commercial fishing gear (such as set net or haul net lengths) permitted to be used within the whole Fishery.

Day time closures for set netting operate in some estuaries within the Fishery, however there are no legislated weekend closures. A table summarising the netting restrictions, closures and major catch species for each major estuary is shown in Appendix 1.

2.1 Regulatory Approach

All Western Australian fisheries are managed in accordance with the *Fish Resources Management Act 1994* and the *Fish Resources Management Regulations 1995*. Authorisations are issued to fishermen on an annual basis.

The fishery is managed under a restricted entry regime policies outlined in 'Instructions to Licensing Officers - Notice No. 381' (refer Appendix 2). This Notice outlines directions regarding the granting of authorisations and defines the Fishery. In most fisheries authorisations are attached to a Fishing Boat Licence (FBL). In estuarine fisheries a condition on the Commercial Fishing Licence (CFL) grants the individual authority to operate within the Fishery.

Other management arrangements including gear restrictions, seasonal and time closures, and area closures are provided by various closed water and lawful netting notices. Time, area and gear restrictions vary from estuary to estuary. A list of current legislation is summarised in Appendix 3.

2.2 Current Definition of Fishing Unit

A fishing unit currently consists of a primary fishing boat and up to four subsidiary dinghies. This structure takes into account the diversified nature of estuarine fishing operations and allows different dinghies to be set up for specific fishing operations. These dinghies may only be used in conjunction with other dinghies within the fishing unit, provided the authorisation holder is in control of the fishing operation. An appropriately authorised assistant or trainee fisherman is permitted to assist the fishing operation provided the unit holder is on board his licensed boat and participating in that particular fishing operation. Therefore, fishing boats within the unit may not be operated independently of each other.

It is Fisheries WA policy (Fisheries Management Paper No. 21) to only permit the replacement of dinghies that are less than 5.5 metres with dinghies less than 5.5 metres. Dinghies that are between 5.5 metres and less than 6.5 metres can be replaced by a boat that is less than 6.5 metres.

2.3 Transferability Status

License transfers within the South Coast Estuarine Fishery are not permitted under current policy. The policy was implemented due to concerns expressed by the South Coast Estuarine Fishery Working Group in 1995 with the high level of latent effort in the Fishery. The Working Group recommended that:

- there be no license transferability including family transfers in the fishery;
- the rules regarding licence transferability should be reviewed when the number of licences in the fishery reaches thirty.

There are no special provisions for the transfer of licences within the 'Instructions to Licensing Officers Notice'. The Executive Director has authority to "reissue" a licence under a "grandfather" clause which limits "transferability" to immediate family offspring. This has been termed "limited transferability".

However, as stated previously it is a condition on the CFL which authorises access to the Fishery. This condition cannot be transferred under the *Fish Resources Management Act 1994*. In effect, for the Executive Director to approve a "transfer", an application for the variation or cancellation of an original CFL would have to be received, paralleled by an application for the grant of an authority to fish in an estuary by another party.

2.4 Monitoring Catch Trends

All commercial estuarine fishers send monthly catch and effort returns (refer Appendix 4) to the Fisheries WA Research Division. These returns provide details of catch species, method and days fished and are used to construct data sets that assist in the monitoring and management of the Fishery.

Whilst commercial catch and effort data series extend back to 1952, equivalent information relating to recreational catches is not available. Estimates of the recreational catch for each estuary is unavailable as there is no requirement for recreational fishers to record their catch. In recent years projects have been initiated to incorporate information derived from creel surveys, census surveys and voluntary recreational fishing log sheets (refer Appendix 5) to estimate recreational catches. Recreational catch estimates from these techniques have not yet been undertaken on a specific estuary basis, as is the case for commercial fishery data.

3.0 MANAGEMENT ISSUES

3.1 Resource Sharing

The management of resource-sharing issues in a common property environment is a complex task that needs to be managed as equitably as possible. This is particularly important when dealing with issues that relate to users granted commercial access rights under Fisheries legislation.

In recognition of these issues, the development of many of the gear controls and time closures legislated for Estuarine Fisheries have been designed with a view to promoting resource sharing amongst user groups and reducing the potential level of conflict that might occur between the commercial and recreational sectors.

In addition, the Government through Fisheries WA has endeavoured to reduce commercial fishing effort where sustainability was not the prime management objective, through legislated adjustment schemes such as the Fisheries Adjustment Scheme Act 1987, and more recently the Resource Re-Allocation and Buy Out Initiative.

The Fisheries Adjustment Scheme Act was established to reduce the number of commercial fishing vessels in open access fisheries and inshore/coastal and estuarine fisheries. The General Scheme, initiated in 1987, is equally funded by government and commercial fishermen through a levy on every commercial fishing unit. This Scheme continues to operate and is managed by a committee of government and community representatives including commercial and recreational fishermen.

The Resource Re-Allocation and Licence Buy Out Initiative introduced by Government in 1997 has been developed to buy out commercial fishing endorsements for resource-sharing purposes. A total of \$8,000,000 over four years has been allocated to this initiative. Voluntary Fisheries Adjustment Schemes for each Estuarine Fishery operated between January and May 1998.

3.2 Assessment of Recent Fishery Adjustment Schemes

The success of these well-targeted Fisheries Adjustment Schemes is clearly demonstrated by comparing the reduction in fishing unit numbers in the Estuarine Fisheries over the last decade (see Table 1). Over the period from 1987 to the end of 1997, the fishing unit numbers across the five Estuarine Fisheries decreased from 145 to 85. This represented a 41 per cent reduction in the number of fishing units. This reduction was due to natural attrition and license buy-back through the General Fisheries Adjustment Scheme.

The recent Voluntary Fisheries Adjustment Schemes which were active from January 1998 to May 1998 facilitated a reduction of a further 24 units. Therefore the Fisheries Adjustment Schemes that specifically targeted the Estuarine Fisheries achieved a further 28 per cent reduction in the number of fishing units in nine months of operation.

The South Coast Estuarine Fishery Voluntary Fishery Adjustment Scheme resulted in the surrender of seven fishing units to the present number of 33. This represents a 17

per cent reduction in the number of fishing units, which in simple terms this may be equated to a 17 per cent reduction of potential effort.

Table 1 **Number of independent fishing units for each Estuarine Fishery**

Name of Fishery	No. of fishing units January 1987	No. of fishing units January 1998	No. of fishing units October 1998★
South Coast	66	40	33★
Peel Harvey	41	24	14
Leschenault Inlet	14	7	6
Hardy Inlet	7	4	2
Swan Canning	17	8	6
Total Number of Units	145	85	61

★ This date represents the date when all offers to the recent Voluntary Fisheries Adjustment Schemes for the Estuarine Fisheries were finalised.

3.3 Latent Effort

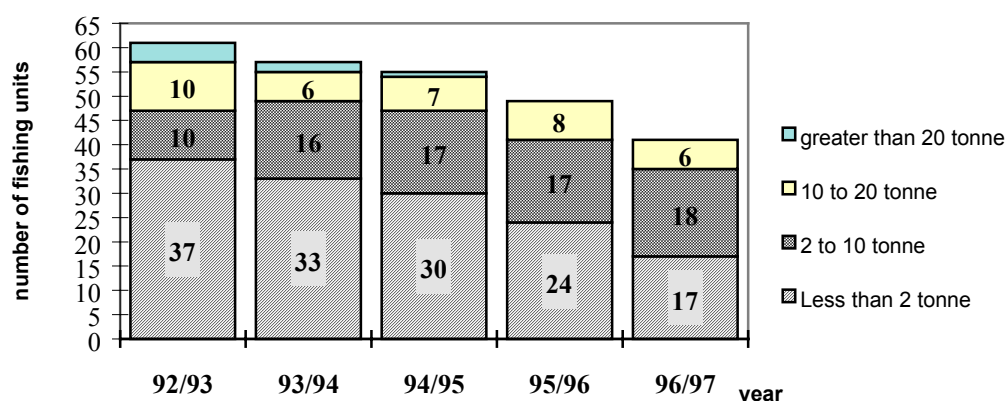
While there are no identified sustainability concerns with the current level of active fishing effort, estuarine cobbler and black bream have been identified as being vulnerable in a number of estuaries. An increase in effective fishing effort may place some of these populations at risk, place pressure on stocks currently considered sustainable and affect the resource share amongst user groups.

An increase in fishing effort is possible due to the activation of latent effort (non-active fishing effort). A significant amount of latent and low level of effort still exists in the fishery due to:

- Diverse fishing operations. Approximately two-thirds of the estuarine fishing units are part of a fisherman's diverse fishing operations. By operating in conjunction with other fisheries such as South Coast Salmon, Herring Trap, Southern Demersal Gillnet And Demersal Longline or South Coast Purse Seine Fisheries less time is dedicated to estuarine fishing. This effort may be activated within the Fishery should changes occur in other fisheries.
- Low level fishing activity by part time operators, semi-retired "life-style" operators or fishermen approaching retirement.
- the ability of each unit holder to move from estuary to estuary within the Fishery.

An indication of latent effort is illustrated in Figure 1 by categorising fishing unit catches for the years 1992/3 to 1996/7. Units that have a catch of less than 2000 kg (2 tonnes) may be considered units that represent high levels of latent effort. In a transferable licence environment, it is likely that these fishing units would increase their catch by activating the latent effort existing within the unit. It is therefore prudent that latent effort is reduced, particularly before transferability is considered.

Latent effort may be reduced by limiting the quantity of gear, time, and number of participants permitted in the Fishery.

Figure 1: Total number of Fishing units in each catch category.

3.4 Optimum Number of Fishing Units

The activation of latent effort needs to be considered when determining the long-term management of the Fishery. This latent effort needs to be reduced. The mechanisms for achieving this objective are varied, however it is considered imperative that an optimum number of units be determined as part of the long-term management strategy. This concept is not new, having been the basis for many long-term management plans aimed at sustainable and economically viable fisheries. It also formed the basis for some of the strategies proposed in the Draft Report of the South Coast Estuarine Working Group.

The Western Australian Fishing Industry Council (WAFIC) previously proposed that a minimum of 25 licensees should remain in the fishery, which is a position put forward by the South Coast Licensed Fishermen's Association. This figure is deemed by industry to be low enough to remove latent effort, and high enough to increase economic viability to maintain market infrastructure.

3.5 Transferability

The South Coast Licensed Fishermen's Association and the Western Australian Fishing Industry Council have requested that limited transferability in the South Coast Estuarine Fishery be reinstated to family members.

Fisheries WA considers at this stage, given the lack of current effort controls, that transferability, including limited licence transfer, is likely to increase fishing effort. Should licences be transferred, the new unit holders are likely to activate this latent effort and increase catches in order to recoup an economic return on the cost of investment to enter the fishery. The issues relating to transferability and its role in future management arrangements are discussed further in the 'Management Proposal' section.

3.6 Boat Length and Boat Replacement

The Fisheries WA boat replacement policy has restricted boat replacements to two categories; below 5.5 metres and boats between 5.5 and 6.5 metres. The 6.5 metre length restriction historically corresponds to the Department of Transport survey exemption. Survey exemption is now available for boats up to 8 metres. Industry have requested a change in the boat replacement policy in line with the Department of Transport survey exemption sizes. The primary purpose of the boat replacement policy is to contain fishing effort. A significant increase in boat size has the potential to lead to increases in the amount of fishing gear, auxiliary equipment, operational range and days fished, and compensatory measures to contain effort in these areas would have to be introduced.

3.7 Permitted Fishing Gear

The general public and the fishing industry have sought clarification on the permitted use and quantity of specified gear in the fishery. At times, the relatively low level of controls on the type and quantity of gear, particularly in relation to net lengths, has stimulated resource sharing conflict both within the fishery and from the recreational sector. Defining the permitted gear will also assist in reducing the latent effort in the fishery.

3.8 Management of Specific Estuaries

Unlike other estuarine fisheries the South Coast Estuarine Fishery encompasses a number of estuaries. Each estuary is unique in their environmental dynamics. Therefore the population characteristics of certain species (such as abundance or size) vary between them. As particular estuaries may be highly valued for certain fish species or fishing activity, it may be necessary to have specific management measures for certain estuaries or areas to reduce the risk in terms of sustainability and minimise resource sharing issues.

Currently lawful net notices and closed water notices apply for some specific estuaries. For example, fishing in Beaufort Inlet is only permitted from May 1 to October 31 and restricted to three fishers each using up to a maximum of 1000 metres of net with a minimum mesh size of 76 mm.

An extension of seasonal closures, minimum mesh sizes and net lengths for specified estuaries will address some of the resource sharing issues and facilitate additional protection of breeding stocks of key species.

Wilson Inlet, Stokes Inlet and Irwin's Inlet are highly significant for fishing, recreation, and tourism opportunities. Some recreational fishers and members of local communities have requested a reduction in commercial activity ranging from further catch and effort controls to commercial closures for these estuaries. Specific management arrangements may be a way of addressing these resource sharing issues.

3.9 Management Costs

The current funding for the compliance, management and research of estuarine fisheries is derived from a Consolidated Funding base (i.e. Government revenue). As there are demands on this funding base and as more fisheries are considered in terms of cost recovery, management costs must be considered in the review. Therefore it is important that while developing management strategies the cost of implementation, monitoring and compliance be considered and the management arrangements be cost effective.

4.0 PROPOSED MANAGEMENT STRATEGIES

Stage 1: Introduction Of Consistent Legislation And Management to Effect Structural Adjustment.

This first stage of new management measures for the fishery involves the implementation of a consistent legislative base and the standardisation of legislation where possible across all estuarine fisheries State-wide. Much of the legislation implemented in other estuarine fisheries that controls fishing effort and addresses resource sharing issues has been requested by the community, recreational sector and some commercial fishers.

There is a need to apply consistent management measures that limit fishing effort and minimise resource sharing issues in the South Coast Estuarine Fishery. Introduction of management measures that are consistent with other estuarine fisheries will see major change in the fishery, as it has been relatively free from these restrictions in the past. Management measures presented in Stage 1 are aimed at addressing key issues relating to equitable resource-sharing arrangements and at the same time decreasing the level of latent effort in the fishery.

4.1 Legislative Base

As stated in the overview, the fishery is currently managed by the application of policies outlined in 'Instructions to Licensing Officers' and a number of legislated closed area and gear restrictions.

The intention is to put in place a consistent legislative base for all Estuarine Fisheries which incorporates the relevant 'Instructions to Licensing Officers', Closed Waters and Lawful Nets 'Notices' for the respective fisheries in a form that is consistent with the *Fish Resources Management Act 1994*.

The South Coast Licensed Fisherman's Association has previously requested that the fishery be managed under a Management Plan. This is not the best option for the fishery due to the costs associated with implementing a management plan for both the agency and the participants. It is therefore proposed that the fishery be managed by a Section 43 Order, under the *Fish Resources Management Act 1994* (FRMA), however Management Plans may be considered in the future should cost/benefit factors change.

Recommendation 1

That all the relevant legislation pertaining to the South Coast Estuarine Fishery be incorporated into a single section 43 Order, under the *Fish Resources Management Act 1994*.

4.2 Definition of the Fishery

Currently the definition of the fishery and closed water legislation occurs in numerous legislative instruments. This complex array of legislation needs to be consolidated to

provide clarity for all user groups and to clearly define the areas where commercial activity is permitted.

While it is proposed to continue access to estuaries that provide the majority of the commercial catch, it is considered that it may be beneficial to have estuaries with relatively small commercial catches (particularly those in areas of high social values such as recreation and conservation) closed to commercial fishing activities. However, it is recognised that low catches may be linked to environmental fluctuations resulting in periods of low fishing effort or catches and during times of suitable conditions, some of these estuaries (e.g. Jerdacuttup Lakes, Culham Inlet and Hamersley Inlet) can make a significant contribution to the fishery, both in terms of value and catch.

On this basis there is merit in excluding the following estuarine systems from the South Coast Estuarine Fishery definition;

Donnelly River
Warren River
Parry Inlet
Gardner River
Fitzgerald Inlet, and
Torradup Inlet.

Recommendation 2

That consideration be given to defining the South Coast Estuarine Fishery as:

“the waters of the estuaries named in the schedule below occurring on the south coast of Western Australia between Cape Beaufort and 129° east including Princess Royal Harbour and Oyster Harbour.”

Schedule:

Broke Inlet	Irwin Inlet	Wilson Inlet
Princess Royal Harbour	Oyster Harbour	Waychinicup Inlet
Gordon Inlet	Hamersley Inlet	Culham Inlet
Jerdacuttup Lakes	Oldfield Inlet	Stokes Inlet
Beaufort Inlet		

4.3 Definition of a Fishing Unit

The Swan-Canning, Leschenault and Hardy Inlet Estuarine Fisheries define a fishing unit as being a primary fishing boat with up to two netting dinghies. Fishing units in the South Coast and Peel Harvey Estuarine Fisheries are defined as consisting of one main boat and up to four netting dinghies. In order to achieve consistency in all estuarine fisheries, contain fishing effort and simplify management arrangements it is intended to limit the number of vessels in each fishing unit to one primary vessel and two dinghies.

There are five fishing units in the Fishery that could be affected by the proposal to reduce the number of fishing dinghies. The fishing boats making up these units are also authorised to be used in the South Coast Salmon Managed Fishery. Where dinghies are used exclusively for salmon or herring the Salmon Management Plan may be a more suitable place to accommodate the licensing provisions for these dinghies.

Consideration should also be given to streamlining the boat replacement policy for these fisheries. The current boat replacement policy states that dinghies between 5.5 metres and less than 6.5 metres may be replaced by a boat that is up to 6.5 metres, while a boat less than 5.5 metres may only be replaced by a boat less than 5.5 metres. Given the new proposed management arrangements, it is considered that streamlining the policy to contain all boat replacements to less than 6.5 metres could be achieved without any significant increase in effort. However this needs to be considered within a wider boat replacement review aimed at all dinghy-based fisheries.

It is proposed that no new applications for the issue of a Fishing Boat Licence will be considered if it means that the unit will exceed the definition of a fishing unit. Fishing units that currently exceed the proposed number or size of boats, may be renewed for the remainder of the working life of the boat, but not beyond 1 January 2005.

Recommendation 3

That a fishing unit be defined as one primary fishing boat and two dinghies.

Recommendation 4

That the boat replacement policy be streamlined to allow appropriately endorsed vessels to be replaced with boats up to 6.5 metres.

Recommendation 5

That fishing units exceeding the proposed number be permitted to renew their FBL's for the remainder of the working life of the boat, but not beyond 1st January 2005. Future boat replacement and transfer applications will not be approved for fishing units that are outside the definition of a fishing unit.

4.3.1 Use of Subsidiary Dinghies

As stated previously, the intent for allowing subsidiary dinghies to be endorsed is to enable dinghies to be set up for different estuarine fishing operations. The current Notice states that an Assistant Fisherman or Trainee Fisherman can only 'operate while the unit holder is on board his licensed boat'. Legislation needs to clearly state that subsidiary dinghies are not permitted to operate independently, and that if a fishing operation requires the use of two boats, then they must be working together under the control of the authorisation holder. It should be noted that subsidiary dinghies are granted on the basis that they may only be used within the defined areas of the fishery, unless they are otherwise authorised to operate in another fishery.

Recommendation 6

That the primary fishing vessel and subsidiary dinghies may only be permitted to operate at the same time when used in conjunction with the specific fishing operation that the authorisation holder is conducting. Subsidiary dinghies may only be used within the defined areas of the fishery, unless otherwise authorised.

4.4 Identifying Key Catch and Effort Reference Points

A key issue in each of the estuaries is the relative catch share between the commercial and recreational fishing sectors. As the Research Division of Fisheries WA has been monitoring commercial catch trends since the 1950s, historical data exists to establish catch and effort reference points for the commercial sector. At this stage it is not possible to set recreational reference points due to the lack of historical recreational catch data. As information from recreational catch research projects is accumulated and a historical data set is built up, reference points may be developed for the recreational sector.

The formalised monitoring of reference points for key species in annual stock assessments would provide “trigger points” to activate detailed assessment. Should any significant increase in catch be a result of escalation of effort (as opposed to environmental fluctuations), then reassessment of management measures will occur.

In order to provide catch and effort reference points and gather information on the key target species, for both commercial and recreational users, suitable reference points, based on historical catch data will be established for :

- historical upper limits for key species and
- traditional net usage (method, length, days fished).

The major recreational and commercially important estuarine fish species are listed in Appendix 6. The key species for reference points will need to be determined in consultation with the Research Division and the commercial and recreational fishing sectors.

Significant data analysis and research will have to be conducted before adequate catch and reference points can be determined. This would include:

- validating the historical data set,
- gathering of fishery-independent data such as fishery surveys and biological/age structure information from selected estuaries and
- correlating recreational data with commercial data.

Whilst the Research Division currently reports on the catch effort trends on major species, the information needs to be further refined, particularly in relation to effort. In order to adequately detect effort trends, commercial fishers’ logbooks may need to be reviewed, along with modification to the catch and effort system. This process

would initially require analysis of catch data by the Research Division, a process which would require allocation of resources and funding.

Recommendation 7

That reference points based on historical fishing effort and catch limits for key recreational and commercial species be established.

4.5 Weekend and Public Holiday Closures

Weekend closures operate in all Estuarine Fisheries excluding the Hardy Inlet and South Coast Estuarine Fisheries. Weekend closures serve the purpose of;

- limiting fishing effort by reducing the potential number of fishing days and
- reducing commercial activity at times when recreational activity is more likely to occur, thus reducing the potential for conflict between user groups.

Weekend closures generally apply from early Saturday morning until either Sunday evening or Monday morning (refer Table 2). In order to achieve the above objectives it is intended to introduce a closure for all commercial fishing in the South Coast Estuarine Fishery between Saturday morning and Monday morning. This closure will allow the setting of nets on all weekday nights and restrict hauling to weekdays and week nights only.

Table 2 Current Weekend Closures By Fishery

Fishery	Week End Closure Period
Swan Canning Estuarine Fishery	Saturday Morning to Sunday evening.
Peel Harvey Estuarine Fishery	Saturday Morning to Monday Morning
Leschenault Inlet Estuarine Fishery	Saturday Morning to Monday Morning
Hardy Inlet Estuarine Fishery	No weekend closures
South Coast Estuarine Fishery	No weekend closures
Proposed for South Coast Estuarine Fishery	Saturday Morning to Monday Morning for entire fishery

To ensure effective resource-sharing and reduction in potential conflicts, closures should also be introduced for specified public holidays such as Australia Day, Good Friday, Easter Monday, Christmas Day, Boxing Day, Labour Day, Foundation Day, Queen's Birthday and New Year's Day.

Recommendation 8

That all estuaries in the South Coast Estuarine Fishery be subject to weekend closures to commercial fishing activities. Weekend closures will commence from 1.5 hours after sunrise each Saturday morning until 1.5 hours after sunrise on Monday.

Note: The *Fish Resources Management Act 1994* defines sunrise and sunset as the times provided by the Perth Astronomical Observatory for the relevant day.

Recommendation 9

That all estuaries in the South Coast Estuarine Fishery be subject to closure for all commercial fishing activity for specified public holidays. Closures will commence from 1.5 hours before sunset on the night previous to the specified public holiday and 1.5 hours before sunset on that public holiday. The specified public holidays are: Australia Day, Good Friday, Easter Monday, Christmas Day, Boxing Day, Labour Day, Foundation Day, Queen's Birthday and New Year's Day.

4.6 Daytime Set Net Closures

The prohibition on daytime netting was implemented for most estuaries in order to separate commercial and recreational set net operations from other recreational activity as part of resource sharing arrangements. Daytime set net closures only apply to set nets, and other commercial fishing activity may occur during the day. This management measure has significantly reduced interactions and potential conflict within visible river/estuarine and inshore areas. Daytime set net closures may also reduce fishing effort by limiting the amount of time fishing nets are in the water.

Daytime closures for set nets exist in the Peel Harvey, Swan-Canning, Leschenault and Hardy Inlet Estuarine Fisheries (Table 3). The South Coast Estuarine Fishery has daytime closures for set nets in Princess Royal Harbour, Oyster Harbour and Wilson Inlet only. All other estuaries in the South Coast Estuarine Fishery have no daytime closures for set netting (although seasonal closures exist for some estuaries).

The daytime prohibition on the use of set nets has been effective in reducing commercial fishing activity during the day when recreational activity tends to occur. In particular this will benefit areas of high recreational significance, which currently are not subject to daytime closures.

Table 3 Existing and Proposed Daytime Closures for each Estuarine Fishery

Name of Fishery	Extent of Current Daytime set net closures for fishery
Mandurah Estuarine	Daytime set net closures for whole fishery
Leschenault Inlet Estuarine	Nil
Hardy Estuarine	Daytime set net closures for whole fishery
Swan Canning Estuarine	Daytime set net closures for whole fishery
South Coast Estuarine	Only applies to Wilson Inlet, Princess Royal Harbour, Oyster Harbour and Broke Inlet
Proposed for South Coast Estuarine Fishery	Daytime set net closures for whole fishery

Recommendation 10

That daytime set net closures be introduced for all estuaries. Closures to operate during the period 1.5 hours after sunrise to 1.5 hours before sunset.

4.7 Permitted Gear

As discussed in Section 3.3 a significant proportion of fishing units have a history of low level catches (Figure 1). As no legislation exists limiting the quantity of fishing gear, each fishing unit has the potential to significantly increase effort in response to market forces or changes to other aspects of a fisher's diverse fishing activity. This risk of escalation of effort is relevant to the potential to increase the amount of net used for both set net and haul net operations. In each of the other estuarine fisheries the maximum combined net length for both set nets and haul nets are defined. This is illustrated in Table 4 under the discussion of maximum gear lengths for set nets and haul nets.

Commercial fishers and the general public have also sought clarification for certain types of gear usage in the fishery. In order to remove any confusion and to control fishing effort, the permitted type and quantity of gear needs to be defined in the legislation pertaining to the fishery.

Recommendation 11

That the permitted fishing gear in the South Coast Estuarine Fishery be restricted to gill nets, haul nets, seine nets, fish traps, crab pots, hand lines, prawn drag nets and hand gathering of specified species of shellfish.

4.7.1 Maximum gear lengths for set nets and haul nets.

Currently there is no legislation defining maximum gear lengths for set nets and haul nets except for those that apply to fishing within the Beaufort Estuary and garfish nets in Wilson Inlet. Therefore as previously mentioned a significant quantity of latent effort exists within the fishery due to the potential to increase the quantity of net used.

In order to meet the objectives of this review, maximum net length provisions must be implemented to ensure both sustainability and equitable resource sharing arrangements.

In 1995 the South Coast Estuarine Fishery Working Group (Fisheries Management Paper 76) reported concern regarding the steady increase in the length of net used by commercial fishermen and recommended a maximum combined net length of 1500 m for set nets and 600 m for haul nets. In a separate recommendation it was proposed to allow a maximum combined length of 2000 m in the more remote estuaries of the Fishery. Of the 26 submissions received in response to the Report, 12 stated that they felt a 1500 m allocation for set nets was excessive.

The South Coast Estuarine Fishery Working Group recommendations for maximum net length restrictions were not implemented and the fishery continues to have no maximum net length provisions. The inconsistency of the South Coast Estuarine Fishery with respect to net lengths in other Estuarine Fisheries is clearly highlighted in Table 4. The implementation of a combined maximum net length of 1000 m for set nets and 500 m for haul nets will assist in ensuring long term sustainability of the fish stocks and form consistency across all Estuarine Fisheries state wide. It should be noted that there are areas where legislation prohibits or restricts the use of nets of certain specifications.

Recommendation 12

That no more than three set nets totalling a maximum combined length of 1000 metres be permitted to be used within the South Coast Estuarine Fishery. The maximum combined length of seine or haul nets permitted in the Fishery be 500 metres.

Table 4 Maximum combined net lengths permitted for each Estuarine Fishery and proposed for South Coast Estuarine Fishery.

Fishery	Maximum allowable combined set net length per unit	Maximum allowable haul/seine nets
Mandurah Estuarine	1000*	500
Leschenault Inlet Estuarine	1000	500
Hardy Inlet Estuarine	1000**	500
Swan Canning Estuarine	1000	500
South Coast Estuarine	Nil***	Nil
South Coast Estuarine Fishery Working Group report	1500	600
Proposed for South Coast Estuarine Fishery	1000	500

*Trainees in the Mandurah estuary that were endorsed before March 1989 are permitted to use up to a maximum of 1000m independent of the owner of the unit.

**In the Hardy Inlet Estuarine Fisheries: up to a maximum of 1400 m of set net may be used if more than one person is fishing in the unit.

***Net length restriction applies for one estuary only - Pallinup River and Beaufort Inlet has a maximum combined set net length of 1000m.

4.7.2 Set nets

Set nets are the major traditional estuarine fishing method used to target commercially valuable species such as whiting, bream, cobbler, mullet and flathead.

Lawful Net Notices specifying minimum mesh sizes apply to particular estuaries and target species within the fishery. A minimum mesh size of 57 mm (2 ¼") is generally stated. Notable exceptions are:

- Wilson Inlet (refer 'Notice 196') where minimum mesh size permitted is 44 mm (1¾"), on a seasonal basis. This notice also states that when a net is intended to be used for the catching of black bream a minimum mesh size of 89 mm shall be a lawful net.
- Beaufort Inlet where minimum mesh size permitted is 76 mm (a seasonal closure also exists).

Concerns relating to mesh size have been raised at times by both the recreational and commercial sectors. Most of the concern relates to the possibility of incidental bycatch of undersize or non-target species and damage to these fish prior to being released.

In light of these concerns there may be merit in introducing standard mesh sizes for set nets across all estuaries. It is considered that a move to increase the minimum set net mesh size to 63 mm will reduce incidental mortalities and increase the value of fish caught (higher grading opportunities that may lead to increased returns).

This would be particularly relevant for whiting, however it is recognised that this mesh size may still be too small when targeting black bream. In recognition of this point there is merit in considering an increase in minimum mesh size greater than 63 mm for estuaries where black bream is the predominant target species. It is considered that a move to a minimum mesh size in the vicinity of 101 mm for some estuaries will significantly protect undersize bream, and increase resource sharing for the species, while still making it feasible to catch the larger sea mullet.

However any increases may in effect mean that some fishers shift to haul/seine netting methods to catch some species previously taken. It is therefore important that this proposal is considered in consultation with the fishing industry, community members and research.

Recommendation 13

That the minimum mesh size for set nets permitted to be used in the South Coast Estuarine Fishery be 63 mm. A minimum mesh size greater than 63 mm should be considered for estuaries where black bream is the predominant target species.

4.7.3 Haul/seine nets

Haul/seine netting is an active form of fishing where the net encircles schooling fish. As the net is encircled fish are herded to the centre of the net. As the net is pulled in fish are trapped in a small circle. The main panel of the net (the bunt), which is made up of relatively small mesh, prevents fish from escaping. Eventually the bunt or pocket is closed off and the trapped fish can be sorted. Captured fish may be sorted whilst remaining in the water. Target species are retained while other undersize or non-target species may be immediately released, therefore reducing mortalities of undersize fish and incidental bycatch. The fish that are retained also tend to be of higher product quality.

Fisheries WA receives numerous complaints regarding the perceived increase in effort and bycatch of haul/seine netting activities. Concerns regarding the perceived effort increase may be adequately addressed by the net length restrictions and weekend closure in the previous recommendations.

Recent studies on seine/haul netting of King George whiting in South Australia have found that mortalities are reduced by sorting the catch in the water. While it is believed that many estuarine fishers using haul/seine nets (excluding haul mesh nets) sort the catch in the water it is considered that this should be incorporated in legislation.

Recommendation 14

That legislation be developed making it mandatory to sort haul/seine net catches in the water; that is the bunt containing the catch is not drawn ashore or aboard a boat while containing the catch.

4.7.4 Fish Traps

The Fish Trap Prohibition Notice 1994 prohibits the use of fish traps unless authorised under a managed fishery plan, or by licence condition.

The South Coast Licensed Fisherman's Association has sought to have fish traps included as a permitted means in the South Coast Estuarine Fishery and King George Sound based on traditional usage. Whilst the issue of King George Sound is outside the scope of this paper, fish trap use within the South Coast Estuarine Fishery forms part of the fishery.

Currently, four fishermen who have historically used fish traps continue to use the method primarily to target leatherjackets. Whilst this current level of fish trap activity appears sustainable, significant problems may occur if the activity is increased. Of particular concern is one leatherjacket species, which is endemic to the Albany Harbours and King George Sound and appears to have a limited distribution elsewhere.

It is therefore proposed that this activity be permitted to continue at traditional levels

under a more formalised arrangement. However, the permitted number of fish traps, the area of use, design specifications and permitted species taken would need to be determined. This will be developed during the consultation process.

Recommendation 15

That fishers be permitted to use a specified number of fish traps in Oyster Harbour and Princess Royal Harbour. The permitted number of fish traps, the area of use, and permitted species would be determined during consultation with input from the Research Division of Fisheries WA.

Recommendation 16

That design specifications for fish traps be developed by Fisheries WA during the consultation process.

4.6.5 Crab Pots and Crab Management

Crabs are taken within the Fishery by set nets and crab drop nets, however with the exception of some years of higher abundance, it is not a major component of the overall commercial catch. Almost all of the catch is taken as an incidental bycatch during normal netting, although during years of higher abundance some targeting of this species does occur by means of set nets. Therefore there is merit in implementing catch methods that will provide greater protection for undersize and breeding stocks, while increasing the quality of the catch.

Crab pots are recognised as an environmentally friendly and efficient method of capturing crabs. It is therefore considered in the best interests of the fishery to encourage the use of crab pots when crabs are being targeted. It is important though that crab catch levels do not escalate beyond traditional levels. This would require further input from the fishing industry and Fisheries WA Research Division.

Recommendation 17

That the commercial catch and management arrangements for crabs within the defined waters of the Fishery remain within the scope of the South Coast Estuarine Fishery.

Recommendation 18

That fishers be permitted to use a specified number of crab pots. The number and area of use will be determined during consultation with input from the Fisheries WA Research Division.

4.7.6 Hand-held spears

Notice No 592 (published Government Gazette No 38 on 2 March 1993) prohibits all commercial fishermen from using harpoons, spear guns, Hawaiian slings or any other type of pointed instrument to take fish. Fisheries WA supports this management control.

This notice prohibits commercial fishers from using pointed instruments such as spear guns. In recognition that estuaries are significant nursery areas, there is merit in considering a total prohibition of spearing for all user groups in all estuaries. However, the issue regarding the non-commercial take of fish using spears should be referred to the Recreational Regional Planning process.

Recommendation 19

That commercial fishermen continue to be prohibited from using harpoons, spear guns, Hawaiian slings or any other type of pointed instrument to take fish.

4.7.7 Hand-gathering of specified species of shellfish

In 1988, Fisheries Notice No 366 was implemented to limit commercial fishing effort on specific shellfish species. This notice prohibits all licensed professional fishermen unless authorised from taking, among other species, all fish of the class *Lamellibranchiata* which include cockles, mussels and razor shells. Some fishermen in the fishery are permitted to gather cockles, mussels and razor shells as a condition on their Commercial Fisherman's Licence.

In the interests of fishing these stocks in a sustainable manner, access to cockle and razor shell stocks needs to remain within traditional levels as localised serial depletion may occur with over-fishing of these type of species. There is particular concern that an increase in effort may be highly detrimental to one species of cockle which is endemic to the Albany Harbours and King George Sound area. For this reason, fishing effort needs to be limited. Therefore the number of fishers permitted to harvest shellfish should be restricted.

In the interest of protecting the benthic environment, reducing effort and reducing incidental mortality of benthic species (including shellfish species), the harvesting of shellfish should be restricted to hand-gathering only. The use of implements or auxiliary equipment should be prohibited.

Additional applications for harvesting shell fish species will be assessed taking into account the area to be fished and the current harvest in that area.

Recommendation 20

That only commercial fishers who are currently authorised by specific licence condition be permitted to harvest specified shell fish species in the fishery.

Recommendation 21

The gathering of shellfish will be restricted to hand-gathering by the authorisation holder within specified areas and the use of any implements or auxiliary equipment will be prohibited.

STAGE 2: Determining The Optimum Number Of Commercial Fishing Units and Mechanisms for Achieving Transferability

The determination of an optimum number of fishing units is considered to be a critical factor in addressing some of the concerns relating to latent effort, long-term resource sustainability and a pre-requisite for the implementation of transferability provisions.

While entry can be regulated and controls put in place to restrict effort, the long term intention should be to reduce the number of fishing units to the point where they may be transferred without the need to consider the potential effect of releasing latent effort, and increasing overall fishing effort and total catch in the fishery. Therefore, the number of fishing units should be reduced to an optimum number of units before transferability can be considered.

4.8 Optimum Number of Fishing Units for Each Fishery

As discussed previously in the Management Issue Section, the optimum number of fishing units is considered to be the number of fishing units that would stabilise the total catch in the fishery. Using historical catch data and assuming that each fishing unit is able to maximise their catch, it is estimated that an optimum number of fifteen fishing units would stabilise the commercial catch at historical fishing levels.

Fisheries WA considers that achieving an optimum number of fishing units of fifteen will reduce the risk of escalating catch and effort should transferability provisions be implemented, whilst maintaining the economic infrastructure and viability of the remaining operators.

The optimum number of fishing units is a central element of the management package and requires further consultation. Gaining industry support for the concept and determining methods to achieve a reduction of unit holders to an optimum number is important to provide a starting point for negotiation, particularly with respect to transferability. The appropriate number of units that should remain in the fishery will be dependant on the degree of management controls implemented.

Recommendation 22

That fifteen be the optimum number of units which should remain in the fishery.

4.9 Mechanism to Achieve the Optimum Number of Fishing Units

A reduction in the number of fishing units may be achieved by the following methods:

- natural attrition provided no transferability is permitted,
- incentives to leave the fishery through Fishery Adjustment Schemes and
- introduction of catch criteria.

The rate of reducing the number of participants by natural attrition compared to offering economic incentives to leave the fishery was discussed in Section 3.2. A reduction in participants to a specified number may also be achieved by the introduction of catch history criteria in a management plan. In this reduction mechanism only fishers that meet certain catch criteria are granted continued access to a fishery. The South Coast Estuarine Fishery Working Group proposed a mechanism of this nature and recommended that participants who were not likely to meet the access criteria be given the opportunity to surrender their endorsements to a Fishery Adjustment Scheme. Fishers may favour the combination of using catch criteria and an adjustment scheme to reduce the numbers over a set period in order to progress towards transferability.

The reduction of numbers is considerably increased with the introduction of specific Fisheries Adjustments Schemes. Currently fishers considering retirement may approach the General Fisheries Adjustment Scheme, or specific schemes if they are available to seek funds for surrendering their fishing authorisations. As discussed previously, the South Coast Estuarine Fishery Voluntary Fisheries Adjustment Scheme 1997 which was open to applications between January and May 1998 was successful in removing 17 per cent of the participants. Therefore, in addition to the proposed management measures, a Voluntary Fisheries Adjustment Scheme specific to the Fishery should be considered to parallel the management arrangements.

Recommendation 23

That a Voluntary Fisheries Adjustment Scheme be reactivated in the Fishery to parallel the proposed management arrangements.

4.10 Transferability

Transferability is one of the key issues in considering the long-term management of the fishery.

As stated in the outline of the fishery about two thirds of authorisation holders participate in the fishery as part of their diverse fishing operations. In effect this means that at least 20 of the 33 licences within the fishery are not operating at their maximum efficiency, and therefore fishing effort is spread amongst other fisheries. Should full licence transfer provisions be implemented as part of the management package it must be assumed that all licences have the potential to be fully activated. Therefore full transferability provisions should only be implemented when the amount of latent effort is reduced in the fishery. This includes reduction of the number of participants to

achieve the optimum number of units, combined with implementation of appropriate time and gear management arrangements.

Recommendation 24

That in the short term authorisation to fish in the fishery remain non-transferable.

Recommendation 25

That transferability provisions be considered when fishing units have reduced to the optimum number and appropriate legislation is implemented to limit fishing effort.

STAGE 3: Issues and Options for Area Specific Management and Further Resource Sharing.

Wilson Inlet, Irwin's Inlet and Stokes Inlet represent the areas in which the majority of resource sharing issues are focussed. Some members of the recreational sector have requested that in addition to reducing the numbers of participants across the fishery, that fishing activity in these specific estuarine systems be reduced or completely removed.

While Stages 1 and 2 will ensure significant progress in terms of minimising resource sharing issues (including reducing latent effort, and limiting fishing effort), there are some issues which continue to be raised in a number of different forums generating a level of community and sectoral debate. The purpose of Stage 3 is to summarise and present options for the more prevalent resource-sharing issues pertaining to specific areas that may not be specifically addressed in Stages 1 and 2. Options have been formulated to stimulate further community debate on these issues during the consultation process.

Management options involving reducing access to specific estuaries require extensive consultation with user groups and may require further progression through the *Voluntary Guidelines for Resource Sharing Process* and/or the proposed Regional Recreational Fishing Management Planning Process.

4.11 Wilson Inlet - Resource Sharing Issues

Wilson Inlet produces a significant commercial catch component of the South Coast Estuarine Fishery. It is also as an important area for attracting recreational fishers and tourists. Wilson Inlet continues to be the area where resource sharing issues are the most prominent. These issues are:

- concern with catch share between recreational and commercial fishers,
- concerns at the amount of fishing effort undertaken by haul/seine nets,
- bycatch concerns of haul/seine net activities and incidental mortalities,
- concern in regard to the small minimum mesh size for set nets,
- concern with the number of fishers who are able to access Wilson Inlet and
- concerns with the low amount of commercial fishing closures.

It is anticipated that management measures implemented in Stage 1 and 2 will minimise many of the above concerns, however due to the significance of Wilson Inlet to both the commercial and recreational sectors, the consideration of specific management options is warranted.

Wilson Inlet Option 1

Reduce the number of authorisation holders who can access Wilson Inlet by investigating the feasibility of a specific Fisheries Adjustment Scheme which would allow authorisation holders to voluntarily surrender their access entitlement to the Inlet, with restrictions in future access by the remaining licensees.

Wilson Inlet Option 2

Reduce commercial fishing activity in Wilson Inlet by:

- introducing a netting restriction for Wilson Inlet and limiting the combined total net length for each unit holder to a level less than that permitted in the Fishery and/or
- implementing a seasonal closure for commercial fishing (all activities) in Wilson Inlet.

Wilson Inlet Option 3

Incorporate the prohibition of all commercial fishing activity into the existing netting area closure from the mouth of the Inlet to Poison Point in Wilson Inlet.

4.12 Stokes Inlet: Resource Sharing Issues

There have been requests from some recreational fishers and other interested stakeholders to close Stokes Inlet to commercial fishing. Most requests came from Esperance-based recreational fishers who perceive that their community would benefit from Stokes Inlet becoming a recreational fishing-only area.

Although all South Coast Estuarine Fishery authorisation holders are permitted to access Stokes Inlet during the seasonal opening, only a low number consistently fish the area. A reduction in commercial access or total commercial closure may generate significant benefits to the recreational fishery and Esperance community while having no major impact on the fishery as a whole.

Stokes Inlet Option 1

Reduce the number of authorisation holders who can access Stokes Inlet by investigating the feasibility of a specific Fisheries Adjustment Scheme to remove access entitlements in the Inlet, with restrictions in future access by the remaining licensees.

Stokes Inlet Option 2

Address the catch share concerns in Stokes Inlet by considering the introduction of a minimum mesh net size that will facilitate both an increase in catch share to the recreational anglers and additional protection of black bream. A minimum mesh size of greater than 89 mm may be considered.

Stokes Inlet Option 3

Increase the period of the existing commercial seasonal closure, 1 December to 31 April the following year, by closing the Inlet earlier or later in the year.

Stokes Inlet Option 4

That consideration be given to implementing a total closure of Stokes Inlet to commercial fishing.

4.13 Irwin Inlet - Resource Sharing Issues

Although Irwin's Inlet is open to commercial fishing activity for only six months of the year, it generates significant resource sharing issues. Irwin Inlet has been an ongoing source of debate due to fishing activity around the barway and delta channel where fish aggregate and are particularly vulnerable to intensive fishing activity. It may therefore be prudent to limit or close access to this area.

Irwin Inlet Option

That consideration be given to implementing a closure for all types of netting activity from the internal mouth of the channel to the delta head/bar of Irwin Inlet.

4.14 Future Management: Restocking of Natural Waterways

Fisheries WA have received requests from recreational and commercial fishers regarding restocking natural waterways in order to enhance fish production and improve catches.

Whilst restocking may in some circumstances even out variations in annual recruitment and provide an increased abundance of certain species, the restocking of wild fish populations with hatchery reared fish has a number of issues associated with it, which need careful consideration and protocols developed before any large scale program is embarked upon. Issues which require discussion are:

- the risk of introducing diseases from the intensive conditions of a hatchery to a wild population and the risk of introducing a strain of fish that may out-compete or out-breed the natural wild population, and consequently reducing or changing the genetic diversity and adaptive behaviours in the stock and thus its ability to respond to shifts in environmental conditions.
- availability of brood stock and juveniles.
- cost of operating and monitoring the hatchery restocking program.

- any effect that an artificially enhanced population of fish is likely to have on other species in the food chain or the ecology of the waterway.
- World experience has shown that restocking can provide excellent improvements in the productivity of dams and fully enclosed waters, where natural breeding is limited or non-existent, but the results are far less certain in more open waters such as estuaries, rivers or the ocean which support a complete ecology, and are likely to experience wider variations in environmental conditions.
- Environmental conditions, disease, predators and the availability of food have a major effect on the survival and growth rates of both hatchery and wild juveniles.
- If larger fish, which have been grown out to a greater size in hatchery ponds are stocked in order to improve survival rates, there is a risk that their individual behaviour will have already been shaped by the conditions of the hatchery, and they may not survive long enough under wild conditions to contribute to the productivity of the fishery.
- determining the beneficiaries of the restocking program. In areas which are shared by commercial and recreational fishers, who pays and how is the resource share determined?

Restocking programs have seldom been used to enhance commercial fisheries productivity due to the uncertainty and cost involved, but have certainly proven successful on a relatively small scale in creating recreational freshwater fisheries, where the level of take is low, catch and release is practised, and the primary management strategies focus on limiting access and continued stocking to maintain fish numbers.

Consequently any restocking program for naturally occurring species in a wild environment should be regarded as a trial, and will need to be carefully monitored against predetermined objectives and performance criteria, and the results of the restocking evaluated before any commitment to further stocking can be made.

It should also be emphasised that restocking is not a replacement for good fisheries management. Restocking has been included in this paper in order to develop appropriate protocols should a restocking trial proceed. At this stage it is not envisaged as a management tool and therefore will not replace any of the proposals discussed elsewhere in the discussion paper.

Restocking Recommendation 1

That the feasibility of restocking be discussed and protocols be developed for restocking.

5.0 SUMMARY OF RECOMMENDATIONS

Stage 1: Introduction Of Consistent Legislation And Management to Effect Structural Adjustment.

Recommendation 1

That all the relevant legislation pertaining to the South Coast Estuarine Fishery be incorporated into a single Section 43 Order, under the *Fish Resources Management Act 1994*.

Recommendation 2

That consideration be given to defining the South Coast Estuarine Fishery as:

“the waters of the estuaries named in the schedule below occurring on the south coast of Western Australia between Cape Beaufort and 129° east including Princess Royal Harbour and Oyster Harbour.”

Schedule:

Broke Inlet	Irwin Inlet	Wilson Inlet
Princess Royal Harbour	Oyster Harbour	Waychinicup Inlet
Gordon Inlet	Hamersley Inlet	Culham Inlet
Jerdacuttup Lakes	Oldfield Inlet	Stokes Inlet
Beaufort Inlet		

Recommendation 3

That a fishing unit be defined as one primary fishing boat and two dinghies.

Recommendation 4

That the boat replacement policy be streamlined to allow appropriately endorsed vessels to be replaced with boats up to 6.5 metres.

Recommendation 5

That fishing units exceeding the proposed number be permitted to renew their FBL's for the remainder of the working life of the boat, but not beyond 1 January 2005. Future boat replacement and transfer applications will not be approved for fishing units that are outside the definition of a fishing unit.

Recommendation 6

That the primary fishing vessel and subsidiary dinghies may only be permitted to operate at the same time when used in conjunction with the specific fishing operation that the authorisation holder is conducting. Subsidiary dinghies may only be used within the defined areas of the fishery, unless otherwise authorised.

Recommendation 7

That reference points based on historical fishing effort and catch limits for key recreational and commercial species be established.

Recommendation 8

That all estuaries in the South Coast Estuarine Fishery be subject to weekend closures to commercial fishing activities. Weekend closures will commence from 1.5 hours after sunrise each Saturday morning until 1.5 hours after sunrise on Monday.

Note: The *Fish Resources Management Act 1994* defines sunrise and sunset as the times provided by the Perth Astronomical Observatory for the relevant day.

Recommendation 9

That all estuaries in the South Coast Estuarine Fishery be subject to closure for all commercial fishing activity for specified public holidays. Closures will commence from 1.5 hours before sunset on the night previous to the specified public holiday and 1.5 hours before sunset on that public holiday. The specified public holidays are: Australia Day, Good Friday, Easter Monday, Christmas Day, Boxing Day, Labour Day, Foundation Day, Queen's Birthday and New Year's Day.

Recommendation 10

That daytime set net closures be introduced for all estuaries. Closures are to operate during the period 1.5 hours after sunrise to 1.5 hours before sunset.

Recommendation 11

That the permitted fishing gear in the South Coast Estuarine Fishery be restricted to gill nets, haul nets, seine nets, fish traps, crab pots, hand lines, prawn drag nets and hand-gathering of specified species of shellfish.

Recommendation 12

That no more than three set nets totalling a maximum combined length of 1000 metres be permitted to be used within the fishery. The maximum combined length of seine or haul nets permitted in the fishery be 500 metres.

Recommendation 13

That the minimum mesh size for set nets permitted to be used in the South Coast Estuarine Fishery be 63 mm. A minimum mesh size greater than 63 mm should be considered for estuaries where black bream is the predominant target species.

Recommendation 14

That legislation be developed making it mandatory to sort haul/seine net catches in the water, that is the bunt containing the catch is not drawn ashore or aboard a boat while containing the catch.

Recommendation 15

That fishers be permitted to use a specified number of fish traps in Oyster Harbour and Princess Royal Harbour. The permitted number of fish traps, the area of use, and permitted species would be determined during consultation with input from the Research Division of Fisheries WA.

Recommendation 16

That design specifications for fish traps be developed by Fisheries WA during the consultation process.

Recommendation 17

That the commercial catch and management arrangements for crabs within the defined waters of the Fishery remain within the scope of the South Coast Estuarine Fishery.

Recommendation 18

That fishers be permitted to use a specified number of crab pots. The number and area of use will be determined during consultation with input from the Fisheries WA Research Division.

Recommendation 19

That commercial fishermen continue to be prohibited from using harpoons, spear guns, Hawaiian slings or any other type of pointed instrument to take fish.

Recommendation 20

That only commercial fishers who are currently authorised by specific licence condition be permitted to harvest specified shellfish species in the Fishery.

Recommendation 21

The gathering of shellfish will be restricted to hand-gathering by the authorisation holder within specified areas and the use of any implements or auxiliary equipment will be prohibited.

STAGE 2 Determining The Optimum Number Of Commercial Fishing Units and Mechanisms for Achieving Transferability

Recommendation 22

That fifteen is the optimum number of units which should remain in the fishery.

Recommendation 23

That a Voluntary Fisheries Adjustment Scheme be reactivated in the fishery to parallel the proposed management arrangements.

Recommendation 24

That in the short-term authorisation to fish in the fishery remain non-transferable.

Recommendation 25

That transferability provisions be considered when fishing units have reduced to the optimum number and appropriate legislation is implemented to limit fishing effort.

STAGE 3: Issues and Options for Area Specific Management and Further Resource Sharing.

Wilson Inlet Option 1

Reduce the number of authorisation holders who can access Wilson Inlet by investigating the feasibility of a specific Fisheries Adjustment Scheme to allow authorisation holders to voluntarily surrender their access entitlement to the Inlet, with restrictions in future access by the remaining licensees.

Wilson Inlet Option 2

Reduce commercial fishing activity in Wilson Inlet by:

- introducing a netting restriction for Wilson Inlet and limiting the combined total net length for each unit holder to a level less than that permitted in the fishery, and/or
- implementing a seasonal closure for commercial fishing (all activities) in Wilson Inlet.

Wilson Inlet Option 3

Incorporate the prohibition of all commercial fishing activity into the existing netting area closure from the mouth of the Inlet to Poison Point in Wilson Inlet.

Stokes Inlet Option 1

Reduce the number of authorisation holders who can access Stokes Inlet by investigating the feasibility of a specific Fisheries Adjustment Scheme to remove access entitlements in the Inlet, with restrictions in future access by the remaining licensees.

Stokes Inlet Option 2

Address the catch share concerns in Stokes Inlet by considering the introduction of a minimum mesh net size that will facilitate both an increase in catch share to the recreational anglers and additional protection of black bream. A minimum mesh size of greater than 89 mm may be considered.

Stokes Inlet Option 3

Increase the period of the existing commercial seasonal closure, 1 December to 31 April the following year, by closing the Inlet earlier or later in the year.

Stokes Inlet Option 4

That consideration be given to implementing a total closure of Stokes Inlet to commercial fishing.

Irwin Inlet Option

That consideration be given to implementing a closure for all types of netting activity from the internal mouth of the channel to the delta head/bar of Irwin Inlet.

Restocking Recommendation 1

That the feasibility of restocking be discussed and protocols be developed for restocking.

6.0 SUMMARY

This discussion paper has identified a number of key issues that need to be addressed within the Fishery. The main issues relate to the adequacy of current management arrangements in providing a suitable regime for a sustainable and viable managed commercial fishery, while providing all user groups with access to the fish resource through equitable resource-sharing arrangements.

The management strategies presented in this discussion paper have been developed to stimulate discussion on these important issues, particularly the issues relating to resource sharing. In doing so, the report recommends a number of strategies which can be implemented through management arrangements and options for further consideration and consultation with key stakeholder groups.

With this in mind the report has identified those areas of management that need to be re-assessed and has recommended strategies aimed at addressing some of the key issues through the introduction of consistent management arrangements across all estuarine fisheries, implementing strategies aimed at maintaining commercial effort and catches at traditional and sustainable levels, and implementing strategies aimed at providing equitable sharing of the fish resource amongst user groups.

This has been a complex task as this fishery consists of a number of unique estuaries, rivers and inlets, all with different and unique features, and environmental qualities

In the longer term, it is envisaged that the report will generate change resulting in a management regime which will establish a foundation for a long term sustainable management plan for the benefit of all direct and indirect stakeholder groups.

Fisheries WA encourages key stake-holders and the general community to forward submissions to the agency in response to this discussion paper. The process is detailed under 'Submissions to this Discussion Paper' at the front of this paper.

APPENDIX 1 SUMMARY OF GEAR RESTRICTIONS CLOSURES AND CATCH FOR THE MAJOR ESTUARIES

Estuary	Netting restrictions	Temporal Closures	Seasonal Closure Period	Major catch species
Oyster Harbour	Minimum set net mesh size of 57 mm (Notice 196), No length restrictions for set nets or seine nets.	1 November to 1 March set net are prohibited between 1.5 hours after sunrise and 1700 hours. All other times set nets are prohibited between 1.5 hours after sunrise and 1.5 hours before sunset. Hauling and throw nets may be used at any time.	Nil A seasonal day time closure exists from the south west side of Green Island to the Emu Point channel prohibiting set nets at all times and haul nets between 0700 hours and 1800 hours between 1 November to 31 April.	cockles, leatherjacket, cobbler, crab, sea mullet, yellow eye mullet, herring, garfish, squid.
Princess Royal Harbour –	Minimum mesh size of 57 mm (Notice 196) No length restrictions for set nets or seine nets.	Same as Oyster Harbour		cockles, leatherjacket, cobbler, herring, crab, flathead, sea mullet, garfish
Wilson Inlet	Minimum set net mesh size of 57 mm No length restrictions for set nets or seine nets. “Garfish Nets” having a minimum mesh size 44 mm and maximum combined length of 500m may be used between 1 May -31 October.	Same as Oyster Harbour	No seasonal closure. Closures exist around the mouths of the Hay, Sleeman and Denmark Rivers. A closure also exists from Poison Point across to the north eastern corner of Plantagenet Location 1828 to the opening/barway of Wilson Inlet.	cobbler, King George whiting, Sea mullet, yellow eye mullet, herring, flathead, flounder, pink snapper, garfish.

Appendix 1 (Continued) Summary of Gear Restrictions Closures and Catch For the Major Estuaries				
Irwin's Inlet:	Minimum of 57 mm mesh size for all species other than bream, in which case the mesh size shall be not less than 89 mm (refer Notice 196). No length restrictions for set nets or seine nets.		1 November to 31 April the following year.	sea mullet, cobbler, silver bream (tarwhine), herring, yellow eye mullet, King George whiting
Broke Inlet:	Minimum mesh size of 57 mm (Lawful Nets Notice 442). No length restrictions for set nets or seine nets.	Set nets are prohibited between 1.5 hours after sunrise and 1.5 hours before sunset.	1 November to 31 April the following year.	yellow eye mullet, King George whiting, sea mullet, herring
Beaufort Inlet:	Lawful Nets are defined as not more than 3 nets totalling not more than 1000 m Minimum mesh size of 76 mm. Nets only be used by a person authorised in writing (this is restricted to 3 selected by ballot each year)	Nil	1 November to 31 April the following year.	
Stoke's Inlet:		Nil	1 December to 31 April the following year.	black bream, sea mullet
Gairdner River:		Nil	1 December to March 31 the following year.	black bream sea mullet

APPENDIX 2

C,C No 22

3/3/89

FISHERIES ACT 1905
SOUTH COAST ESTUARINE FISHERY
INSTRUCTIONS TO LICENSING OFFICERS
Notice No. 381

FD 1332/76

PURSUANT to Section 17 of the Fisheries Act I hereby issue the following directions to Licensing Officers regarding the granting and renewal of Professional Fishermen's Licences and Fishing Boat Licences for the South Coast Estuarine Fishery.

1. All Professional Fishermen's Licences issued for the South Coast Estuarine Fishery shall be endorsed as follows:-

"The holder of this licence is authorised to engage in the taking of fish for sale in the South Coast Estuarine Fishery.

"Fishing Unit No _____"

"Owner fisherman/part owner fisherman/assistant fisherman or trainee fisherman."

2. All Fishing Boat Licences issued for the South Coast Estuarine Fishery shall be endorsed as follows:

"The boat described herein is licensed to be used for taking fish for sale in the South Coast Estuarine Fishery."

"Fishing Unit No _____"

3. The number of fishing units and the number of fishermen and fishing boats making up those units which may be licensed to take fish in the South Coast Estuarine Fishery are to be restricted to those listed in the schedule except as provided hereunder.

4. A Fishing unit shall consist of:-

- (a) A primary fishing boat (mother ship);
- (b) Not more than four netting dinghies;
- (c) Not more than the number of fishermen in the schedule excepting as is provided hereunder.

5. Licences for fishermen additional to those listed in the schedule may be issued on the written approval of the Director of Fisheries to:-

- (a) a trainee fisherman, being the son/grandson/daughter/grand daughter of the unit holder, to assist in the operation of that unit, who has been nominated by the unit holder to be the designated owner/part owner of the unit on the retirement of the existing owner/part owner fisherman.

Prior to granting approval under this paragraph the Director of Fisheries shall determine that the unit has not remained inactive for the preceding two years prior to the date of application. Where the Fishing performance of the unit has been such that it can be established that the members of the unit did not spend the major part of their working time- fishing in, and have not earned a substantial part of their income from the South Coast Estuarine Fishery in the preceding two years. the Director of Fisheries shall refuse the application.

- (b) assistant fishermen as nominated by the unit holder to assist in the operation of the unit, who shall, on the retirement of the unit holder, have no cause or right to claim the transfer of that fishing unit or part thereof of that fishing unit.

6. A trainee fisherman licensed under sub clause 5(a) shall submit a report to the Officer in Charge of the Albany District Office of the Fisheries Department once every three months giving details of fishing activities during the preceding three months.
7. An assistant fisherman or a trainee fisherman shall only be:-
 - (a) permitted to operate when the unit holder is on board his licensed boat.
 - (b) permitted to operate alone when the Officer in Charge of the Albany District Office of the Fisheries Department has granted approval; and for the purposes of this sub clause such approval shall be given to retrieve gear only when the unit holder has become incapacitated after the gear has been set.
 - (c) permitted to operate on a unit when no other assistant fisherman or trainee fisherman is operating on the same unit.
8. Subject to the approval of the Director of Fisheries fishing units may be transferred from grandfather/grandmother/father/mother to grandson/grand daughter/son/daughter.

Prior to granting an approval under this clause the Director of Fisheries shall ensure that the applicant has completed a probationary period of two year, and has spent at least two hundred days actually fishing under the supervision of the unit holder.

9. Units and fishermen listed in the schedule may be reduced by: -
 - (a) not replacing owner or part owner fishermen upon their retirement or other withdrawal from the fishing industry.
 - (b) not renewing inactive licences.
10. A professional fisherman who has been authorised to engage in taking fish for sale in the South Coast Estuarine Fishery and who wishes to engage in professional fishing in another fishery for a period of time shall first obtain the approval of the Director of Fisheries who may specify conditions relating to the entitlement to return to the South Coast Estuarine Fishery as a professional fisherman.
11. The holder of an endorsed licence who relinquishes the licence or endorsement or retires from the South Coast Estuarine Fishery shall not be replaced by any other fisherman except in accordance with this notice or with the approval of the Director of Fisheries who may grant or refuse such approval after investigating the potential of the fishery.
12. The holder (if an endorsed licence for any of the Fisheries listed hereunder shall not hold an endorsed licence to fish in the South Coast Estuarine Fishery--
 - (i) Shark Bay Beach Seine and Mesh Net Fishery;
 - (ii) Exmouth Gulf Beach Seine Fishery;
 - (iii) Mandurah Estuarine Fishery;
 - (iv) Swan/Canning Estuarine Fishery-,
 - (v) Leschenault Estuarine Fishery.
 - (vi) Hardy Inlet Estuarine Fishery.

For the purpose of these instructions the "South Coast Estuarine Fishery" means the commercial fishery in the waters of all estuaries on the south coast of Western Australia between Cape Beaufort and 129' east longitude, including Princess Royal Harbour and Oyster Harbour.

The Notice relating to the South Coast Estuarine Fishery published in the *Government Gazette* No. 105 of 4 November 1988 is revoked.

Schedule (names of fishermen)

APPENDIX 3 CURRENT LEGISLATION APPLICABLE TO THE SOUTH COAST ESTUARINE FISHERY

The notices which relate specifically to the fishery are:

- 'Instructions to Licensing Officers' Notice No. 381
- 'Closed Waters Professional Netting' (Rivers, Estuaries, Inlets and Lakes South of 23° South Latitude) Notice 1992 (Notice No. 548).
- 'Nets in the Wellstead Estuary' Notice No. 227
- 'Prohibition of taking fish - Bremer River and its Tributaries' Notice No. 228
- 'Pallinup River and Beaufort Inlet Lawful Nets' (Further advice is needed on the opening status, as this is a lawful net notice.) Notice No. 368
- 'Lawful Nets South Coast Estuaries' Notice No. 196
- 'Donnelly River Lawful Nets'- F & W 1419/76
- 'Lawful Nets (Broke Inlet)' Notice 1990 Notice No. 442
- 'Meshing Nets to be used or intended to be used in the waters of Bandy Creek' GG 1 Nov 1940 C.S.D. 262/37

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APPENDIX 5 VOLUNTARY RECREATIONAL FISHING LOG SHEETS

ANGLER'S DAILY LOG SHEET No. 2082

Date: _____; Time started fishing _____ am/pm; Time stopped fishing _____ am/pm; Boat or Shore: _____

Wind - strength						- direction	Sea Conditions							Cloud %		Rainfall		
Calm 1	Light 2	Mod 3	Strong 4	Gale 5			Calm 1	Slight 2	Mod 3	Rough 4	Very rough 5			Nil 1	Light 2	Mod 3	Heavy 4	
Species						Location	Kept	Released	Gear	Tackle	Bait	Length (mm)			Weight (g)			
No fish caught																		
Gear	Rod & Reel	R	Handline	H	Crab Pot	P	Net	O										
Tackle	Single hooks	1	Gang of 3 hooks	3	Gang of 4 hooks	5	Lure	7	Other									
	Gang of 2 hooks ...	2	Gang of 3 hooks & treble ..	4	Gang of 4 hooks & treble ...	6	Lure & barbless hook ...	8										
Bait	Mulle	M	Live bait	L	Squid	S	Fly	F	Maggots/Wogs ...									
	Small Fish	SF	Prawn	P	Octopus	O	Strip Bait	SB	Other	Z								

Comments

APPENDIX 6 CATCH SPECIES IN ESTUARIES

Major Recreational Species

The following commercially caught fish are considered to be major recreational species:

- cobbler;
- black bream;
- silver bream;
- sea mullet;
- Australian herring;
- King George whiting;
- Pink snapper (Wilson's Inlet); and
- Blue Manner Crab.

List of commercial estuarine fish species

- Australian Salmon
- Blue Manna Crab
- Bream, Black
- Bream, Silver (Tarwhine)
- Cobbler
- Cockles
- Flathead
- Flounder
- Garfish
- Herring
- Leatherjacket
- Mullet, Sea
- Mullet, Yellow-eye
- Mussel
- Prawns
- Sand Crab
- Skate
- Skipjack
- Squid
- Tailor
- Whiting, King George
- Whiting, Western Sand

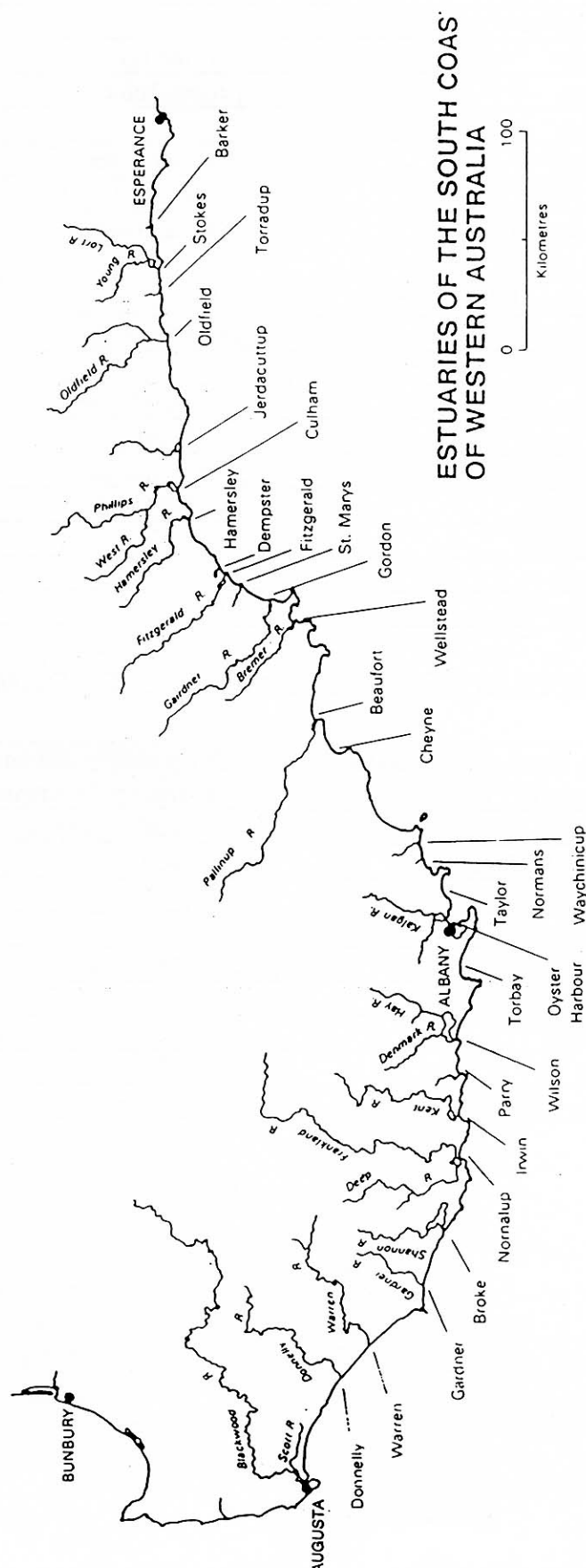
APPENDIX 7 ESTUARIES OPEN TO COMMERCIAL FISHING

Current Estuaries Open to Commercial Fishing	Proposed Estuaries Open to Commercial Fishing
Donnelly River	
Warren River	
Broke Inlet	Broke Inlet
Irwin Inlet	Irwin Inlet
Parry Inlet	
Wilson Inlet	Wilson Inlet
Princess Royal Harbour	Princess Royal Harbour
Oyster Harbour	Oyster Harbour
Gardner River	
Waychinicup Inlet	Waychinicup Inlet
Gordon Inlet/ Gairdner River	Gordon Inlet/ Gairdner River
Fitzgerald Inlet	
Hamersley Inlet	Hamersley Inlet
Culham Inlet	Culham Inlet
Jerdacuttup Lakes	Jerdacuttup Lakes
Oldfield Inlet	Oldfield Inlet
Torradup Inlet	
Stokes Inlet	
Beaufort Inlet	Beaufort Inlet

APPENDIX 8 ESTUARIES CLOSED TO COMMERCIAL FISHING

Current Estuaries closed to Commercial Fishing	Proposed Additional Estuaries to be closed to Commercial Fishing
Barker	Donnelly River,
Nornalup/Walpole	Warren River,
Torbay	Parry Inlet,
Taylor	Gardner River,
Normans	Fitzgerald Inlet,
Cheyne	Torradup Inlet.
Wellstead	Stokes Inlet (refer Stokes Inlet Option 4)
St Marys	
Dempster	

APPENDIX 9 MAP SHOWING ESTUARIES OF THE SOUTH COAST OF WESTERN AUSTRALIA



Hodgkin and Clarke, 1989

REFERENCE LIST

Fisheries Management Paper No. 21, Commercial fishing licensing in Western Australia.

Fisheries Management Paper No. 76, Draft report of the South Coast Estuarine Fishery Working Group. March 1995.

Fisheries Research Report No 104, 1996, An assessment of the effects of a trial period of unattended recreational netting, in selected estuaries

Fisheries Management Paper No. 108, Issues affecting Western Australia's inshore crab fishery: Blue swimmer crab (*Portunus pelagicus*), Sand Crab (*Ovalipes australiensis*). Cathy Campbell (September 1997)