BI/FISH– 306

FINAL APPLICATION TO THE AUSTRALIAN GOVERNMENT DEPARTMENT OF ENVIRONMENT AND HERITAGE ON THE SOUTH COAST TRAWL FISHERY

Against the *Guidelines for the Ecologically Sustainable Management of Fisheries*

For Consideration Under Part 13A of the *Environment Protection and Biodiversity Conservation Act 1999*

JULY 2005

Department of Fisheries
Government of Western Australia

Fish for the future

DEPARTMENT OF FISHERIES, WESTERN AUSTRALIA
LOCKED BAG 39, CLOISTERS SQUARE WA 6850

TABLE OF CONTENTS

TABLE OF FIGURES

TABLES

1. INTRODUCTION TO THE APPLICATION

1.1 DESCRIPTION OF INFORMATION PROVIDED

This is an application to the Department of Environment and Heritage (DEH) to assess the South Coast Trawl Fishery (SCTF) against the Australia Government guidelines for sustainable fisheries. The submission of a successful application against these guidelines is now needed to meet the requirements under Part 13 A of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC), to enable the saucer scallop *(Amusium balloti)* and other relevant by-products of the to fishery remain on the section 303DB list of species exempt from export regulations (previously Schedule 4 of the *Wildlife Protection (Regulation of Exports and Imports) Act, 1982*) past December 2005.

The information provided in this application covers all the elements specified in the *Guidelines for the Ecologically Sustainable Management of Fisheries* (located on the DEH website www.deh.gov.au/coasts/fisheries/assessment/guidelines.html) along with other information (at a variety of levels of complexity) considered relevant to those who wish to gain an understanding of the management of this fishery. The application includes:

- Comprehensive background information on the history of the SCTF and a description of the management arrangements and the biology of the saucer scallop, which provides the context for assessing this application (see Section 2 for details).
- A description of the National Ecologically Sustainable Development (ESD) reporting framework and methodology that was used to generate the information presented in the application (see Section 3 for details).
- Specific supporting statements relevant to each of the criteria within the Guidelines. These criteria include the "General Requirements", which covers many of the governance aspects related to the management of the SCTF, plus each of the objectives listed under "Principle 1" (target species issues) and "Principle 2" (broader ecosystem issues) of the Guidelines (see Section 4).
- Section 4 also has, where appropriate, specific links and reference to the detailed ESD component reports contained in Section 5. Referral to this additional information is facilitated by the incorporation of appropriately placed hyperlinks (electronic version only).
- At the end of Section 4 there is an Overview Table that for each issue outlines, which Guidelines are relevant; if there is an operational objective; the availability of suitable data for the indicators; whether the current performance against the limit/measure chosen is acceptable; and a summary of what (if any) future actions are required.
- Section 5 includes a comprehensive account of the risk assessment outcomes and current performance of this fishery, presented in the National ESD format, covering each of the environmental and governance issues relevant to this application for the fishery. These reports cover each of the issues in a comprehensive manner and include either; the explicit objectives, indicators, performance measures, current and future management responses and

justification for each major component; or a full justification for why specific management of this issue within the fishery is not required.

1.2 OVERVIEW OF APPLICATION

The SCTF is principally a scallop fishery, however in low scallop catch years, licensees may use other gear to target finfish species. Scallop landings for the fishery have varied considerably over the last 17 years depending primarily on the strength of recruitment. In 2000, the SCTF had its highest catch of scallops, 2,722 tonnes whole weight, which was also the highest single fishery catch of scallops for the State in that year. In subsequent years, catches have remained lower than the catch in 2000 but higher than average with harvesting of residual stock and additional local settlement. In 2002 the SCTF had a total catch of 669 tonnes whole weight of scallops and the annual value was $4.4 million (which includes mixed finfish landings recorded by two licensees) whilst in 2003 the catch was only 80 tonnes whole weight with a value of $0.3 million.

The SCTF is mostly managed by limiting the access to the fishery to four fishing boats that are each governed by two fishing boat licence conditions. In addition, the management of the SCTF includes a closed area in the Recherche Archipelago during certain times of the year.

The *Fish Resources Management Act, 1994* (FRMA) and the *Fish Resources Management Regulations 1995* (the Regulations) provide the legislative framework for the management arrangements for this fishery.

The maintenance of scallop stocks within the stock abundance levels that should provide the normal (but highly variable) recruitment leading to the successful continuation of the fishery has been achieved through having a significant amount of information on the biology and recruitment status of the scallop species.

Trawling is practically restricted to a relatively small area of the South Coast region, and occurs predominately over sandy substrates. Bycatch is not a significant problem in this fishery since the mesh size used in the fishery excludes most of the smaller finfish species from being caught.

Consequently, the management regime for the SCTF should meet the *Guidelines for the Ecologically Sustainable Management of Fisheries*. Detailed justification for this conclusion is documented within the remainder of this application.

2. BACKGROUND INFORMATION ON FISHERY

2.1 DESCRIPTION OF THE FISHERY

2.1.1 SOUTH COAST TRAWL FISHERY

Access to the south coast trawl fishery is limited, with only four fishing boat licences with the necessary conditions to use trawl gear in the area of the fishery (Figure 1). Condition 73 provides for the use of trawl nets off the south coast of Western Australia in State waters east of 115° E longitude (Cape Leeuwin). Condition 79 provides for the trawling of scallops within the Recherche Archipelago.

Although fishermen may operate anywhere in the area of the fishery, in practice, trawling typically occurs in three key areas including Bremer Bay (blue block in Figure 1), the Recherche Archipelago (dark green blocks in Figure 1) and Israelite Bay (red block in Figure 1).

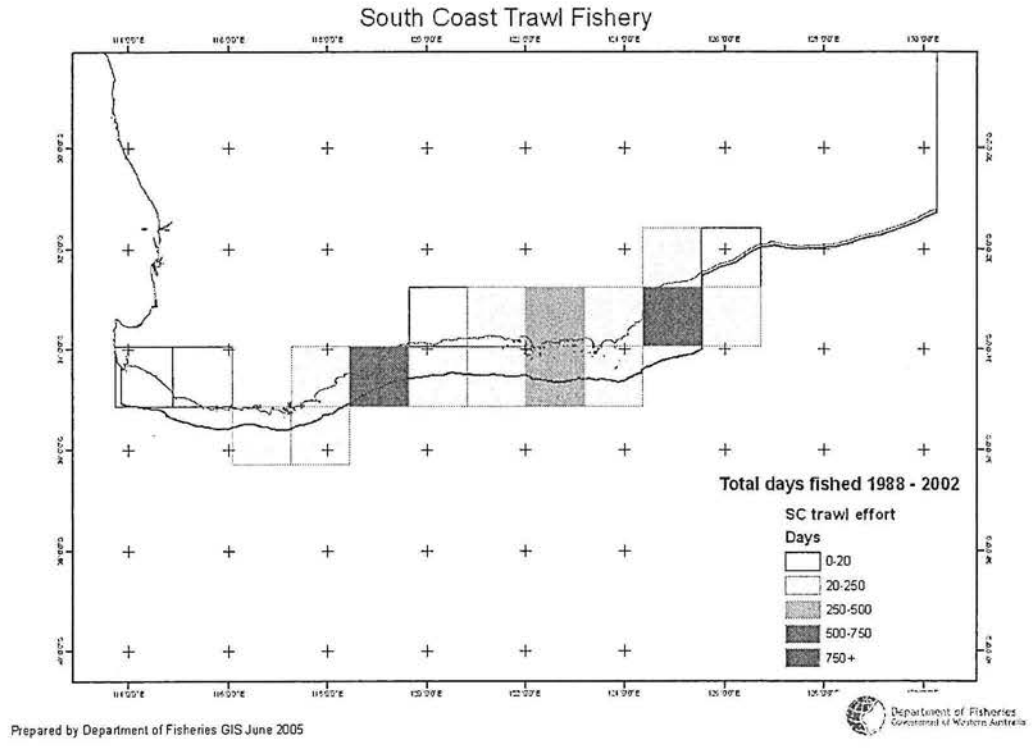


Figure 1 Location and licence area of South Coast Trawl Fishery.

The annual effort expended in this fishery is largely dependant on initial fishing surveys by operators to estimate stock abundance and likely benefits of continued fishing. As a consequence, the level of effort utilised each year closely follows stock abundance and catch levels/rates.

The level of fishing activity and quantity of catch within the SCTF is highly variable (Figure 2) with very high catches observed in 2000. The variability in catches has largely been driven by the level of scallop recruitment to these grounds.

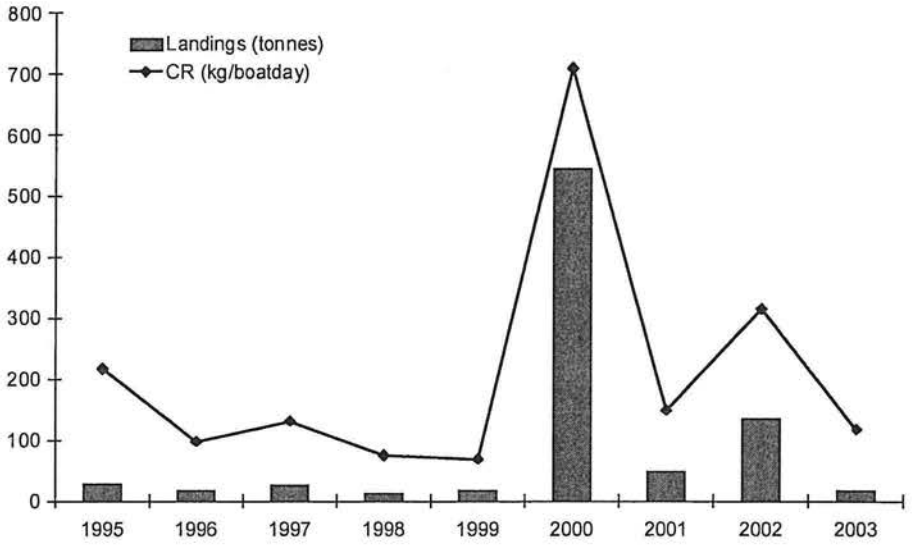


Figure 2 Scallop catch (tonnes meat weight) and catch rate (kg/boat day) history of the SCTF, 1995 to 2003

2.1.2 FISHING METHODS

The south coast trawl fishery is principally a scallop fishery with most boats using 100 mm mesh scallop nets. However, in low scallop catch years some boats may also target fish using other gear such as mid-water trawls. No gear restrictions currently apply in this fishery, however, restrictions will apply when more sophisticated management arrangements are introduced within the next few years.

2.1.3 MANAGEMENT

The region is currently managed by licence conditions issued pursuant to *Fisheries Notice No. 287* of October 1987 and Fisheries Notices No. 586 *(Trawling for Scallops, South Coast, Notice)* of December 1992.

Current management measures in the fishery revolve around a closed season during the three-month period from 1 December to 1 March, for waters in the scallop zone within the Recherche Archipelago. No seasonal closures currently apply to scallop trawling in areas outside of the Archipelago (Harris et al., 1999).

2.1.4 History

During the mid 1980's, several small trawlers operating out of Esperance and Albany discovered beds of saucer scallops in south coastal waters, especially within the Recherche Archipelago (Anonymous, 1987). As a result interest developed amongst WA fishers to exploit this resource, with some concerns raised regarding the potential for excessive fishing capacity, as had been experienced in other Australian trawl fisheries (Anonymous, 1987).

Following advice recommending management arrangements be introduced at an early stage to control the development of any inshore trawl fishing, the Minister for Fisheries approved a Notice limiting trawling in State waters on the south coast, east of 115°E. A Ministerial statement was then issued on 1 July 1986, advising interested parties that a development plan was being considered for the region and that future access would be restricted to those vessels currently trawling in the area. This date was used as the benchmark for eligibility to obtain an interim endorsement to continue trawling in the region, with 11 vessels subsequently being judged eligible (Anonymous, 1987).

Draft proposals for a development plan were circulated for comment by interested parties in September 1987, with the finalised plan for the south coast fishery released in November 1987 (Anonymous, 1987).

The 11 vessels granted interim access to the fishery had their endorsements formalized and were granted access. Over the ensuing years, however, the number of vessels carrying appropriate licences has gradually been reduced to four vessels on the basis of non-performance (Mant, Department of Fisheries, *pers. comm.*). The four licences remaining are effectively owned by two operators, who either operate the licences themselves or lease them to other fishers (Harris et al., 1999).

2.1.5 NON-RETAINED SPECIES

The large mesh (100 mm) trawl gear used in scallop trawling takes minimal bycatch. The real areas trawled by the four vessels also represent a very small percentage of the fishing area within the legislated boundary, therefore bycatch species impact is considered to be minimal (Sporer and Kangas, 2003).

2.1.6 RESEARCH

Research into the biological and environmental aspects of WA scallop stocks and commercial exploitation, has been carried out by the Department of Fisheries since the late 1960s. This research was aimed at determining basic biology of the species to ensure that the scallops are being harvested at ecologically sustainable levels whilst achieving the best economic returns from the available scallop resource.

For the SCTF research monitoring of the scallop stocks is undertaken utilising fishers' monthly return data.

2.2 BIOLOGY OF SAUCER SCALLOP

Distribution and Stock Structure

The saucer scallop, *Amusium balloti*, belongs to the family Pectinidae. The western population of *A. balloti* has a distribution spanning most of the WA coast, having been recorded from Broome in the north to Esperance in the south (Figure 3). The greatest numbers are found in Shark Bay and around Abrolhos Islands (Joll, 1989). The eastern population of *A. balloti* occurs from Innisfail, Queensland to Jervis Bay, New South Wales (Kailola et al., 1993). Therefore, the distribution of the eastern and western populations of saucer scallops are separated across the northern Australian waters thus resulting in two separate populations.

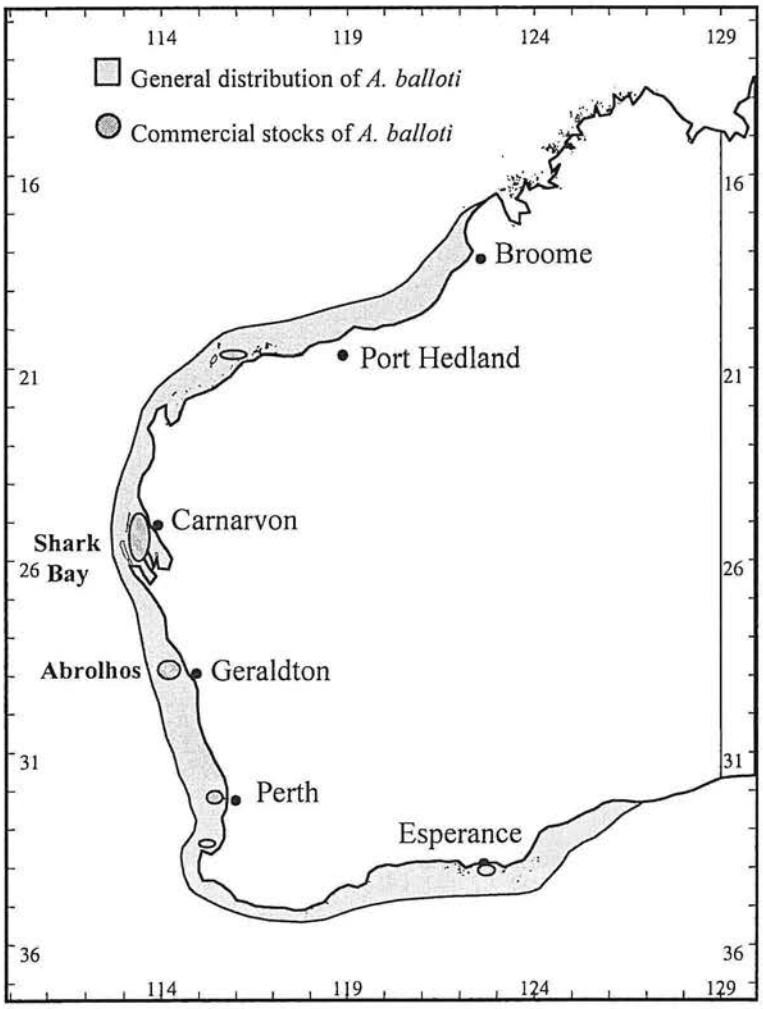


Figure 3 Distribution of *Amusium balloti* in WA.

There is uncertainty regarding differences (if any) in taxonomy between the eastern and western population of saucer scallops. While there is some varying usage of nomenclature it is likely that the eastern population and western population are the same species or sub-species. In Kailola et al. 1993, the eastern and western populations are referred to as separate sub-species (Ballot's saucer scallop in the east and Western saucer scallop in the west) as a result of research conducted in Queensland. This research found that not only were there differences in the genetic make-up of the two populations but the degree of difference indicated that there is probably no interbreeding between the two (Kailola et al., 1993). In this report the Department of Fisheries will refer to the commercial scallop caught in the SCTF as the saucer scallop, *Amusium balloti* from the western population.

Although *A. balloti* has an extensive distribution, it tends to be restricted to areas of bare sand in the more sheltered environments found in the lee of islands and reef systems. The species has been reported occurring in depths from 10-75m in discrete beds, up to 15 km in length, at densities of up to 1 per m^2 (Dredge, 1988; Kailola et al., 1993).

Life History

Early growth of this species is rapid and although saucer scallops have been recorded reaching 140mm in length and living up to 3-4 years, most appear to live no more than two years and usually attain a maximum size around 115mm (Heald, 1978; Dredge, 1988).

The reproductive cycle among Abrolhos Island and Fremantle scallop stocks begins with the onset of gametogenesis in June/July with spawning occurring 4-8 weeks after the onset of gametogenesis (August until the following February/March) (Joll and Caputi, 1995a). Although it was originally believed that the reproductive cycle of the saucer scallop was triggered by changes in water temperature in the range of 18°-23°C, recent research conducted by Joll and Caputi (1995a), has found that the relationship between changes in gonad weight and water temperature is tenuous for *A. balloti* on the WA coast. Limited observations at Esperance (Joll, unpublished data) indicate that the spawning season on the southern coast of Western Australia is similar to that at Fremantle (Joll and Caputi 1995).

Saucer scallops are broadcast spawners, releasing their eggs and sperm into the surrounding waters for fertilisation to occur in the water column (Kailola et al., 1993). The life cycle for the saucer scallop is depicted below in Figure 4.

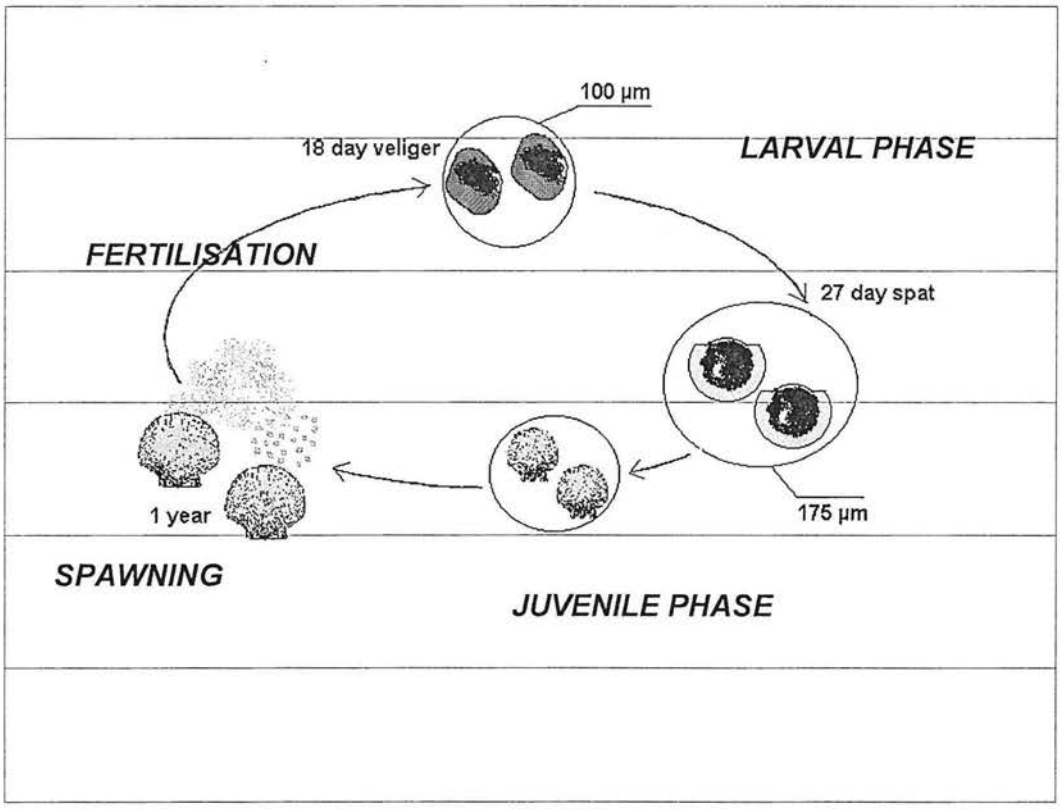


Figure 4 Life cycle of the saucer scallop, *Amusium balloti.*

The planktonic, larval phase of the saucer scallop lasts between 12 and 24 days (Rose et al., 1988). Success of the larval phase appears to be governed by prevailing oceanographic events, which greatly influence settlement locations and subsequent recruitment patterns. The predominant oceanographic influence along the WA coast is the Leeuwin Current, a southward flowing current of relatively warm, tropical water that is low in salinity (Joll and Caputi, 1995b). While the environmental mechanisms relating to the recruitment variability of *A. balloti* are yet to be fully understood, it appears that in years of a strong Leeuwin Current there is an increased likelihood that larvae are flushed away from areas of suitable recruitment habitat. This hypothesis is supported by research data, which indicates that in years when the current flow is strong, scallop recruitment in Shark Bay is low and vice versa (Joll and Caputi, 1995b). Highly variable settlement of saucer scallops, due to environmental conditions have been observed in the SCTF with very high settlement observed in the SCTF in 2000. It is also quite possible that the Leeuwin Current could have some temperature effects on spawning or fertilisation because of associated warmer waters (Joll and Caputi, 1995b).

Following the larval phase, juvenile scallops settle out as spat over a period of several days (Rose et al., 1988). During this time, they crawl actively using a well-developed, ciliated foot, and do not appear to attach permanently to the substrate (Rose et al., 1988). A week after settlement, a byssal notch and associated threads develop on the dissoconch of the right valve, although attachment to the substrate remains very weak and is never permanent (Rose et al., 1988).

Growth of these new recruits is rapid. Scallops derived from early in the spawning season (April-July) reach sizes around 50-60 mm in shell height by November, some 6-7 months after fertilisation. A size suitable for commercial harvest (>90 mm shell length) is reached by March-April the next year, within approximately one year (Joll and Caputi, 1995a). It is around this stage that the recruits mature and enter the breeding stock (Joll and Caputi, 1995a).

Saucer scallops are filter feeders, removing small organic material and particulates from the surrounding water. Known predators include pink snapper (*Pagrus auratus*) and octopus.

2.3 MAJOR ENVIRONMENTS

2.3.1 PHYSICAL ENVIRONMENT

The south coast trawl fishery operates in waters that are temperate in nature but can be influenced by the tropical Leeuwin Current. This makes the seawater temperatures much higher than would normally be expected at these latitudes. This increased temperature allows the species of scallop to occur in these locations.

2.3.2 ECONOMIC ENVIRONMENT

The majority of the annual catch is destined for export as frozen scallop meat to Asia, principally via Hong Kong markets. Very small quantities of scallops are occasionally left 'roe-on', in the shell or in the half-shell to supply the gourmet seafood market.

Wholesale market prices for scallops have fluctuated markedly, with a low of $8.50 seen in 1991 to a high of $30.00 in 1997 followed by a drop in prices in more recent years to around $16.80/kg in 2003 (Table 1). Market variability has arisen primarily in response to product availability and condition, although poor marketing in the face of a large supply and price manipulation by Hong Kong buyers was blamed for the low prices in the early 1990s.

Size and condition of the meat play an integral part in determining the market value of scallop meat, and consequently these factors greatly influence selection of appropriate seasonal opening dates. Higher prices are usually paid for larger scallops, so it is desirable to open the scallop fisheries when meats may reasonably be expected to be better than the 40/lb criterion, as this size is preferred on the export market.

YEAR	AVE. PRICE*	Shark Bay	Abrolhos	South Coast	South West	Nickol Bay	TOTAL
1985	11.00	2.5	0.1	0.03	0.01	0.0	**2.64**
1986	15.50	3.5	1.0	0.25	0.03	0.01	**4.79**
1987	16.00	8.0	1.1	0.36	0.4	0.01	**9.87**
1988	17.00	12.0	0.4	0.47	0.07	0.36	**13.30**
1989	17.50	2.1	0.8	0.22	0.1	0.05	**3.27**
1990	14.50	7.0	0.4	0.03	0.6	0.18	**8.21**
1991	8.50	21.5	0.2	0.19	0.2	0.11	**22.20**
1992	14.00	58.0	1.1	0.27	0.2	0.01	**59.58**
1993	17.00	32.9	4.7	0.01	0.1	0.02	**37.73**
1994	20.00	17.2	10.0	0.01	0.07	0.01	**27.29**
1995	28.50	17.0	9.1	0.79	0.1	0.01	**26.91**
1996	28.25	10.1	6.5	0.49	0.1	0.01	**17.20**
1997	30.00	9.9	0.3	0.78	0.04	0.01	**11.03**
1998	22.00	5.5	0.9	0.25	0.03	0.0	**6.68**
1999	21.75	7.4	2.6	0.36	0.02	0.0	**10.38**
2000	26.25	7.1	2.3	14.3	0.12	0.0	**23.82**
2001	20.50	4.4	4.8	1.0	0.10	0.0	**10.3**
2002	16.50	5.8	0.6	4.4	0.04	0.0	**10.84**
2003	16.80	2.6	19.6	0.3	0.04	0.0	**22.54**

Table 1 Historical annual values ($ million Aust) for each of the Western Australian scallop fisheries, 1985-2003.

2.3.3 Social Environment

Only four licences operate in this fishery. The estimated employment for the year 2002 was 16 (4 skippers and 12 crew) (Kangas and Sporer 2003).

3. METHODOLOGY

3.1 SCOPE

This application is based upon the ESD report for the SCTF. The ESD report was generated by assessing **"the contribution of the SCTF to ESD".** This assessment examined the benefits and the costs of the SCTF across the major components of ESD (see Table 2). In doing so, it will eventually provide a report on the performance of the fisheries for each of the relevant ecological, economic, social and governance issues associated with this fisheries. Given the timeframes involved, only the criteria required for the "Guidelines for the Ecologically Sustainable Management of Fisheries", which cover mainly the environmental elements of ESD (outlined below in Table 2) were generated for this application.

Table 2 Main National ESD Reporting Framework Components.
Nb: Only those ESD components in **bold*** are reported in this application.

National ESD Framework – ESD COMPONENTS
Contribution to Ecological Wellbeing
Retained Species*
Non-Retained Species*
General Ecosystem*
Contribution to Human Wellbeing
Indigenous Community Issues
Community Issues
National Social and economic Issues
Ability to Achieve
Governance*
Impact of the environment on the fishery

3.2 OVERVIEW

There were four steps involved in completing the ESD report for the SCTF. It was based upon using the National ESD Reporting Framework, which is outlined in detail in the WA ESD policy paper (Fletcher, 2002) and in the "*How to Guide*" (Fletcher et al., 2002) located on the website (www.fisheries-esd.com):

1. The issues that needed to be addressed for the fishery were determined through an internal workshop for the fishery, which utilised information generated through the external workshops held for the Shark Bay Scallop Managed Fishery (due to practical similarities between the trawl fisheries). This process was facilitated by adapting the set of "Generic ESD Component Trees" into a set of trees specific to the SCTF.

2. A risk assessment/prioritisation process was completed that objectively determined, which of these identified issues was of sufficient significance to warrant specific management actions and hence a report on performance. The justifications for assigning low priority or low risk however were also recorded.
3. An assessment of the performance for each of the issues of sufficient risk to require specific management actions was completed using a standard set of report headings where operational objectives, indicators and performance measures, management responses etc were specified.
4. An overview assessment of the fishery was completed including an action plan for activities that will need to be undertaken to enable acceptable levels of performance to continue or, where necessary, improve the performance of the fisheries.

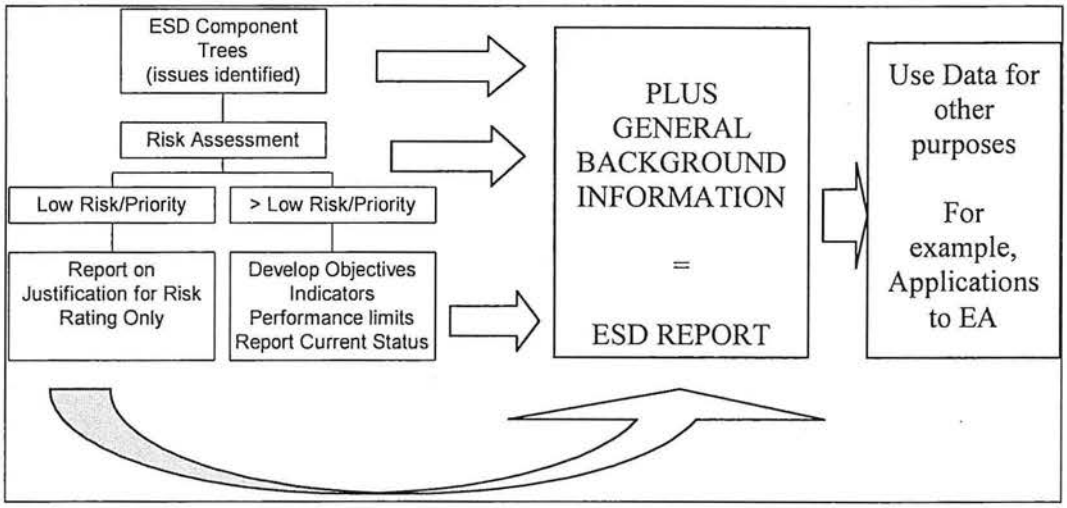


Figure 5 Summary of the ESD reporting framework processes.

3.3 ISSUE IDENTIFICATION (COMPONENT TREES)

The National ESD Reporting Framework has eight major components, which fall into three categories of the "contributions to ecological wellbeing", "contributions to human wellbeing" and the "ability to achieve the objectives" (Table 2). Each of the major components is broken down into more specific sub-components for which ultimately operational objectives can be developed.

To maximize the consistency of the approach amongst different fisheries, common issues within each of the components were identified by the then Standing Committee on Fisheries & Aquaculture and ESD reference groups within each of the major component areas and arranged into a series of "generic" component trees (See Fletcher (2002) and the www.fisheries-esd.com web site for a full description). These generic trees were used as the starting point for identifying the issues. These trees were subsequently adapted into trees specific to the SCTF by expanding (splitting) or contracting (removing/lumping) the number of sub-components as required (see Figure 6).

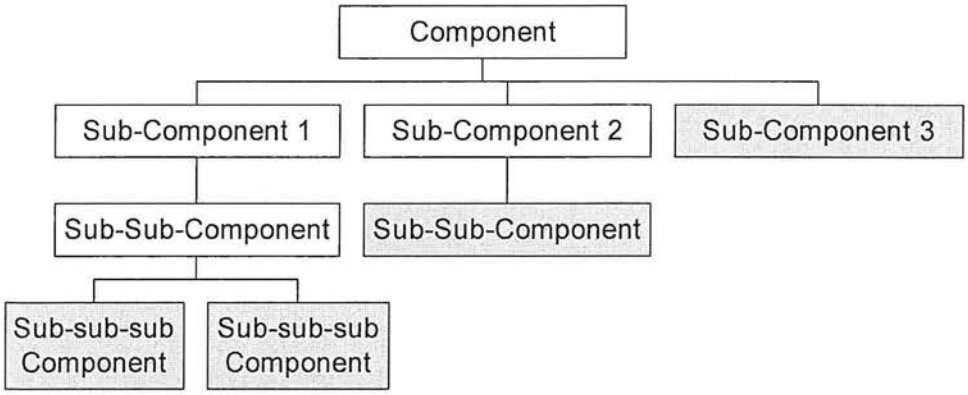


Figure 6 Example of a component tree structure.

3.4 RISK ASSESSMENT/PRIORITISATION PROCESS

After the components/issues were identified, a process to prioritise each of these needs was completed using a formal risk assessment process. The risk assessment framework that was applied at the internal workshop was consistent with the Australian Standard AS/NZS 4360:1999 Risk Management, concentrating on the risk assessment components. The general Risk Assessment process is well documented but in summary, it considers the range of potential consequences of an issue/activity and how likely those consequences are to occur. The combination of the level of consequence and the likelihood is used to produce an estimated level of risk associated with the particular hazardous event/issue in question.

Due to the similarities of this fishery with the Western Australian Shark Bay Scallop fishery (which went through the full risk assessment process with two external workshops), only an internal workshop was held for the SCTF. Consequently, the information collected through the Shark Bay Scallop fishery risk assessment process was applied and utilised to generate the application for the SCTF.

An estimate of the consequence level for each issue was made by the group at this internal workshop. This level was from 0-5, with 0 being negligible and 5 being catastrophic/irreversible (see Appendix 2 for details of consequence tables). This assessment was based upon the combined judgments of the participants at the workshop, who collectively had considerable expertise in the areas examined.

The level of consequence was determined at the appropriate scale for the issue. Thus for target species the consequence of the SCTF was based at the population not at the individual level. Obviously catching one fish is always catastrophic for the individual but not always for the population. Similarly, when assessing possible ecosystem impacts this was done at the level of the whole ecosystem or at least in terms of the entire extent of the habitat, not at the level of an individual patch or individuals of non-target species.

The likelihood of a consequence occurring was assigned to one of six levels from remote to likely. In doing so, again it was considered the likelihood of the "hazardous" event (consequence) actually occurring based upon collective wisdom, which included an understanding of the scale of impact required.

From these two figures (consequence and likelihood), the overall risk value, which is the mathematical product of the consequence and likelihood levels (Risk = Consequence x Likelihood), was calculated. Finally, each issue was assigned a Risk Ranking within one of five categories: High, Moderate, Acceptable, Low and Negligible based on the risk value (see Table 3).

Table 3 Risk ranking definitions.

RISK	Rank	Likely Management Response	Reporting
Negligible	0	Nil	Short Justification Only
Low	1	None Specific	Full Justification needed
Moderate	2	Specific Management Needed	Full Performance Report
High	3	Possible increases to management activities needed	Full Performance Report
Extreme	4	Likely additional management activities needed	Full Performance Report

In general, only the issues of sufficient risk (Moderate, High & Extreme), - those that require specific management actions need to have a full performance reports completed. Nonetheless, the rationale for classifying issues as low risk or even negligible were also documented and formed part of the ESD report. This allows all stakeholders and interested parties to see why issues were accorded these ratings. This process is summarized in Figure 5 (above).

It is important to note that the Risk Assessment involves the completion of reports that contain the completed justifications for the scores generated. Thus, the scores determined within the meeting by themselves are insufficient.

3.5 COMPONENT REPORTS

Only the issues of sufficient risk or priority that require specific management actions have a full performance report completed (which form section 5 of this application). Nonetheless, the rationale for classifying issues as low risk/priority were also documented and forms part of the report so that stakeholders can see where all the identified issues have finished.

For each of the lowest level sub-components (assessed as being of sufficient risk/priority to address), a detailed assessment of performance is generated. The SCFA Working Group in conjunction with the ESD Reference Group agreed upon a set of 10 standard headings each of which need to be addressed (Table 4). Added to this list a further heading, "**Rationale for Inclusion**", has been added. This specific heading allows the issues raised within the risk assessment process to be explicitly recorded. A full description of each of these headings is located in the WA ESD policy (Fletcher, 2002), which is available on the WA Fisheries website.

Table 4 The National ESD reporting framework headings used in this report.

1. Rationale for Inclusion
2. Operational Objective (+ justification)
3. Indicator
4. Performance Measure (+ justification)
5. Data Requirements
6. Data Availability
7. Evaluation
8. Robustness
9. Fisheries Management Response
-Current
-Future
-Actions if Performance limit is exceeded
10. Comments and Action
11. External Drivers

The completion of these component reports was initiated after the internal workshop for the SCTF back in August 2002. Progress towards completing these reports was subsequently made by a variety of Departmental staff. The draft application was sent to DEH and stakeholders including industry members and industry groups for review. This final application was generated after the review process.

4. ASSESSMENT OF THE SCTF MANAGEMENT REGIME AGAINST THE AUSTRALIAN GOVERNMENT GUIDELINES FOR ASSESSING THE ECOLOGICALLY SUSTAINABLE MANAGEMENT OF FISHERIES

GENERAL REQUIREMENTS OF THE GUIDELINES

The management arrangements must be:

Documented, publicly available and transparent

As per the FRMA *"the Executive Director is to cause a copy of every order, regulation and management plan in force under this Act –*

- *To be kept at the head office of the Department; and*
- *To be available for inspection free of charge by members of the public at that office during normal office hours."*

In addition to the legislative requirements being fulfilled, the current management regime, as documented in the formal set of management regulations (fishing boat licences) and Orders (Recherche Archipelago seasonal closure), can be purchased by interested parties from the Western Australian State Law Publisher or viewed online at http://www.slp.wa.gov.au/statutes/subsiduary.nsf/Fisheries.

Of more relevance, is that the discussion paper and any future proposals for modifications to these management arrangements will be distributed widely to stakeholder groups automatically and other interested individuals by request in hard copy format. Where appropriate, management discussion papers are also available from the Departmental web site www.fish.wa.gov.au.

Once completed, the full ESD Report on the SCTF will be made publicly available via publication and electronically from the Department website. This will provide increased transparency through explicitly stating objectives, indicators, performance measures, management arrangements for each issue and how the fisheries are currently performing against these criteria.

Developed through a consultative process providing opportunity to all interested and affected parties, including the general public

S64 and S65 of the FRMA define the requirement for procedures that must be undertaken before determining or amending all management plans. The Department has developed a management discussion paper which seeks to initiate the process of formalising the management of the SCTF under an interim managed fishery framework. Following Ministerial approval of the consultation process, the discussion paper will be circulated to licence holders and relevant stakeholders and will form the basis from which changes to the current management arrangements for this fishery can be developed.

The Department of Fisheries arranges meetings with industry members regarding the fishery when required. These meetings review data from the past seasons and discuss management arrangements, research and compliance issues. In addition, for the Shark Bay Scallop fisheries (a similar trawling fishery) a workshop was held to seek outside involvement in the development of the ESD reports. This workshop included industry members, industry representative groups, non-government environmental organisations, scientific researchers and other State government agencies as well as a representative from DEH.

The information that was collected through the two workshops in the development of the Shark Bay Scallop Managed Fishery assessment report has been incorporated within this report. The issues identified for this fishery are very similar to those affecting the SCEF. Details of the methodology used to generate this report including how the issues were identified, how these identified issues were subjected to a risk assessment, and how the objectives etc were developed are described in Section 3.5.

Ensure that a range of expertise and community interests are involved in individual fishery management committees and during the stock assessment process.

The range of expertise that has been involved in the process of determining proposed management arrangements and reviewing stock assessments is sufficiently extensive. The groups that have been involved in the generation and review of the information contained in this application include:

- Department of Fisheries, WA;
- WAFIC; and
- Industry Representatives.

As was previously mentioned in the above guideline, information generated from the workshop that was conducted for the Shark Bay Scallop Managed Fishery was used in developing this application. The groups that were involved in the workshop, generation and review of the Shark Bay Scallop fishery (and other trawl fishery) applications included:

- Department of Fisheries, WA;
- Department of Environment, WA;
- DEH
- Department of Conservation and Land Management (CALM), WA;
- The trawling industry;
- WAFIC;
- Recfishwest;
- Conservation Council of WA;
- University of WA; and
- Western Australian Museum.

The general consultation methods used for this fishery are summarised in the Governance Section 5.4.1.5.

Be strategic, containing objectives and performance criteria by which the effectiveness of the management arrangements are measured

The ESD Component Reports (see Section 5) contain the available objectives, indicators and performance measures for measuring the effectiveness of the management arrangements for the SCTF.[2]

For some components, the objectives, indicators and performance measures are well established and the data are available to demonstrate levels of performance over time. For other components, the objectives, indicators and performance measures have only just been developed and/or the necessary data collection is only just being initiated. The status of this information is documented within each of the individual component reports within the National ESD Reporting Framework in Section 5.1-5.4.

Be capable of controlling the level of harvest in the fishery using input and/or output controls

The FRMA, FRMR, Section 43 Orders and the licence conditions for the SCTF provide the legislative ability to control the level of harvest within this fishery. This is primarily achieved through the use of input control measures based upon limiting the number of vessels allowed to operate in the fishery to only four, along with some seasonal spatial closures.

Contain the means of enforcing critical aspects of the management arrangements

The Department of Fisheries, WA employs operational staff to ensure compliance with the critical aspects of the management arrangements for this fishery.

However, the reality is that there are (other than a limit on boat numbers and the Recherche Archipelago closure) currently very few restrictions on scallop trawling effort on the south coast, and therefore little scope for compliance/enforcement activities.

Despite this, a full summary of compliance activities and their effectiveness is provided in Section 5.4.1.3.

[2] It is proposed that these will be collated and formally published as a set of Ministerial Guidelines in the near future.

Provide for the periodic review of the performance of the fishery management arrangements and the management strategies, objectives and criteria

The Department is meeting this guideline through the annual "State of the Fisheries" report and (in time) the five-year review of this document.

There is an annual review of the performance of the major aspects for each fishery through the completion of the "State of the Fisheries" report. This is updated and published each year following a review by the Office of the Auditor General (OAG). It forms an essential supplement to the Department's Annual Report to the WA Parliament with the latest version located on the Departmental website www.fish.wa.gov.au. See Section 5.4.3.1 Assessments and Reviews for more information.

The ESD Component Reports contain a comprehensive performance evaluation of the fishery based upon the framework described in the ESD policy (Fletcher, 2002). This includes the development of objectives, indicators and performance measures for all aspects of this fishery and includes status reports for those components that are not subject to annual assessment. The Department intends to complete and review externally this full assessment, including examination of the validity of the objectives and performance measures every five years.

Be capable of assessing, monitoring and avoiding, remedying or mitigating any adverse impacts on the wider marine ecosystem in which the target species lives and the fishery operates

The Department is meeting this guideline through the development of this report. Capabilities for the assessment, monitoring and avoidance, remedying or mitigating any adverse impacts on the wider marine ecosystem are documented in the "General Environment" Section 5.3. This has been completed through a formal risk assessment analysis of the issues and, where necessary, the development of suitable monitoring programs.

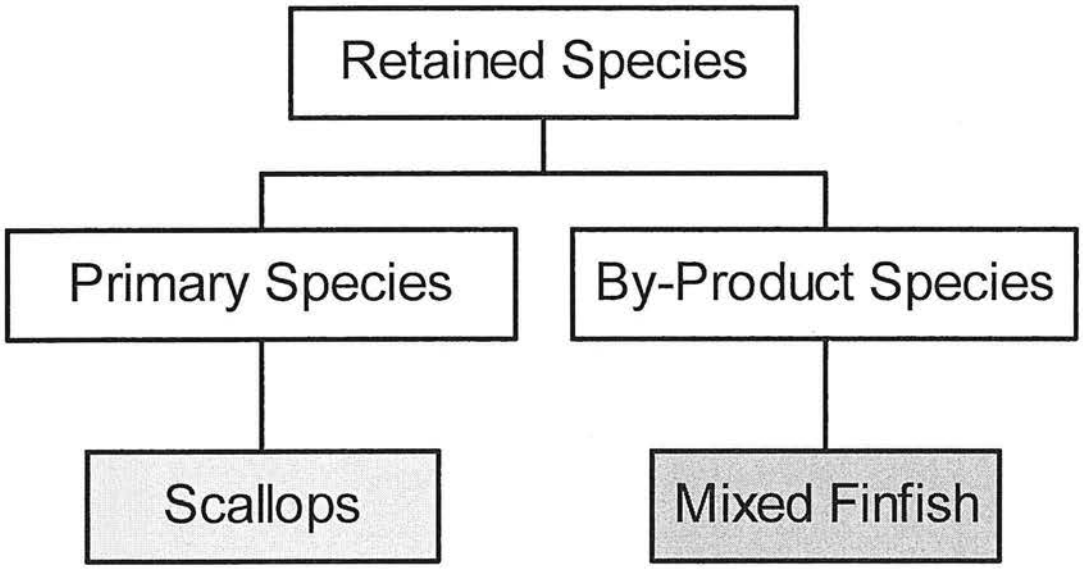
Require compliance with relevant threat abatement plans, recovery plans, the National Policy on Fisheries Bycatch, and bycatch action strategies developed under that policy

The management regime complies with all relevant threat abatement plans for species where there is an interaction. Details are provided in the 'non-retained species' Section of the ESD Report (Section 5.2). In addition, the Department will be developing Bycatch Action Plans based on this material presented in this application for the fishery. This will be circulated to all relevant stakeholders.

PRINCIPLE 1 OF THE GUIDELINES

OBJECTIVE 1. MAINTAIN VIABLE STOCK LEVELS OF TARGET SPECIES

A fishery shall be conducted at catch levels that maintain ecologically viable stock levels at an agreed point or range, with acceptable levels of probability.



The component tree detailing the retained species within the SCTF is shown above. The target species for the fishery is saucer scallop (*Amusium balloti*) and has been assessed with appropriately detailed reports having been compiled. Only the saucer scallop was caught in sufficient quantities by this fishery to warrant detailed attention (Section 5.1.1.1). Only one by-product species group was identified as being retained, mixed finfish. Mixed finfish was given a **Low Risk** rating for the SCTF.

An assessment of the current performance demonstrates that scallops are being maintained above levels necessary to maintain ecologically viable stock levels.

- In the SCTF, exploratory trawling is undertaken by industry members to determine the extent of the annual settlement of scallops, which results in an amount of fishing effort that is undertaken in that year.
- The fishery is limited to four fishing boat licences, which further protects the scallop resources in the area (given the size of the area that may be fished).
- The level of capture of other by-product species by this fishery is considered too small to have a significant impact on their dynamics.

Consequently, this fishery is meeting the requirements of Principle 1.

Information Requirements

1.1.1 There is a reliable data collection system in place appropriate to the scale of the fishery. The level of data collection should be based upon an appropriate degree of fishery independent as well as fishery dependent research and monitoring.

Data is collected through fishery dependent systems, many of which have been in place for decades. These on-going monitoring programs are supported by a long history of research programs on the biology and ecology of scallops along the west coast of WA.

It is planned that the Vessel Monitoring System (VMS) will be required in the South Coast Trawl Fishery. This will help the Department monitor the location of the vessels within the fishery. The new management arrangements are expected to be in place within the next few years.

The specific data requirements needed to assess performance for each of the relevant objectives are detailed in the relevant sections of the ESD reports in Section 5.1 Retained Species. The requirements are summarised as follows:

Monitoring Program	Information Collected	Robustness[1]
CAESS returns	Monthly catch and days fished. Available since 1987 for the SCTF.	Moderate
Processor unload records	Scallop landings	High
Climatic data	Monthly Fremantle Sea Level data- used to estimate strength of Leeuwin Current; Rainfall data; Wind data and Swell Height Conditions	High

Assessments

1.1.2 There is a robust assessment of the dynamics and status of the stock dynamics and status for the target species. Review should ideally take place every year, and no greater than three years should elapse between reviews.

The status of scallop breeding stocks and intra-annual variation are assessed and evaluated every year using a synthesis of information obtained from the fishery. A review of the performance for the fishery is conducted at least once a year. This review includes an assessment of the total catch by the fishery, the level of effort to take the catch, the distribution of effort temporally across the season and the calculated catch rates. This assessment is reported annually within the State of the Fisheries Report.

Full details of the current evaluation and a discussion of the robustness of the analyses used are located in 5.1.1.1. These assessments are reported annually within the State of the Fisheries Report.

1.1.3 The distribution and spatial structure of the stock(s) has been established.

The distribution of this species of scallop has been well documented, occurring from Esperance to Broome with a number of locations where there are commercial abundances in Western Australia (see also Figure 3 located in the Background Section). Additionally, *Amusium balloti* occurs from Queensland to New South Wales in eastern Australia. It is also commercially harvested in the eastern states but the distribution of the east and west populations of the saucer scallops are separated across the northern Australian waters (see Section 2.1 for more information).

1.1.4 There are reliable estimates of all removals, including commercial (including discards), recreational and indigenous, from the fished stock. These estimates have been factored into stock assessments and target species catch levels.

Within the list of monitoring programs outlined above for the fishery, data covering each of these sources of removal are outlined. Given the nature of this fishery, only the estimates of removals by the commercial sector are required and these are collected on a daily to monthly basis during the fishing season. There are no recreational or indigenous fisheries for scallops in the South Coast region. Furthermore, there is a minimal likelihood of a significant level of illegal capture of scallops by the commercial fleet.

Sector	Catch Data Collected	Frequency
Commercial	Fishers monthly returns, Processor unload records.	Daily or monthly during the season.
Recreational	N/A	N/A
Indigenous	N/A	N/A
Illegal	N/A	N/A

1.1.5 There is a sound estimate of the potential productivity (maximum safe long term yield) of the fished stock/s.

In the SCTF fishing is very much dependent on the amount of annual settlement with exploratory trawling determining the amount of fishing effort undertaken in any year. The SCTF has also undergone a wide fluctuation in scallop abundance with the 2000 season providing the highest catch of scallops (544 tonnes, meat weight) in the State (Figure 7). This was the highest catch in the history of this fishery. It is believed optimal environmental conditions provided for successful settlement and survival of scallops in the region. In subsequent years, catches have been lower than 2000 but still higher than the average from the harvesting of the residual stock and additional local settlement.

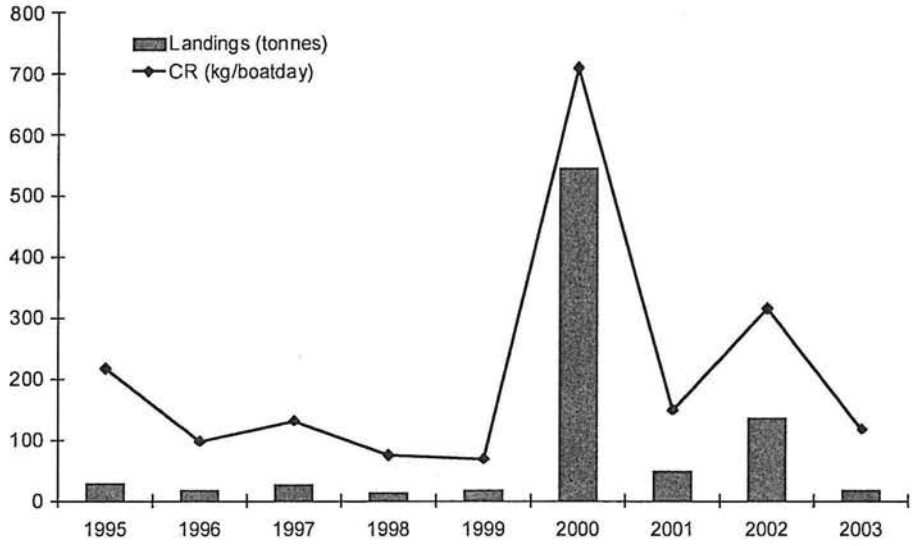


Figure 7 Scallop catch and catch rate history of the SCTF, 1995-2003.

Management Responses

1.1.6 There is a limit reference point, which is the biological and/or effort bottom line beyond, which the stock should not be taken.

The annual effort expended in this fishery is an outcome of initial fishing surveys used by operators to estimate stock abundance and likely benefits of continued fishing. For the SCTF, the amount of fishing that takes place annually is economically driven with fishers stopping at around 150 kg/day.

1.1.7 There are management strategies in place capable of controlling the level of take.

A full discussion of the main regulations and their justifications are located in Section 2.2. This fishery is currently managed by non-transferable licence conditions issued to *Fisheries Notice No. 287* of October 1987 and Fisheries Notice No. 586 (*Trawling for Scallops, South Coast, Notice*) of December 1992. Current management measures in the fishery include:

- Closed season during from 1 December to 1 March for waters in the scallop zone within the Recherche Archipelago. There are no seasonal closures currently applied to scallop trawling in areas outside of the Archipelago.
- The fishery is limited to 4 licences.

The management measures for this fishery are currently being reviewed with the intention of strengthening and improving the current management measures.

1.1.8 Fishing is conducted in a manner that does not threaten stocks of by-product species.

The relatively small area of practical operation of this fishery (over sand habitat) combined with the short time the fishery operates (only a few months per year), the small number of operators (four), the large mesh size used and the slow speed of trawling results in this fishery only catching relatively small amounts of by-product species. Full descriptions of the information available and the levels of risk of impact on these by-product species from the fishery are located in section 5.1.2.1. None of the by-product species were rated as having sufficient risk to require specific ongoing monitoring other then the monthly return information on landed catches.

Mixed Finfish- Summary
ERA Risk Rating (C1 L6 LOW)

The overall take in this fishery in the last five years is small (<10% of total) compared to the take by all fisheries. Those species reported as landed in excess of one tonne per year are generally caught using mid-water fish trawl gear, not scallop demersal trawl gear (Tables 5 and 6). Most of these species are caught in a different habitat (between 100-200 m isobath) to that of scallop catches (generally less than 40 m depth) (*Dr. R. Lenanton, Department of Fisheries, pers. comm.*).

Table 5 Landings (kilograms) of by-product species in the SCTF 1990-1997.

Species	1990	1991	1992	1993	1994	1995	1996
Flathead (Platycephalidae)	6136	3237	10954	10515	149		40
Footballer *Microcanthus strigatus*	955	1656	1259	641			
Gurnard (Triglidae)	883	1112	1388	1346	101		
Leatherjacket (Monocanthidae)					2208		
Blue Mackerel (*Scomber australasicus*)	711	767	511	762			
Redfish (*Centroberyx* sp.)	35123	12461	22958	37940	2199		
Shark, other	7389	45271	16917	8262	323		
Queen snapper (*Nemadactylus valenciennesi*)	207	790	227	370	1337		
Trevally (Carangidae)	1619	3504	4023	5162			

Table 6 Landings (kilograms) of by-product species in the SCTF 1998-2003.

Species	1997	1998	1999	2000	2001	2002	2003
Flathead (Platycephalidae)		223	39	9	19	42	28
Footballer *Microcanthus strigatus*		505				130	
Gurnard (Triglidae)		151	74	88	791	49	
Leatherjacket (Monocanthidae)		5154	2535	3246	10424	1826	38
Blue Mackerel (*Scomber australasicus*)			10104		24	8440	
Redfish (*Centroberyx* sp.)		1137	3077	5988	2598	3184	106
Shark, other		552	363		124	232	42
Queen snapper (*Nemadactylus valenciennesi*)		104	462	767	2929	968	3

Trevally (Carangidae)		4			285	3762	

1.1.9 The management response, considering uncertainties in the assessment and precautionary management actions, has a high chance of achieving the objective.

Management actions taken over the past 17 years have been effective in maintaining the scallop spawning biomass for the fishery. There is, therefore, an extremely high probability that they will continue to do so.

Strategies which are readily available to offer further protection to the breeding stock for both fisheries if required include:

a. Changes to the timing of the start of the fishing season.
b. Reduction in the length of the fishing season.
c. Area closures.

The current mechanisms to implement these changes would involve either a modification of the condition on the licence or an amendment to the order relating to the fishing activity.

OBJECTIVE 2. RECOVERY OF STOCKS

Where the fished stocks are below a defined reference point, the fishery will be managed to promote recovery to ecologically viable stock levels within nominated timeframes.

There are no stocks within this fishery that are currently below defined reference points/limits as at the moment there are no defined reference points. However, despite this, because of the apparent lack of a stock-recruitment relationship, defined reference points (at least for breeding stock levels) are of little relevance for scallops.

PRINCIPLE 2 OF THE COMMONWEALTH GUIDELINES

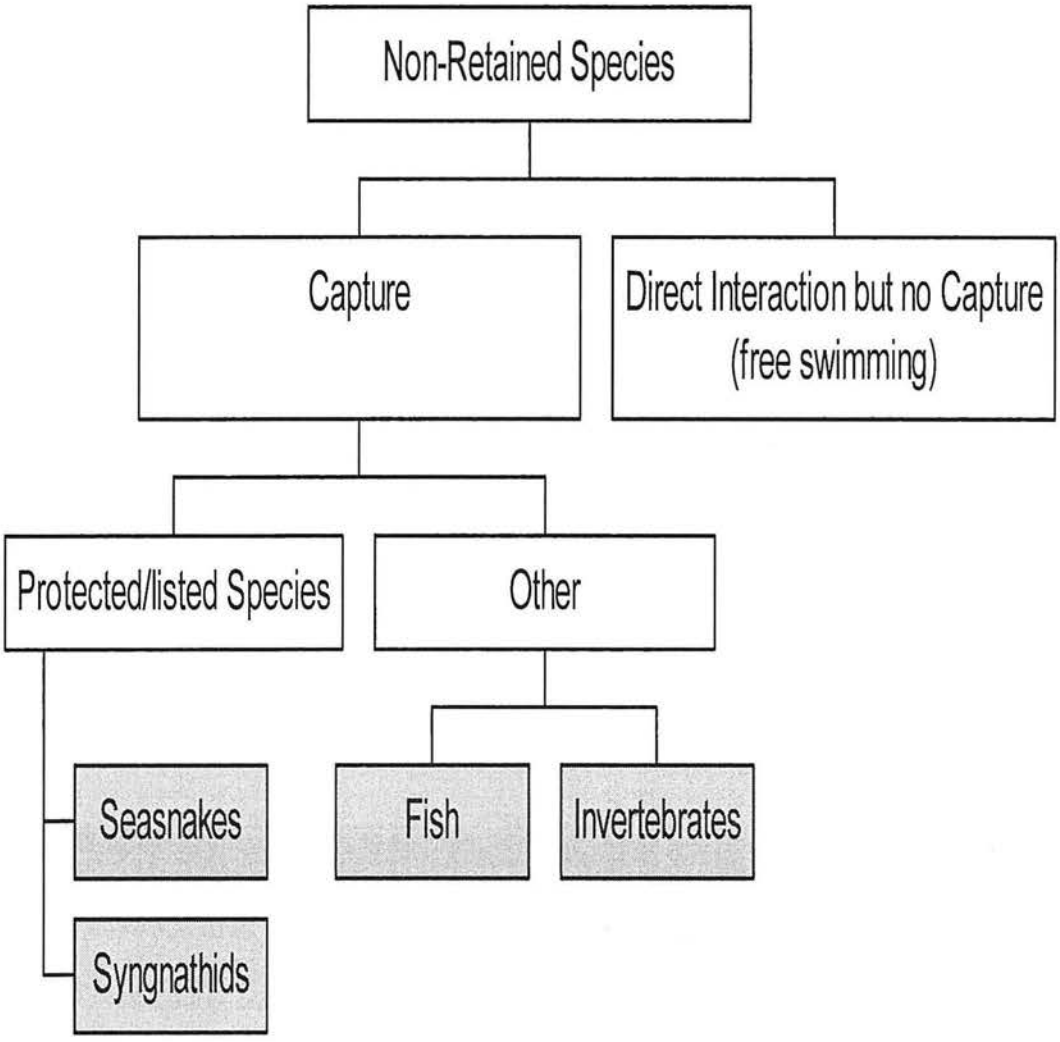
OBJECTIVE 1. BYCATCH

The fishery is conducted in a manner that does not threaten bycatch species.

There is limited information regarding the historical level and nature of bycatch in the fishery. Researcher observations in the Shark Bay Scallop Managed Fishery (SBSMF) indicate that the bycatch numbers are relatively lower in scallop trawling fisheries than prawn trawling due to the larger mesh size nets used, clumped distribution of the scallops and lower trawling speeds. All the bycatch species

identified by the component tree were ranked as either negligible or low risks. Three of the species are not actually captured in the net but on rare occasions interact with the trawling operations. The protected species components of this group (eg syngnathids and seasnakes) are covered in objective 2.2; the remaining non-retained (bycatch) species are covered under objective 2.1.

Comprehensive reports on each of these bycatch (non-retained) species are presented in Section 5.2 NON-RETAINED SPECIES. These assessments indicate that the performance of the fishery is currently adequate in not threatening any of the bycatch (non-retained) species and is therefore meeting objectives 1 and 2 of Principle 2.



Information Requirements

2.1.1 Reliable information, appropriate to the scale of the fishery, is collected on the composition and abundance of bycatch.

There is limited information on the nature and volume of bycatch species for both fisheries. Information has come from data that has been collected in other similar fisheries such as the SBSMF. In July 2000, a two-year FRDC funded research

program on the implementation of bycatch reduction devices began. This included an observer program designed to record, identify and quantify bycatch in the SBSMF. The information gathered in this research program has been utilised in the assessment for this fishery.

Assessments

2.1.2 There is a risk analysis of the bycatch with respect to its vulnerability to fishing.

A formal risk assessment for each of the identified non-retained/bycatch species (including those with direct interaction but no capture) was completed (see Section 3.4 for details). In the capture category for non-retained species, this assessment concluded that the fishery was a negligible risk to discarded fish and invertebrates.

Discarded Fish – Summary
ERA Risk Rating (C0 L5 NEGLIGIBLE)

Since trawling is a non-selective form of fishing other species such as adult small species and juveniles of other larger fish are caught. Since these fish are generally not of commercial value, they are discarded overboard. Teleost species caught are generally dead when discarded however elasmobranchs are usually returned alive. It is generally agreed that the extent of bycatch generated from scallop trawling is relatively minimal compared to that generated by prawn trawling.

The reason for the low amount of discards is threefold. Firstly, the larger 100 mm mesh size used on the scallop nets (designed to avoid the capture of prawns and reduce the catch of small scallops) allow a large proportion of fish to escape from the net, meaning that very few fish that enter the net are retained. Secondly, the clumped distribution of scallops allows trawlers to target aggregations of scallops without collecting high numbers of non- targeted species. Thirdly, the lower trawling speed (3 knots) probably allows some of the stronger swimming species to escape via the mouth of the net. For full details see 5.2.1.5.

Invertebrates – Summary
ERA Risk Rating (C0 L5 NEGLIGIBLE)

The configuration of the trawl gear and the mesh size largely precludes the capture of invertebrate species living on or in the substrate. This design minimises the capture of invertebrates other than scallops. Consequently, the Risk Assessment concluded that this fishery would only have a negligible impact on each of these species. For full details see 5.2.1.6.

Management Responses

2.1.3 Measures are in place to avoid capture and mortality of bycatch species unless it is determined that the level of catch is sustainable (except in relation to endangered, threatened or protected species). Steps must be taken to develop suitable technology if none is available.

The combination of seasonal and area closures and the relatively small area trawled in plus the limited number of licences (four) in which this fishery operates within greatly reduces the impacts on all of these affected species.

2.1.4 An indicator group of bycatch species is monitored.

The minimal risks associated with this group of non-retained species, results in it being unnecessary to monitor any of these species on a regular basis.

2.1.5 There are decision rules that trigger additional management measures when there are significant perturbation in the indicator species numbers.

The risks associated with this group of species will be reassessed at the next major review of this fishery. This will occur within five years as a requirement of the WA ESD policy.

2.1.6 The management response, considering uncertainties in the assessment and precautionary management actions, has a high chance of achieving the objective.

There are relatively low levels of interactions of the fishery with non-retained species due to the small number of licences and licence area. It is likely that there will continue to be only minimal and acceptable levels of impact on non-retained species.

OBJECTIVE 2. PROTECTED/LISTED SPECIES

The fishery is conducted in a manner that avoids mortality of, or injuries to, endangered, threatened or protected species and avoids or minimises impacts on threatened ecological communities.

Information Requirements

2.2.1 Reliable information is collected on the interaction with endangered, threatened or protected species and threatened ecological communities.

As previously mentioned, there is limited direct information available on the nature and volume of bycatch species for the fishery. Information has come from data that has been collected in other similar fisheries such as SBSMF. These results have been utilised in the assessment of this fishery.

Assessments

2.2.2 There is an assessment of the impact of the fishery on endangered, threatened or protected species.

A formal risk assessment for each of the identified non-retained/bycatch species (including those with direct interaction but no capture) was completed (see Section 3.4 for details). In the capture category for non-retained species, this assessment concluded that the fishery was a low risk to syngnathids and a negligible risk to seasnakes.

Capture

Syngnathids – Summary
ERA Risk Rating (C1 L2 LOW)

Syngnathids are occasionally incidentally caught in this fishery and are generally discarded, presumed to be dead. A full rationale for the low risk rating for syngnathids is documented in section 5.2.1.1.

Seasnakes – Summary
ERA Risk Rating (C0 L5 NEGLIGIBLE)

Five species of seasnakes have been recorded as far as the lower west coast, including the Shark Bay seasnake, *Aipysurus pooleorum,* which is endemic to the region. Only one species of seasnake has been recorded as far as the south coast of Western Australia, namely the yellow bellied seasnake, *Pelamis platura* (Storr et al., 2002). The South Coast Trawl Fishery is not known to interact with sea snakes.

Direct Interaction but no Capture

2.2.3 There is an assessment of the impact of the fishery on threatened ecological communities.

There are no threatened ecological communities associated with this fishery.

Management Responses

2.2.4 There are measures in place to avoid capture and/or mortality of endangered, threatened or protected species.

As previously mentioned above in 2.1.3, it is expected that the quantity and likelihood of bycatch captures will not increase, unless there is a significant change in fishing practices away from scallops to finfish.

2.2.5 There are measures in place to avoid impact on threatened ecological communities.

Not applicable.

2.2.6 The management response, considering uncertainties in the assessment and precautionary management actions, has a high chance of achieving the objective.

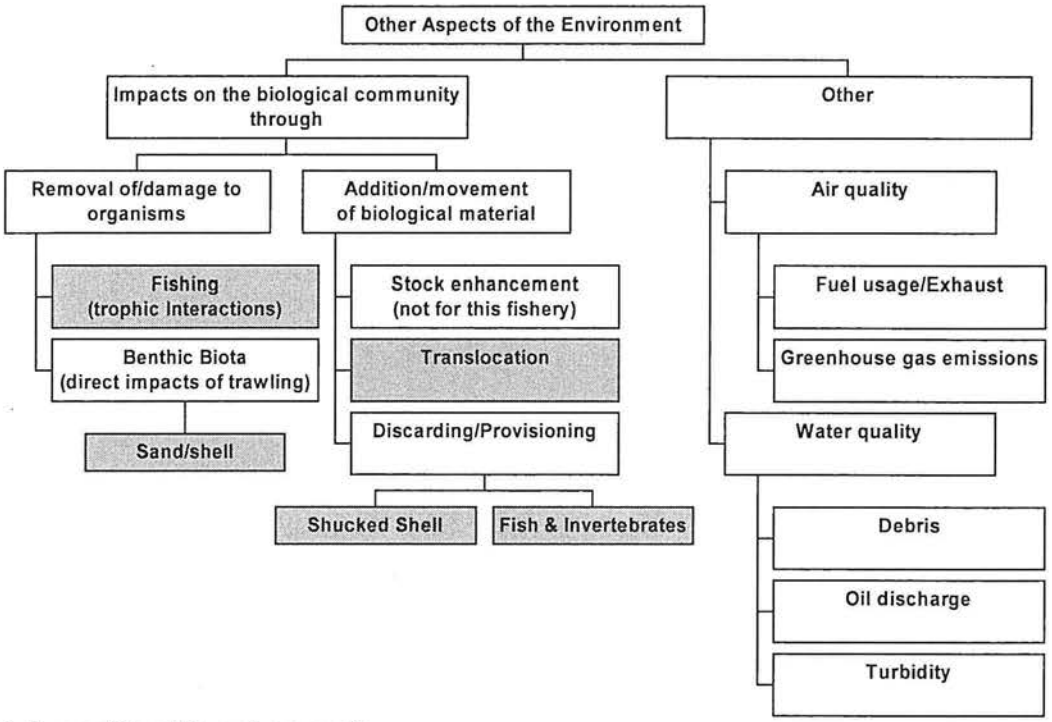
Given the relatively low levels of interactions of this fishery with non-retained species and the small number of operators within the fishery, it is likely that the current situation of only having minimal and acceptable levels of impact on these threatened species by the fishery will continue or diminish further. Nonetheless, as monitoring data becomes more available, the suitability of the current performance limits may need to be reviewed. If they are inappropriate and/or the level of interactions increases, appropriate alterations to practices will be taken.

OBJECTIVE 3. GENERAL ECOSYSTEM

The fishery is conducted, in a manner that minimises the impact of fishing operations on the ecosystem generally.

The issues that relate to the broader ecosystem identified for the fishery are shown in the following component tree. A formal risk assessment process subsequently assessed each of these issues with the information relating to each issue detailed in Section 5.3.

Of the six issues identified for the SCTF, three (trophic interactions, impacts on sand/shell, and discarded fish) were rated as low risk, two (translocation and discarding scallop shells) were rated as negligible. Consequently, the current performance for the fishery is meeting Objective 3 and this acceptable performance is likely to at least continue or improve in the future.



Information Requirements

2.3.1 Information appropriate for the analysis in 2.3.2 is collected and/or collected covering the fisheries impact on the ecosystem and environment generally.

Appropriate levels of information have been obtained for most of the issues identified, which has allowed for a sensible assessment of the level of risk to be determined. This information includes data directly related to the fishery in terms of the stock assessment and status of scallop stocks, levels of catch and effort, gear designs, area swept by the fleet and understanding of spatial and temporal closures. There are a number of research publications that provide valuable evidence on the effects of otter-

trawling on sand communities, and trophic structures in similar fisheries/environments in other parts of Australia and elsewhere. Consequently, the levels of information available for most issues identified allowed a sensible assessment of the level of risk to be determined.

Assessments

2.3.2 Information is collected and a risk analysis, appropriate to the scale of the fishery and its potential impacts, is conducted into the susceptibility of each of the following ecosystem components to the fishery.

A formal risk assessment was completed (see Section 5.3 for details) on each of the identified issues relevant to the fishery (see component tree for issues). The identified issues that were assessed and a summary of the outcomes are located in Table 7 – complete justifications are located in the performance reports in Section 5.3.

Table 7 Summary of risk assessment outcomes for environmental issues related to the SCTF.

ISSUE	RISK	SUMMARY JUSTIFICATION	FULL DETAILS
TROPHIC INTERACTIONS			
Impact of taking retained and non-retained species from the environment	**Low**	**The total level of biomass (excluding shell) taken by this fishery is very small. None of the species taken are known to be an exclusive food source for any predator and no predators are taken in any quantity.**	**5.3.1.1**
IMPACTS ON BENTHIC BIOTA:			
Sand/shell	Low	The fishers operate over very small proportions of the licence areas in the fishery and therefore few areas are impacted from trawling. Studies elsewhere have shown only minor and short-lived damage from this type of trawling in sandy areas. **Furthermore,** trawling occurs for a maximum of 3 months in the SCTF which allows for the sandy bottom habitats to recover, if needed.	**5.3.1.2**
ADDING OR MOVING MATERIAL			
Translocation	Negligible	The Leeuwin Current provides a natural connection between the trawling grounds and Fremantle (where most vessels go to for seasonal maintenance).	5.3.2.1
Discarding fish (provisioning)	Low	The low number of fish discards combined with the low number of operators and the large area over	5.3.2.2

		which the organisms are discarded results in any impacts being diffused.	
Discarding Scallop Shells	Negligible	The SCTF now uses mostly large boats and covers large areas thus allowing the discarded shells to be spread out over the fishery area.	5.3.2.3

Thus, all of these issues were rated as NEGLIGIBLE or LOW risk.

Management Responses

2.3.3 Management actions are in place to ensure significant damage to ecosystems does not arise from the impacts described in 2.3.1.

The most important management action that ensures there is minimal impact on the broader ecosystem is to ensure that there is an adequate level of spawning stock to ensure recruitment is not affected by spawning stock abundance. Furthermore, while scallops are filter feeders, removing small organic material and particulates from the surrounding water, they are only one of a large number of such feeders in this region. Furthermore, they are not the sole prey for any species. It should also be noted that recruitment and stock abundance are highly variable from year to year and therefore the ecosystem does not depend on relatively static levels of scallop stock abundance. Consequently, ensuring adequate levels of spawning stock serves to achieve two objectives (eg a sustainable fishery and minimising impacts on any trophic interactions). Other management measures such as gear restrictions, spatial and seasonal closures and limiting the number of operating vessels also further minimise the potential for impacts on bycatch species and other indirect impacts. In addition, planned future research will help to further minimise the potential for impacts in the future by expanding our knowledge of the broader ecosystem.

2.3.4 There are decision rules that trigger further management responses when monitoring detects impacts on selected ecosystem indicators beyond a predetermined level, or where action is indicated by application of the precautionary approach.

None of the issues were found to be of sufficient risk to require specific target levels as they are effectively covered by the other management arrangements and trigger points (e.g. recruitment level of scallops).

2.3.5 The management response, considering uncertainties in the assessment and precautionary management actions, has a high chance of achieving the objective.

Given the risk assessment identified that under current management arrangements there have been minimal or negligible impacts from the fishery on the broader ecosystem even after around many years of fishing, it is highly likely that the fishery will continue to meet the objectives of having acceptable levels of impact. If future studies indicate that further management is required for various habitat types and the composition and abundance of by-product and/or bycatch species, then appropriate actions will be developed.

OVERVIEW TABLE

The following table provides a summary of the material presented in the report.

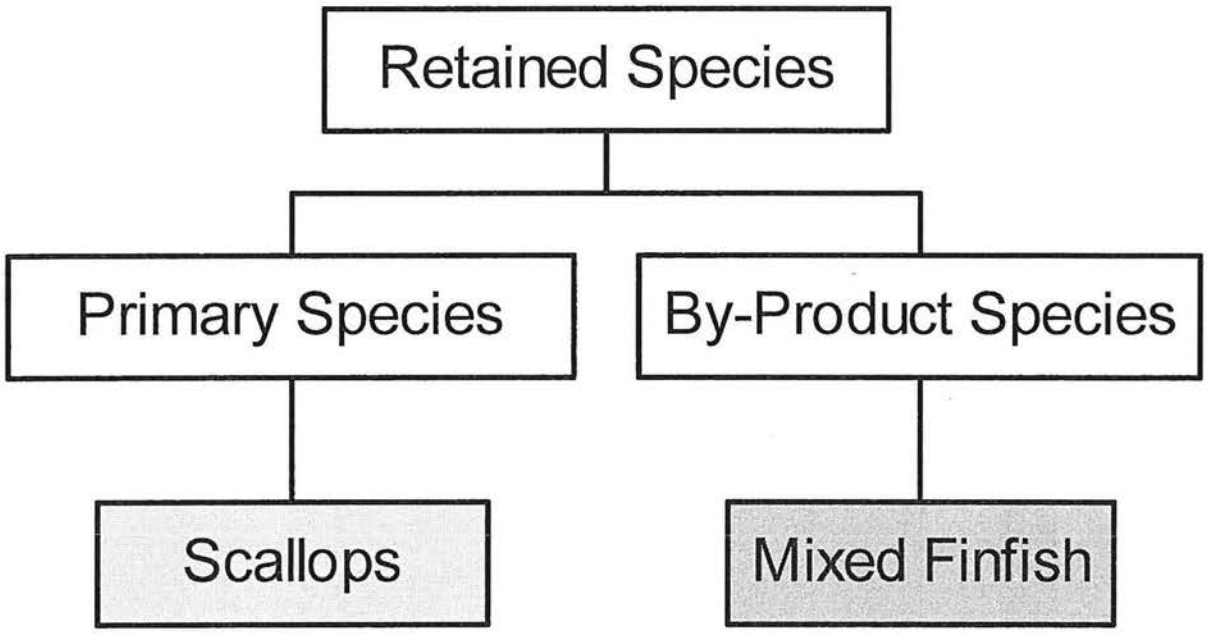
Issue	Objective Developed	Indicator Measured	Performance Measure	Current Performance	Robustness	Guidelines Covered	Actions
RETAINED SPECIES (Component Tree)						1.1	
5.1.1.1 Scallops	Yes although Low Risk	Amount of annual settlement	Fishing effort determined through exploratory trawling. Fishers stop around 70kg/day.	Acceptable	Low	1.1.1 – 1.1.7	Continue and improve current monitoring, management and assessment arrangements.
5.1.2.1 Mixed Finfish	No- Low Risk	N/A	N/A	N/A	N/A	1.1.8	Review Risk at Next Major Assessment.
NON-RETAINED SPECIES (Component Tree)						2.1 & 2.2	
5.2.1.1 Syngnathids	No- Low Risk	N/A	N/A	N/A	N/A	2.2.1 – 2.2.6	Review Risk at Next Major Assessment.
5.2.1.2 Seasnakes	No- Negligible Risk	N/A	N/A	N/A	N/A	2.2.1 – 2.2.6	Review Risk at Next Major Assessment.
5.2.1.3 Discarded Fish	No- Negligible Risk	N/A	N/A	N/A	N/A	2.1.1 - 2.1.6	Review Risk at Next Major Assessment.
5.2.1.4 Invertebrates	No- Negligible Risk	N/A	N/A	N/A	N/A	2.1.1 – 2.1.6	Review Risk at Next Major Assessment.

Issue	Objective Developed	Indicator Measured	Performance Measure	Current Performance	Robustness	Guidelines Covered	Actions
GENERAL ENVIRONMENT (Component Tree)						2.3	
5.3.1.1 Trophic Interactions	No- Low Risk	N/A	N/A	N/A	N/A	2.3.1 – 2.3.5	Review Risk at Next Major Assessment.
5.3.1.2 Impact to Sand and Shell	No- Low Risk	N/A	N/A	N/A	N/A	2.3.1 – 2.3.5	Improve management when VMS implemented.
5.3.2.1 Translocation	No – Negligible Risk	N/A	N/A	N/A	N/A	2.3.1 – 2.3.5	Review Risk at Next Major Assessment.
5.3.2.2 Discarding/Provisioning	No- Negligible Risk	N/A	N/A	N/A	N/A	2.3.1 – 2.3.5	Review Risk at Next Major Assessment.
5.3.2.3 Discarding Scallop Shells	No- Negligible Risk	N/A	N/A	N/A	N/A	2.3.1 – 2.3.5	Review Risk at Next Major Assessment.

5. PERFORMANCE REPORTS

5.1 RETAINED SPECIES

COMPONENT TREE FOR RETAINED SPECIES OF THE SCTF



Yellow boxes indicate that the issue was considered high enough risk to warrant having a full report on performance. Blue boxes indicate the issue was rated as a low risk and no specific management is required – generally only the justification is presented.

5.1.1 PRIMARY SPECIES

5.1.1.1 SCALLOPS

Rationale for Inclusion:

The Western saucer scallops (*Amusium balloti*) is the only target species for the SCTF.

ERA Risk Rating: Impact on breeding population (C2 L3 LOW)

For the SCTF it was also determined that fishing for scallops may only have a 'moderate' impact on the breeding population level. This consequence was considered 'unlikely' to occur due to the small number of licenses in the fishery. The overall risk rating is therefore 'low'.

Operational Objective

Ensuring there is sufficient breeding stock at the time of spawning to minimise the risk of recruitment overfishing.

Justification:

Scallops can be fished to reasonably low levels due to their life history strategies of short life span, high fecundity and high natural mortality. For the SCTF, the fishery is closed during a part of the spawning season (December to March) and the overall fishing effort is generally low except in high settlement years, which are environmentally driven.

Indicator

In the SCTF, fishing is very much dependent on the amount of annual settlement with exploratory trawling determining the amount of fishing effort undertaken in any year.

Performance Measure

End of season assessment of catch rates for the year. In the future it may be appropriate to set a catch rate threshold at which fishing ceases for the season as is in place in other scallop fisheries. This value of this level needs to be determined through consultation with licensees.

Justification:

For the SCTF, the amount fishing that takes place annually is economically driven with fishers stopping at around 150 kg/day.

Data Requirements for Indicator

Data Requirement	Availability
Monthly commercial CAESS returns	Yes, available since 1987

Evaluation

Summary: The management arrangements provide adequate protection of the spawning stock as fishing effort is limited by economic viability in the SCTF.

Scallop landings for the SCTF have varied considerably over the last 17 years (Figure 8) depending primarily on the strength of recruitment. Recruitment strength is largely independent of spawning stock size being environmentally driven (see external drivers section below).

The SCTF has undergone a wide fluctuation in scallop abundance with the 2000 season providing the highest catch of scallops (544 tonnes, meat weight) in the State. This was the highest catch in the history of this fishery. It is believed optimal environmental conditions provided for successful settlement and survival of scallops in the region. In subsequent years, catches have remained at a lower (than 2000) but higher than average with harvesting of residual stock and additional local settlement.

In 2002 scallop landings for the SCTF were 669 tonnes (whole weight), which is the second only to the very high, catch of 2,722 t (whole weight) recorded in 2000.

Robustness

Low

Fisheries Management Response

Current: The SCTF is managed through Section 43 Orders and fishing boat licence conditions on a limited number of fishing boat licences.

Furthermore, the Department of Fisheries management arrangements include:

- Compliance policing.
- Monitoring of improvements in technology that may increase fishing efficiency.
- Ensuring that any significant declines in the breeding population either from environmental effects or due to fishing are observed in time to implement appropriate management interventions.

Future: The Department has developed a management discussion paper for this fishery that will bring the scallop component of the fishery under very similar management arrangements as the other scallop trawl fisheries in the State. Proposed management arrangements include:

- Gear restrictions;
- Boat size restrictions;
- Area closures (particularly near major population centres);
- The capacity to close various parts of the fishery from time to time (i.e. the introduction of fishing season); and
- Unitisation of the fishery, and the capacity to adjust unit values as appropriate.

The discussion paper is currently being printed and will be released for public comment in the near future.

Actions if Performance Limit Exceeded:

1. Strategies available to offer further protection to the breeding stock if required include:
   a) changes to the timing of the start of fishing season,
   b) a reduction in the length of the fishing season, and

c) area closures.

Comments and Actions

There is a process of continual improvement in the on-going development and refinement of the methods used to determine stock estimates. This relates to both the collection of information and method of analysis.

External Driver Check List

Environmental factors such as: climatic changes, ocean currents, often measured using sea-surface temperature patterns, are known to affect the levels of recruitment of scallops.

The risk factors in the context of external drivers are probably the potential for significant environmental pollution (i.e. oil or chemical spills in key breeding areas) or habitat degradation. Major changes in circulation patterns caused by different climatic forces would have an impact on recruitment patterns.

5.1.2 BY-PRODUCT SPECIES

5.1.2.1 MIXED FINFISH

Rationale for Inclusion:

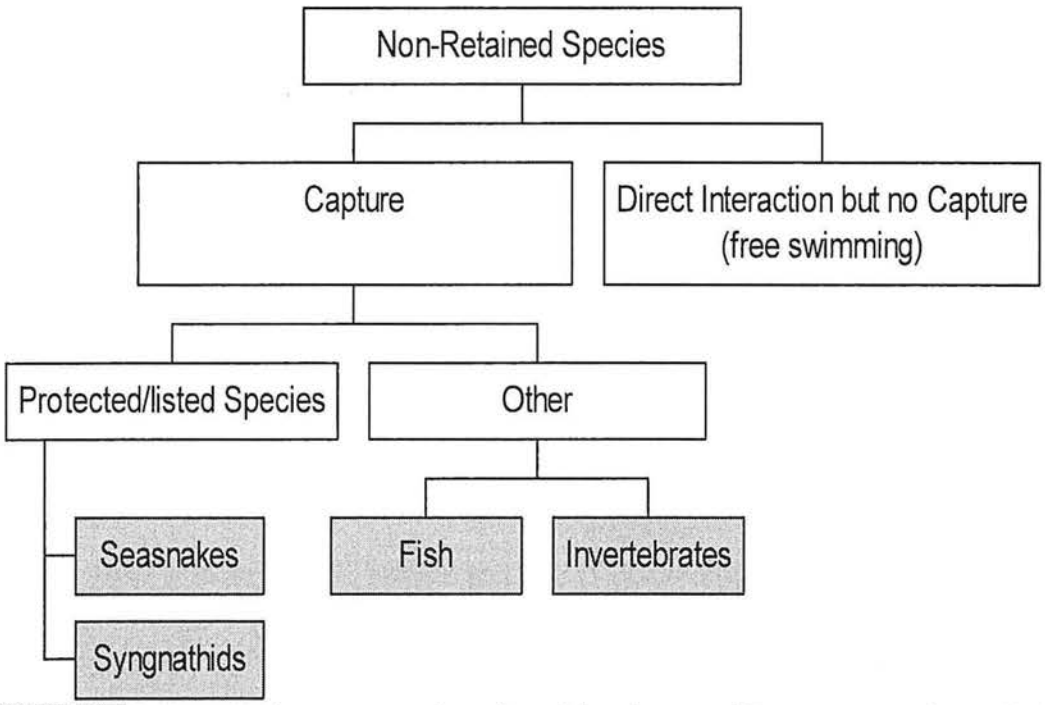
Mixed finfish species are also retained in the SCTF.

ERA Risk Rating: Impact on breeding stock (C1 L6 LOW)

The overall take in this fishery in the last five years is small (<10% of total) compared to the take by all scallop fisheries. Those species reported as landed in excess of one tonne per year are shown in Table 7. These species would generally be caught using mid-water fish trawl gear, not scallop demersal trawl gear. Most of these species would be caught in a different habitat (between 100 –200m isobath, *Dr. R Lenanton, Department of Fisheries, pers. comm.*) to that of scallop catches (generally less than 40 m depth). At current levels of effort fishing activity is unlikely to have any major impact on the breeding stocks of these species. It appears in some earlier years (early 1990's) more fishing effort was directed at some fish species (Tables 5 and 6).

5.2 NON-RETAINED SPECIES

COMPONENT TREE FOR NON-RETAINED SPECIES OF THE SCTF



Blue boxes indicate the issue was rated as a low risk and no specific management is required – only the justification is presented.

5.2.1 CAPTURED IN NETS

5.2.1.1 PROTECTED SPECIES SYNGNATHIDS

Rationale for Inclusion:

Syngnathids are the collective group containing organisms such as seahorses, sea dragons and pipefish. Syngnathids are occasionally incidentally caught in the SCTF and are generally discarded, presumed to be dead. Catch rates of all small finfish bycatch are low due to the 100 mm mesh size. Results from an observer program in the Shark Bay Scallop fishery suggests that very low numbers of syngnathids are caught in the order of 1 per night across the entire fleet of 14 boats). The number caught by the south coast scallop fleet is likely to be lower than this, given the larger mesh sizes, slower speeds used by the fleet and smaller fleet size. Syngnathids protected under the EPBC Act.

ERA Risk Rating: Impact on breeding population (C1 L2 LOW)

The potential consequence of the scallop trawling operations on breeding levels of syngnathids was considered 'minor'. Due to the relatively short fishing season low numbers of syngnathids would be caught. It was considered 'unlikely' that this level of consequence would result, as trawling occurs over areas that are mostly unfavourable to syngnathids, which are known to favour seagrass and detached algal communities.

5.2.1.3 DISCARDED FISH

Rationale for Inclusion:

Trawling is a relatively non-selective form of fishing. As a result, while trawling for scallops, other species are caught. Among these other species are small fish (which include both adults of small species, and juveniles of other larger fish species). These fish are generally not of commercial value and are discarded. Teleost species caught are generally dead when discarded however elasmobranchs are usually returned alive.

The impact of this source of mortality on the sustainability of those caught and discarded species is explored here.

ERA Risk Rating: Impact on breeding population (C0 L5 NEGLIGIBLE)

It is generally agreed that the extent of bycatch generated from scallop trawling is relatively minimal compared to that generated by prawn trawling.

The reason for the low amount of discards is threefold. Firstly, the larger 100 mm mesh size used on the scallop nets (designed to avoid the capture of prawns and reduce the catch of small scallops) allows a large proportion of fish to escape from the net, meaning that very few fish that enter the net are retained. Secondly, the clumped distribution of scallops allows trawlers to target aggregations of scallops without collecting high numbers of non- targeted species. Thirdly, the lower trawling speed (3 knots) probably allows some of the stronger swimming species to escape via the mouth of the net.

Since the number of individuals discarded is minor, it was determined 'likely' that this would have a 'negligible' impact on the breeding populations of those species.

5.2.1.4 INVERTEBRATES

Rationale for Inclusion:

Trawl gear interacts with the sea bottom where many of these species reside, and therefore there is a necessity to investigate this issue.

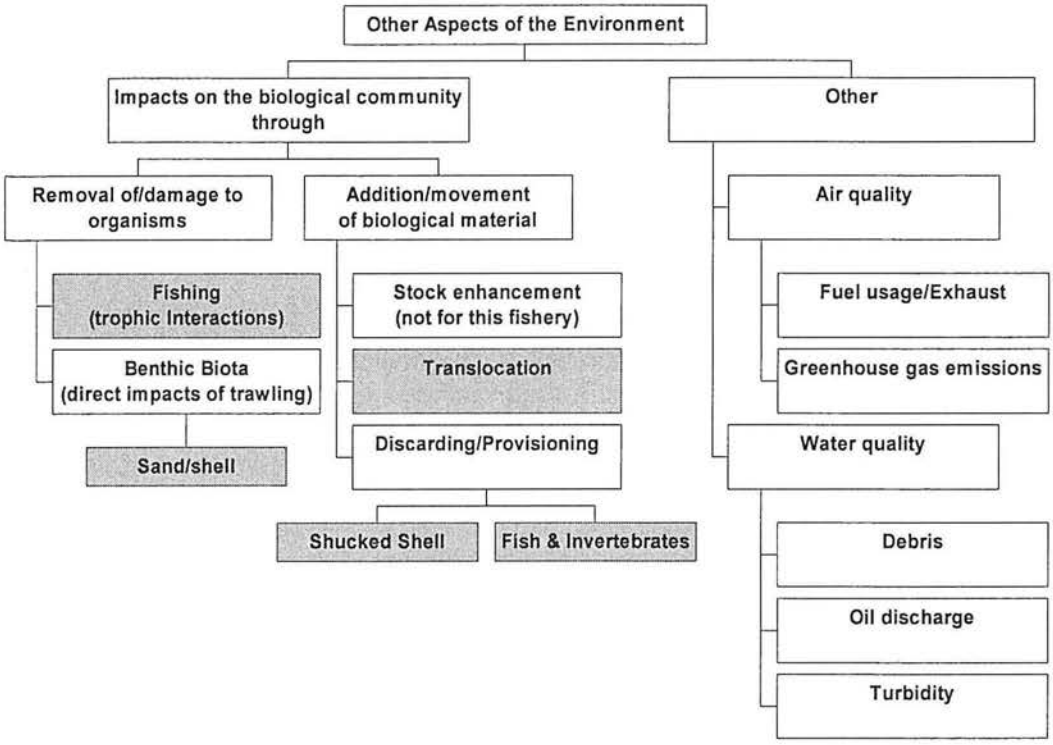
ERA Risk Rating: Impact on breeding population (C0 L5 NEGLIGIBLE)

It was only considered 'possible' that the SCTF could even have a 'negligible' impact on invertebrate breeding populations in the South Coast region. This low ranking is due to the following:

- The trawl gear is configured in a manner that largely precludes the capture of invertebrate species living on or in the substrate. The gap of approximately 150 to 300 millimetres between the ground chain and the footrope of the net is designed to reduce damage to the net through contact with the ground. This specifically serves to minimise the capture of immobile and slow moving benthic organisms (and inanimate objects), as they pass through the gap between the ground chain and the footrope. By contrast, mobile species (such as scallops and prawns) are stimulated to swim by the ground chain and move up into the water column above the footrope and are subsequently caught in the net.
- Some large immobile organisms and inanimate objects may also be 'flicked' up into the water column by the ground chain and subsequently captured in the net.

5.3 GENERAL ENVIRONMENT

COMPONENT TREE FOR GENERAL ENVIRONMENT OF THE SCTF



Yellow boxes indicate that the issue was considered high enough risk at the June 2001 Risk Assessment workshop to warrant having a full report on performance. Blue boxes indicate the issue was rated as a low risk and no specific management is required – only the justification is presented.

5.3.1 IMPACTS FROM REMOVAL OR DAMAGE TO ENVIRONMENT

5.3.1.1 FISHING IMPACTS, THROUGH ALL RETAINED AND NON-RETAINED SPECIES REMOVALS ON ECOSYSTEM

Rationale for Inclusion:

Scallops play a role in the ecosystem: they provide a food source for crustaceans and fish, and also remove plankton from the water column. Additionally, the fishery takes some quantities of mixed finfish species. The potential impact of reducing the number of retained and non-retained species from the environment, through fishing, is investigated here.

ERA Risk Rating: Impact on environment (C1 L2 LOW)

The risk of an impact on the environment, from reducing the amount of retained and non-retained was considered low as:

- This fishery, in terms of the total productivity of the South Coast region, takes little material.
- None of the species captured has an exclusive predator or food source.
- Scallops are one of many filter feeders, which exist in this area and their levels vary dramatically from natural variations.
- The fishery operates in small areas targeting the aggregations of scallops on non-fragile habitats (mostly sand) and then only for a short period of time each year.

5.3.1.2 Impact to Sand/Shell Habitat and Ecology

Rationale for Inclusion:

The SCTF operates over mostly sand and shell habitats where scallop aggregations occur. When trawling, ground chains and otter boards make contact with the sea bottom, disrupting organisms within the habitat. Evidence from video footage of trawled areas in Shark Bay suggests that trawling over sand has the effect of flattening this otherwise rippled and three-dimensional substrate. This may also indirectly affect the species that inhabit this area by changing the nature of their habitat.

ERA Risk Rating: Potential damage to sand/shell habitat (C1 L5 LOW)

The potential impact on the sand and shell habitat, as a result of the scallop trawling operations was considered to have only a MINOR consequence due to the following:

- The fishery operates over a very small portion of its licence area. Therefore there is significant refuge areas that are not trawled within the licence area.
- The area is usually only trawled for less than 4 months a year.

Few studies have been done on the effects of scallop trawling. However, since prawn and scallop trawling are relatively similar studies from prawn fisheries should be considered. There are a number of studies, which have shown that even in the areas where prawn trawling occurs this does not cause significant effects to the infaunal community. A meta-analysis of fishing impacts by Collie *et al.* (2000) found that otter trawling had the least impact of all forms of trawling. Specifically, Kaiser and Spencer (1996) found no detectable difference between trawled and untrawled areas (beam trawl) within mobile sediment (sand) regions. Van Dolah *et al.* (1991) studied changes in infaunal communities over 5 months for areas closed to shrimp (prawn) trawling. They concluded that the seasonal reductions in abundance and number of species sampled had a much greater effect than fishing. Finally, Jennings and Kaiser (1998) suggest that light shrimp trawls do not cause significant disturbance to communities in poorly sorted sediments in shallow water.

In Australia, Gibbs *et al.* (1980) found only minimal impacts on the benthic communities in sandy areas resulting from prawn trawling in Botany Bay, NSW. In southwest WA, Laurenson *et al.* (1993) compared trawled and untrawled areas using trawl samples and underwater video. Their study concluded that the dominant fauna of each area (sand bottom) showed marked similarities, although each group had a

different group of less abundant species. The difference was attributed to the fact that the untrawled area was small and encroached in all directions by seagrass. Underwater video observation of both areas before and after the completion of the depletion experiment failed to detect any visual impact on the substrate or habitat. Extrapolating this study to the SCTF would indicate that trawling causes only minor and short-lived impact to sandy habitats.

5.3.2 ADDITION OF MATERIALS TO THE ENVIRONMENT

5.3.2.1 TRANSLOCATION

Rationale for Inclusion:

The movement of fishing vessels provides a mechanism for marine species to be transported beyond their natural range. In the extreme circumstance, fishing vessels could provide a vector for disease and exotic species. For scallop trawl vessels, their hulls mainly provide the opportunity for translocation, as these vessels do not contain ballast.

ERA Risk Rating: Impact on environment (C0 L5 NEGLIGIBLE)

This risk of translocation of species occurring as a result of this fishery was considered 'likely' to be 'negligible' as vessels in the SCTF have little interaction with fisheries in other regions, although some vessels have licences to operate in other trawl fisheries (Shark Bay, Kimberley and Nickol Bay/Onslow). In practice, most of the vessel exchange is between Shark Bay and the Abrolhos and Nickol Bay/Onslow fisheries. Given the relatively short distances between these areas and the degree of faunal overlap, the translocation risks are negligible. Any change to this would result in a reassessment of the risk.

Vessels do move to Fremantle for seasonal maintenance. Much of the western coast is connected via the Leeuwin Current and as such there is already a connection between Fremantle and the trawl grounds

5.3.2.2 DISCARDING FISH

Rationale for Inclusion:

Bycatch returned to the sea results in fish and, to a lesser extent, crustaceans being made available to others that would normally not have access to this food source. This may affect the feeding behaviour of some species, particularly predators, and increase abundances of other species throughout the water column and at the surface. For example, dead fish, which sink to the seafloor, become available to benthic scavengers. These fish, would normally only be available, in that level of abundance, to pelagic predators.

Studies on the fate of discards through the trophic structure have not been undertaken in this fishery, but this is has been looked at in other fisheries:

- Britton and Morton (1994) reviewed this issue and found that discarding has had a "positive" impact on bird population numbers as they can follow the North Sea fleet and consume 50% of the discards. Other benthic fauna can only get what actually falls down on to the seabed and only in the area where they live (Ramsey et al., 1997). Hence, this study concluded that discarding would not have a major impact on immobile benthic species.
- In the Great Barrier Reef trawl fishery, a study showed that the majority of the discards were fish and about 40% floated and were mostly taken in the daytime by birds, dolphins and sharks (Poiner et al., 1999). Poiner et al. (1999) concluded that because discards are dispersed over the seabed and most scavengers forage over a restricted area discards probably do not cause a measurable seabed impact.
- In Moreton Bay, Queensland, Wassenburg and Hill (1987) found that crabs were a dominant scavenger of bycatch from the prawn trawl fishery, with 30% of their diet coming from this source (note over 65% of the bycatch material from this fishery sinks). This study also found that trawl discards have become the principal food source for three species of seabirds (Wassenberg and Hill, 1990). It is also thought that larger populations of the blue swimmer crab (*Portunus pelagicus*) occur in Moreton Bay than would normally exist because of the food provided by trawler discards (Wassenberg and Hill, 1987).

Of the discards, about 50% of the fish sink, and are mostly dead, becoming available to bottom feeders. However, in the case of this fishery the fish bycatch is very low. Most of the crustaceans sink and most of these are alive when returned.

ERA Risk Rating: Impact on environment (C1 L3 LOW)

The impact of the provisioning as a result of discarding bycatch from this fishery is considered 'unlikely' to have a 'minor' consequence. This was a result of the following factors:

- Although many studies have shown that various trophic groups fed on bycatch, few studies have found direct conclusive evidence of a resultant change in trophic structure.
- The area over which organisms are discarded is large in the fishery and therefore any impacts would be diffused.
- In addition to the bycatch being discarded, around 75-80% of the total weight of a scallop is also discarded. It is calculated that around 20 to 25% of the total weight of the scallop is the weight of the adductor tissue (which is kept) the rest of the scallop (i.e. mantle tissue) is discarded.

5.3.2.3 Discarding Scallop Shells

Rationale for Inclusion:

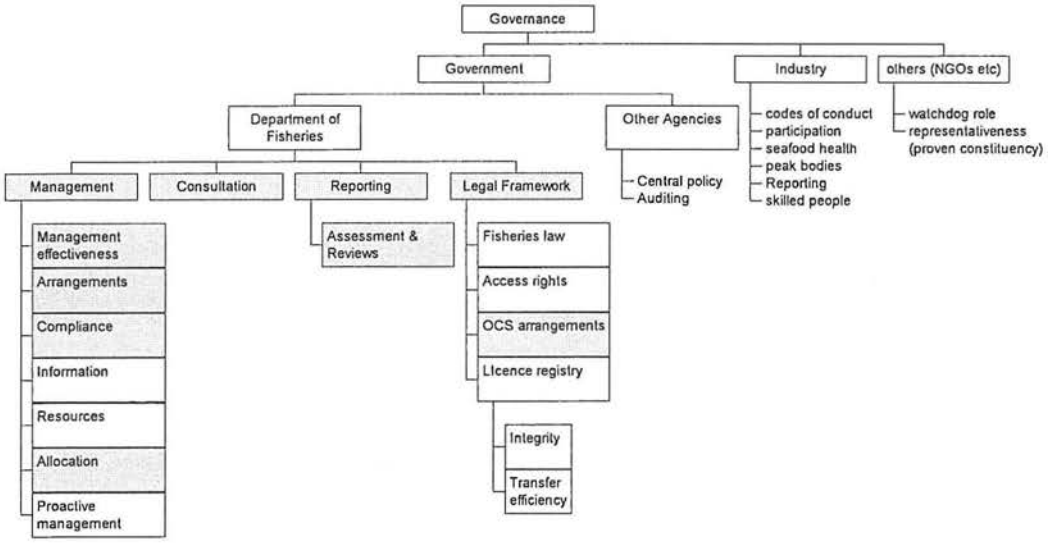
Scallop meat is removed from the shell (a process called shucking) at sea and the meat is generally packed and snap frozen at sea. Empty scallop shells are discarded overboard. The impact of discarding the shells is considered here.

ERA Risk Rating: Impact on environment (C0 L5 NEGLIGIBLE)

The impact of discarding scallop shell was considered 'likely' to be 'negligible'. Discarding of scallop shells has been an issue in the Abrolhos Islands in the past when smaller boats were sometimes used. During rough conditions, shells were shucked and discarded in small discrete sheltered areas leading to an accumulation of shell. However, the SCTF uses mostly large boats and covers large areas thus allowing the discarded shells to be spread out over the fishery area.

5.4 GOVERNANCE

COMPONENT TREE FOR GOVERNANCE OF THE SCTF



Nb- no generic components have been removed from the tree but only those boxes that are yellow will be reported in this application.

5.4.1 DEPARTMENT OF FISHERIES – MANAGEMENT

5.4.1.1 MANAGEMENT EFFECTIVENESS (OUTCOMES)

Rationale for Inclusion:

The effectiveness of management arrangements in the SCTF is ultimately measured by assessing the outcomes of various strategies employed to manage this fishery.

In the SCTF, a formal management plan has not yet been developed – but the Department has commenced the process to bring the fishery under a more sophisticated suite of management arrangements by developing a management discussion paper for the fishery, which should be released for public input in the near future.

At present, there are 4 fishing boat licences that have "conditions" which effectively allow the use of trawl gear in waters off the south coast of the State. The "conditions" attached to these licences do not restrict the amount of gear that may be used. However, they do impose some temporal and spatial restrictions on the use of trawl gear.

Catches in the SCTF are highly variable, being dependent on sporadic recruitment, which appears to be strongly influenced by environmental conditions (e.g. the Leeuwin Current). As a result, the comparison of current catch to historical catch is of little value in measuring the effectiveness of management arrangements.

Operational Objective

The commercial catch of all scallops and finfish in the SCTF is maintained within the annually predicted range.

Justification:

If effective management arrangements are operational in the fishery (including restrictions on effective effort levels and compliance with the regulations) then the actual total catch of scallops in each fishery should be very close to the total predicted catch. Any variation outside of the predicted total catch range would elicit the need to explain the cause of this deviation and potentially result in changes to management arrangements.

Indicator

There is no catch predictor at present except anecdotal and fisher's estimates.

Performance Measure

The catch range for the SCTF has not been determined by the Department, but some industry members have suggested that a catch of up to 200 tonnes meat weight (or 1000 tonnes whole weight) may be possible off the south coast.

Justification:

The justification for the catch levels for scallops is located in Section 5.1.

Data Requirements for indicator

The following data are required for this indicator:

Data Requirement	Data Availability
Commercial catch and effort	Yes – obtained annually
Historical catch levels	Yes – records available and accessible
Level of fishing effort and fishing power	Yes – number of vessels, days fished, hours trawled, areas of operations and activity and fishing power comparisons readily available.
Environmental indicators	Yes – key environmental indicators readily available.

Evaluation

Relatively high catches of scallops has been seen in 2000 and 2002 believed to be due to very favorable environmental conditions. No declining trends are evident in this fishery to raise any concerns about its sustainability.

In the SCTF the total catch for the 2002 season was 669 tonnes (whole weight), compared to only 239 tonnes (whole weight) taken in the 2001 season. The 2002 season catch is the second highest catch for the SCTF compared to the very high catch of 2,722 tonnes in 2000. In 2003 the catch was only 80 tonnes whole weight with a value of $0.3 million.

Robustness
Medium / High

The data required to assess annual and monthly catch rates are readily available but not real-time. However, the changes in fishing power and fleet efficiency through time need to be evaluated and considered in these analyses to ensure that the measures continue to be relevant.

Fisheries Management Response

Management measures help to achieve the objectives for the total scallop catch (see above), but also ensure that scallops are caught at a time when the best price will be paid while also maintaining scallop spawning stock.

Historically, variations in catch outside of the predicted range have been explained either in terms of increased fishing effort, increased fishing efficiency or seasonal environmental factors. The response to these issues in other fisheries has sometimes been to reduce fishing effort (e.g. spatial or temporal closures) with a focus on limiting the exploitation of breeding stocks or new recruits and to develop better predictive models to take into account environmental factors such as sea surface temperature and ENSO, El Nino and La Nina events.

The Department of Fisheries is doing further work to improve the measurement of fishing efficiency in all trawl fisheries and understanding the relationship between stock recruitment, environmental factors and catch. The Department will continue to use input controls to adjust for variations in fishing efficiency where required. Furthermore, the introduction of the VMS (within the next few years) will enable the Department of Fisheries to collect and analyse data on the area swept by this fishery and individual trawler activity.

Actions if Performance Limit is Exceeded:
These strategies, which could be employed at any time in the south coast trawl fishery include:

- Reductions in the total effort expended in the fishery through a determination of the length of the fishing season or within season closures.
- Implementation of gear restrictions.
- Additional area closures.

External Driver Checklist

Environmental factors such as climatic changes, ocean currents and sea surface temperatures are known to impact upon recruitment and therefore are likely to significantly impact the level and productivity of scallop breeding stocks.

5.4.1.2 MANAGEMENT ARRANGEMENTS

Rationale for Inclusion:

In WA, a number of instruments are used to articulate the management arrangements for fisheries. The FRMA has elements that affect all fisheries. The FRMA provides for the creation of Management Plans, Orders (Notices), Regulations, Ministerial Policy Guidelines (MPGs) and Policy Statements.

The FRMA sets out the objects for the sustainable management of fish resources in Western Australia, and provides the framework for developing and implementing management plans for each of the State's fisheries.

For the SCTF, the current management arrangements focus on two prohibition notices (Orders) made under Section 43 of the FRMA, and two conditions [endorsements] that allow certain types of fishing as an exception to the Orders. Order No. 556 (a general 'trawl' order) and Order No. 586 (which deals specifically with fishing for scallops in the Recherche Archipelago) effectively prohibit all trawling activity off the south coast of the State (within the 200m isobath as the Commonwealth manage trawling activity in water that is deeper). Fishing Boat Licence conditions 73 and 79 currently exclude the holder from the provisions the current trawling Orders. There are, at the time of writing, a total of four fishing boat licences with both conditions 73 and 79.

Table 8 Objects of the FRMA.

Objects
(1) The objects of this Act are to conserve, develop and share the fish resources of the State for the benefit of present and future generations. (2) In particular, this Act has the following objects- (a) to conserve fish and protect their environment; (b) to ensure that the exploitation of fish resources is carried out in a sustainable manner; (c) to enable the management of fishing, aquaculture and associated industries and aquatic eco-tourism; (d) to foster the development of commercial fishing and recreational fishing and aquaculture; (e) to achieve the optimum economic, social and other benefits from the use of fish resources; (f) to enable the allocation of fish resources between users of those resources;

(g) to provide for the control of foreign interests in fishing, aquaculture and associated industries;
(h) to enable the management of fish habitat protection areas and the Abrolhos islands reserve.

Operational Objective

In consultation with the industry members and other stakeholders, the Department periodically reviews the legislation to ensure the management framework remains relevant and aligned with the management objectives for this fishery.

To have an effective and understandable plan for the management of this fishery with all of the 10 principles covered within the suite of arrangements developed for the fishery.

Justification:

Management arrangements ultimately enable the ecologically sustainable exploitation of a natural resource where the potential to harvest the resource may exceed the ability of the resource to replenish itself. In addition, management arrangements can assist in maintaining the economic sustainability of fisheries by regulating effort so the best possible return may be achieved for the catch.

Management arrangements can also define processes within which access to the resource can be allocated to competing user groups (including natural ecosystems).

Indicator

The extent to which the FRMA, Fish Resources Management Regulations (FRMR), Management Plans, MPGs and other management arrangements allow for the timely setting of appropriate effort levels and resource allocation in the fishery.

The extent to which the management plan and supporting documentation addresses each of the issues and has appropriate objectives, indicators and performance measures, along with the planned management responses

Performance Measure

This should be 100%.

Evaluation

Formal evaluation of the management arrangements of the SCTF has been completed. For this fishery, the current potential effort is very low (only 4 boats may operate over a very large area). However, with a view to bringing this fishery into line with other

State trawl fisheries, a review of current management arrangements and the development of new proposed management arrangements has recently been completed. The proposed new management arrangements for the fishery include:

- Gear restrictions;
- Boat size restrictions;
- Area closures (particularly near major population centres);
- The capacity to close various parts of the fishery from time to time (i.e. the introduction of fishing season); and
- Unitisation of the fishery, and the capacity to adjust unit values as appropriate.

Proposed new management arrangements for the fishery are detailed in a management discussion paper for the fishery, which will be released for public comment in the near future.

Current Performance against each of the areas required within the "plan"[1]:

1. **An explicit description of the management unit** – The management unit for the SCTF is not yet formally described. Under proposed management arrangements, the description of a management unit in the SCTF would be defined in the same way as other trawl fisheries (i.e. within a clause of the management plan).
2. **The issues addressed by the plan** –The issues that need to be addressed by the SCTF management arrangements have been examined thoroughly and are documented within the 8 ESD component trees and their reports.
3. **Descriptions of the stocks, their habitat and the fishing activities** –The SCTF stocks are described in Section 2.1 and the fishing activities are described in Section 2.2.
4. **Clear operational (measurable) objectives and their associated performance measures and indicators** – These are now located in Section 5 for each of the major issues.
5. **Clearly defined rules, including what actions are to be taken if performance measures are triggered** – For each of these major issues, the management actions that are planned to be taken if performance limits are exceeded are now articulated in Section 5.
6. **Economic and social characteristics of the groups involved in the fishery** – A brief description of the economic and social characteristics of the fisheries is located in Section 3.3 and there is to be a greater level of detail accumulated during the process of completing the remainder of the ESD components.
7. **Management and regulatory details for the implementation of the actual management plan** – The regulations relating to the SCTF are located in the fishing boat licence conditions 73 and 79 (read in conjunction with the south

[1] "Plan" – includes all management arrangements

coast trawl prohibition notices), and the FRMR (A complete set of which has been provided to DEH).

8. **The reporting and assessment arrangements** – These arrangements are documented in Section 5.4.4.1 and include annual reporting against current agreed performance limits and targets and a five yearly review of these arrangements and assumptions.

9. **How and when reviews of the plan will occur (including consultation mechanisms).** – The FRMA clearly sets out how the process for the review of any management plan must occur.

   In the case of this fishery, no management plan currently exists, but it is proposed that more sophisticated management arrangements be introduced for the fishery within the next few years. During this time (and certainly prior to the completion of the five year interim period) a complete review of management arrangements will be completed.

10. **A synopsis of how each of the ESD issues are being addressed** – A synopsis of ESD issues has been compiled within the Overview Table of this report.

Robustness
Medium

For the South Coast trawl fishery, management arrangements have not changed for many years, so it would appear that they are relatively robust and inflexible. However, the lack of change in management arrangements is more likely to be due to the fact that the current arrangements are minimally restrictive in terms of regulating gear, spatial and temporal matters, and until recently, industry had not lobbied to amend the arrangements, and the Department did not believe a change in management arrangements was required.

Fisheries Management Response

The Department has successfully administered the management arrangements and related legislation to achieve and pursue the stated objectives for the SCTF.

Comments and Actions

The SCTF is managed in a consultative way and would respond readily to changed circumstances. However, fishers are often resistant to change. This means that before the fishers accept changes to management arrangements, they often require substantial evidence of the need for such measures. While most fishers have a very high level of confidence in the Department's research activities, some members of the industry demand certain knowledge before accepting the need for change and can be skeptical of research findings no matter how statistically valid. Individual fishers' views can understandably be greatly influenced by their own experiences and observations while fishing that sometimes may give them a contrary view of the state of the fishery.

External Driver Check List

- Potential resistance of fishers to support Department initiated management arrangements.
- Industry lobbying for change in the fishery.
- Potential reluctance of Minister to exercise power.

5.4.1.3 COMPLIANCE

Rationale for Inclusion:

Effective compliance is vital to achieve the management objectives of any fishery. This involves a mix of sea and land patrols.

The ability to conduct at sea compliance patrols on the south coast is limited because of a lack of suitable patrol boats in the area. However, there are currently very few restrictions over scallop trawling effort on the south coast, and therefore little scope for compliance/enforcement activities.

Operational Objective

To have sufficiently high levels of compliance with the FRMA, FRMR and various conditions [endorsements] and notices.

Justification:

The activities of the participants in the fishery need to be sufficiently consistent with the management framework and legislation in order to make it likely that the expected outcomes and objectives of the fishery will be achieved.

Indicators

The levels of compliance with the legislation, including the estimated level of boundary infringements, and compliance with conditions of licence.

The degree of understanding and acceptance of the rules governing the operation of the SCTF by licensees and the broader fishing community.

Performance Measure

That no fishing for scallops occurs in the Recherche Archipelago on the south coast between 1 December and 1 March in the next following year.

Data Collection Requirements and Processes

Random inspections of vessels at sea and port.
Ongoing collection of data on illegal activities.
Comparative data on the relative effectiveness of certain compliance techniques.

Evaluation

For the SCTF, zero offences were reported between 2000 and 2004. Currently, the Department of Fisheries is systematically conducting compliance risk assessments for all of the fisheries in the State. Information obtained through these risk assessments will be used by the Department to improve compliance activities within each fishery.

Robustness
Medium

The difficulties in identifying every illegal activity will remain. However, it is expected that when new management arrangements are implemented for the South Coast Trawl Fishery, technology such as VMS will improve the capacity of compliance staff to detect breaches of spatial closures. Other more sophisticated fishery rules will also add to the complexity of enforcement operations.

Fisheries Management Response

Despite the relatively low levels of compliance work being done in the SCTF at present, the Regional Services division of the Department will continue to gather intelligence on potential breaches of fisheries regulations within the SCTF if they occur.

Comments and Actions

The Department will continue to provide a compliance service within budgetary and resourcing constraints to the SCTF. It is expected that the completion of a compliance risk assessment for the fishery within the next year will enable the Department to better direct resources to further increase the effectiveness of the limited compliance activities. New proposed management arrangements for the SCTF include VMS requirements.

External Driver Check List

- Changes to technology that may facilitate an increase the level of non-compliance.
- Changes to non-Fisheries legislation (i.e. National Competition Policy) may impact upon the Department's ability to restrict activities in a way that assist compliance (e.g. processor receival restrictions).

5.4.1.4. Allocation Among Users

Rationale for Exclusion:

There is no known recreational or indigenous component to this fishery.

5.4.1.5 CONSULTATION (INCLUDING COMMUNICATION)

Rationale for Inclusion:

The FRMA has certain requirements with regard to consultation that must be undertaken in the course of managing fisheries. The management of the fishery is based around a robust consultation and communication process.

There are sections in the FRMA that relate to the development of management plans and interim management plans (Section 64) and to the amendment of such plans (Section 65).

Section 65 of the FRMA states:

Section 65. Procedure before amending a management plan

(1) A management plan must specify an advisory committee or advisory committees or a person or persons who are to be consulted before the plan is amended or revoked.

(2) Before amending or revoking a management plan the Minister must consult with the advisory committee or advisory committees or the person or persons specified for that purpose in the plan.

(3) Despite subsection (2), the Minister may amend a management plan without consulting in accordance with that subsection if, in the Ministers opinion, the amendment is –

(a) required urgently; or

(b) of a minor nature

(4) If –

(a) the Minister amends a management plan; and

(b) the amendment is made without consultation because it is, in the Minister's opinion , required urgently,

the Minister must consult with the advisory committee or advisory committees or the person or persons specified for that purpose in the plan as soon as practicable after the plan has been amended.

In the SCTF, no such meetings have been held in recent years. However, the Department has worked with industry to develop a set of management arrangements for the fishery, and has held at least one meeting of licence holders and Department staff to progress the issue. A discussion paper regarding proposed management directions for the fishery is complete, and if approved by the Minister, should be released for wider stakeholder comment over the next few months.

Operational Objective

To administer a consultation process that is in accordance with the requirements of the FRMA and allows for the best possible advice from all relevant stakeholders to be provided to the decision maker (Minister/ED) in a timely manner.

Indicators

- The Minister (or the Department on his behalf) conforms to the consultation requirements of the FRMA and the Management Plan.
- The level to which licensees and other stakeholders consider that they are adequately and appropriately consulted.

Performance Measures

Proper consultation procedures have been followed in any amendment of the management plan.

Industry meetings held annually.

Public meeting regarding these and other fisheries held annually.

Data Requirements

The views of industry collected from stakeholders at each annual meeting.

Documentation of the formal consultation procedures (when an amendment to management arrangements is proposed)

Evaluation

Consultation on the management of the SCTF has recently been conducted wholly with commercial industry members. However, during the final development and implementation of proposed management arrangements in the fishery, consultation regarding management issues will be conducted in an open, accountable and inclusive environment where all sectors of the industry and the Department's managers and researchers collectively identify and discuss appropriate courses of action.

Decision makers are provided with advice based on this consultation and reasons are provided for decisions that vary from consultation-based advice.

Robustness
Medium

The formal consultation process is very well understood with relatively high levels of participation from the various stakeholder groups.

Fisheries Management Response

The Department is attempting to improve communication links with industry in the fishery through regular correspondence and encouraging communications with the fishery management officer located in Albany.

Public meetings (held in regional locations) are expected to improve consultation with a wider range of stakeholder groups.

Comments and Actions

The Department will continue to provide a commercial fisheries management officer who coordinates and further develops the consultation process for the SCTF.

External Driver Check List

Despite the aforementioned consultation processes that are in place, disaffected parties may still seek to use political avenues to further their cause.

5.4.2 DEPARTMENT OF FISHERIES - REPORTING

5.4.2.1 ASSESSMENT AND REVIEWS

Rationale for Inclusion:

It is important that the outcomes of the fisheries management processes administered by the Department for the fishery are available for review by external parties. It is also important that the community is sufficiently informed on the status of the fisheries, given that industry are utilising a community resource.

The report that is currently developed annually is the State of the Fisheries Report. Other reports that are completed include an ESD report and this application to DEH. There is a longer-term plan to have the entire system of management audited by the WA Environmental Protection Agency (EPA).

Operational Objective

To continue to report annually to the Parliament and community on the status of all fisheries including the fishery and to prepare a framework for reporting on ESD for all Western Australian fisheries.

Indicators

The extent to which external bodies with knowledge on the management of fisheries resources have access to relevant material and the level of acceptance within the community.

Performance Measure

General acceptance of the management system by the community.

Data Requirements

The majority of data required to generate reports are already collected in the course of pursuing resource management objectives. The Department conducts an annual survey of the community with respect to the community's opinion on the status of the State's fisheries and attitudes to the performance of the Department.

Evaluation

The Department has implemented more than one process to report on the performance of this fishery and in doing so has acted to ensure that the community has access to this information. In addition to this base level reporting, continual development of the management process will see the fishery undergo regular independent audits ensuring that the evaluation of the management arrangements in these fisheries is robust.

The Department has been the recipient of a number of awards for excellence for its standard of reporting - Premiers Awards in 1998, 1999 for Public Service excellence, Category Awards in Annual Reporting in 1998, 1999, 2000; Lonnie Awards in 2000, 2001.

Current Reporting Arrangements for this fishery include:

State of Fisheries

There is annual reporting on the performance of the fishery against the agreed objectives within the "State Of The Fishery Report". The document is available in hard copy format but is also available from the Department's web site in PDF format.

Annual Report

A summary of this report is presented within the Department's Annual Report and is used in some of the Performance Indicators that are reviewed annually by the OAG.

ESD

The Department is currently completing an ESD report series (of which the material presented in this application is a subset). Once completed this too will be available from the web site.

Robustness
High

Fisheries Management Response

Current: For many years the Department has produced substantial and high quality documents that report on the operation of the Department and the status of its fisheries – these reports are the Annual Report and the State of the Fisheries.

Future: The Department is working with the EPA to prepare a framework for reporting on ESD for all Western Australian fisheries. It is proposed that this framework will be linked to a regular audit cycle involving the EPA and periodic reporting to the OAG. The Department is working to combine the processes for reporting to the States and the Commonwealth and believes that this can best be achieved by using a Bilateral Agreement with DEH under the EPBC.

Comments and Actions

The assessment and review processes already established together with proposed external review processes should ensure that there will be many opportunities for the appropriateness of the management regime and the results it produces to be reviewed.

External Driver Check List

The assessments provided by independent review bodies and the community.

5.4.3 DEPARTMENT OF FISHERIES - LEGAL FRAMEWORK

5.4.3.1 OCS ARRANGEMENTS

The jurisdiction for the State management of trawl fishing off the south coast is provided under the Offshore Constitutional Settlement 1995 (the OCS) (see Fisheries Management Paper 77). The OCS is a legal arrangement between the Australian and State Governments, and defines control over the fisheries that operate off each State of Australia. The OCS sets out jurisdictional arrangements for all waters between the coast and the outer limit of the Australian Fishing Zone (200 nautical miles).

An "arrangement" which gives effect to the OCS was gazetted in the Australian Government Gazette No.GN4 of 1 February 1995 and is titled "*Arrangement Between the Commonwealth and State of Western Australia in Relation to the Fishery for Fish and Other Aquatic Biological Resources in Waters Relevant to Western Australia*" (the arrangement). The arrangement declares that the fisheries in all waters relevant to Western Australia are to be managed in accordance with the laws of the State, except for some fisheries that are specifically excluded.

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APPENDIX 1 – ACRONYMS

CAESS	Catch and Effort Statistics System
DEH	Department of the Environment and Heritage
ED	Executive Director (Department of Fisheries)
EPA	WA Environmental Protection Authority
EPBC	*Environment Protection and Biodiversity Conservation Act 1999*
ESD	Ecologically Sustainable Development
FRDC	Fisheries Resources Development Corporation
FRMA	*Fish Resources Management Act, 1994*
FRMR	*Fish Resources Management Regulations, 1995*
MAC	Management Advisory Committee
MFL	Managed Fishery Licence
MPGs	Ministerial Policy Guidelines
OAG	Office of Auditor General
VMS	Vessel Monitoring System
SA	South Australia
SBSMF	Shark Bay Scallop Managed Fishery
SCTF	South Coast Trawl Fishery
WA	Western Australia
WAFIC	Western Australian Fishing Industry Council

APPENDIX 2 – DETAILS OF CONSEQUENCE TABLES

Level	Ecological
Negligible	General - Insignificant impacts to habitat or populations, Unlikely to be measurable against background variability **Target Stock/Non-retained:** undetectable for this population **Byproduct/Other Non-retained:** Area where fishing occurs is negligible compared to where the relevant stock of these species reside (< 1%) **Protected Species:** Relatively few are impacted. **Ecosystem:** Interactions may be occurring but it is unlikely that there would be any change outside of natural variation **Habitat:** Affecting < 1% of area of **original** habitat area *No Recovery Time Needed*
Minor	**Target/Non-retained:** Possibly detectable but little impact on population size but none on their dynamics. **By-product/Other Non-retained**: Take in this fishery is small (< 10% of total) compared to total take by all fisheries and these species are covered explicitly elsewhere. Take and area of capture by this fishery is small compared to known area o distribution (< 20%). **Protected Species**: Some are impacted but there is no impact on stock **Ecosystem:** Captured species do not play a keystone role – only minor changes in relative abundance of other constituents. **Habitat**: Possibly localised affects < 5% of total habitat area *Rapid recovery would occur if stopped - measured in days to months.*
Moderate	**Target/Non-retained**: Full exploitation rate where long term recruitment/dynamics not adversely impacted **By-product:** Relative area of, or susceptibility to capture is suspected to be less than 50% and species do not have vulnerable life history traits **Protected Species:** Levels of impact are at the maximum acceptable level **Ecosystem:** measurable changes to the ecosystem components without there being a major change in function. (no loss of components) **Habitat:** 5-30 % of habitat area is affected. :or, if occurring over wider area, level of impact to habitat not major *Recovery probably measured in months – years if activity stopped*
Severe	**Target/Non Retained**: Affecting recruitment levels of stocks/ or their capacity to increase **By-product/Other Non-retained**: No information is available on the relative area or susceptibility to capture or on the vulnerability of life history traits of this type of species. Relative levels of capture/susceptibility greater than 50% and species should be examined explicitly. **Protected Species:** Same as target species **Ecosystem**: Ecosystem function altered measurably and some function or components are missing/declining/increasing outside of historical range &/or allowed/facilitated new species to appear. **Habitat:** 30- 60 % of habitat is affected/removed. *Recovery measured in years if stopped*

Major	**Target/Non retained:** Likely to cause local extinctions **By-product/Other Non-retained:** N/A **Protected Species:** same as target species **Ecosystem:** A major change to ecosystem structure and function (different dynamics now occur with different species/groups now the major targets of capture) **Habitat:** 60 - 90% affected *Recovery period measured in years to decades if stopped.*
Catastrophic	**Target/Non-retained:** Local extinctions are imminent/immediate **By-product/Other Non-retained:** N/A **Protected Species:** Same as target **Ecosystem:** Total collapse of ecosystem processes. **Habitat:** > 90% affected in a major way/removed *Long-term recovery period will be greater than decades or never, even if stopped*