

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

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

For Continued Listing on Section 303DB of the
*Environment Protection and Biodiversity
Conservation Act 1999*

MAY 2004



Department of Fisheries
Government of Western Australia



Fish for the future

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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 Crustacean Fishery (SCCF), which is comprised of two managed fisheries and two other fishing zones, against the Australian Government Guidelines for the ecologically sustainable management of fisheries. The submission of a successful application against these guidelines is now needed to meet the requirements under Part 13 and Part 13A of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC), to enable the western rock lobster (*Panulirus cygnus*), southern rock lobster (*Jasus edwardsii*), champagne crab (*Hypothalassia acerba*), king crab (*Pseudocarcinus gigas*), crystal crab (*Chaceon bicolor*) and other relevant by-product species to 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 2004.

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 for these fisheries. The application includes:

- Comprehensive background information on the history of the SCCF and a description of the management arrangements, which provides the context for assessing this application and the biology of the primary species caught (see Section 2 for details).
- A description of the National Ecologically Sustainable Development (ESD) Reporting Framework and methodology, which was used to generate the information that is presented in the application (see Section 3 for summary and www.fisheries-esd.com for full details).
- Specific supporting statements relevant to each of the criteria within the Commonwealth Guidelines. These criteria include the “General Requirements”, which cover many of the governance aspects related to the management of the SCCF, 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 references 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 outlines for each issue, 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 the fisheries, presented in the National ESD Reporting format, covering each of the environmental and governance issues relevant to this application for the fisheries. 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 SCCF is not required.

1.2 OVERVIEW OF APPLICATION

The SCCF is effectively comprised of four fisheries. There are two managed fisheries (the Windy Harbour/Augusta Managed Fishery and Esperance Managed Fishery), fishery zones (the Albany and Great Australian Bight) in which licence holders can choose to fish in either zone, and a deep sea crab fishery. The primary species for the SCCF are the western rock lobster, southern rock lobster, champagne crab, giant crab and crystal crab. In 2001/02 the SCCF had a total beach value of \$2.5 million with a total catch (all primary species included) of around 91 tonnes. The management arrangements for each of these fisheries have and will continue to be refined through time and are subject to regular reviews to achieve the overall aim of successful management.

The *Fish Resources Management Act, 1994* (FRMA) provides the legislative framework to implement the management arrangements for this fishery. The FRMA, the regulations in the *Fish Resources Management Regulations, 1995* (FRMR) and the specific management plan for each of these fisheries, adheres to arrangements established under relevant Australian laws with reference to international agreements as documented in Section 5.4.2.

The SCCF is in a transitional state with it undergoing changes in the management arrangements to combine the two managed fisheries with the fishery zones and the deep sea crab fishery into one fishery, thus synthesising the current management plans, regulation licences and deep-sea crab endorsements. With the completion of more refined management arrangements accompanied by the input and output controls already existing in the fishery, the Department of Fisheries is confident in the maintenance of the primary species stocks as well as the successful continuation of the fishery.

Consequently, the current and future management regimes for the SCCF 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 ON THE SCCF

2.1 DESCRIPTION OF THE FISHERIES

The SCCF is effectively comprised of four fisheries. There are two managed fisheries (the Windy Harbour/Augusta Managed Fishery (WHARLMF) and Esperance Managed Fishery (ERLMF), fishery zones (the Albany and Great Australian Bight (GAB) in which licence holders can choose to fish in either zone, and a deep sea crab fishery. The Department is in the process of incorporating the two managed fisheries, adjacent zones and deep sea crab fishery under one management plan. As a result, this report will refer to the WHARLMF and ERLMF as “zones” of the SCCF.

The boundaries of the Windy Harbour/Augusta zone (see Figure 1) are in the waters bounded by a line commencing at the intersection of high water mark and 115°8' E longitude (Cape Leeuwin) extending south to the intersection of 115°8' E longitude and 34°24' S latitude; thence west along 34°24' S latitude to the outer limit of the Australian Fishing Zone; thence along that boundary to its intersection with 116° E longitude, thence north along 116° E longitude to the high water mark (near Point D'Entrecasteaux); thence along the high water mark to the commencing point. In 2002/03, 2 vessels were licenced to fish in the zone.

The boundaries of the Esperance zone are between longitudes 120°E (near Hopetoun) and 125°E (near Point Culver) seawards to the 200 nautical mile Australian Fishing Zone outer limit (Figure 1). In 2001/02, 11 vessels were licensed to fish in the area.

Boundaries for the neighbouring zones are defined as:

- GAB zone: being the Australian Fishing Zone adjacent to the south coast of Western Australia, from longitude 125°E to longitude 129°E to the 200 m depth contour (Figure 1).
- Albany zone: being the waters of the Australian Fishing Zone adjacent to the south coast of Western Australia, from longitude 116°E to longitude 120° E to the 200 m depth contour (Figure 1).

In 2002/03, 29 vessels were endorsed to fish in both the GAB and Albany zones.

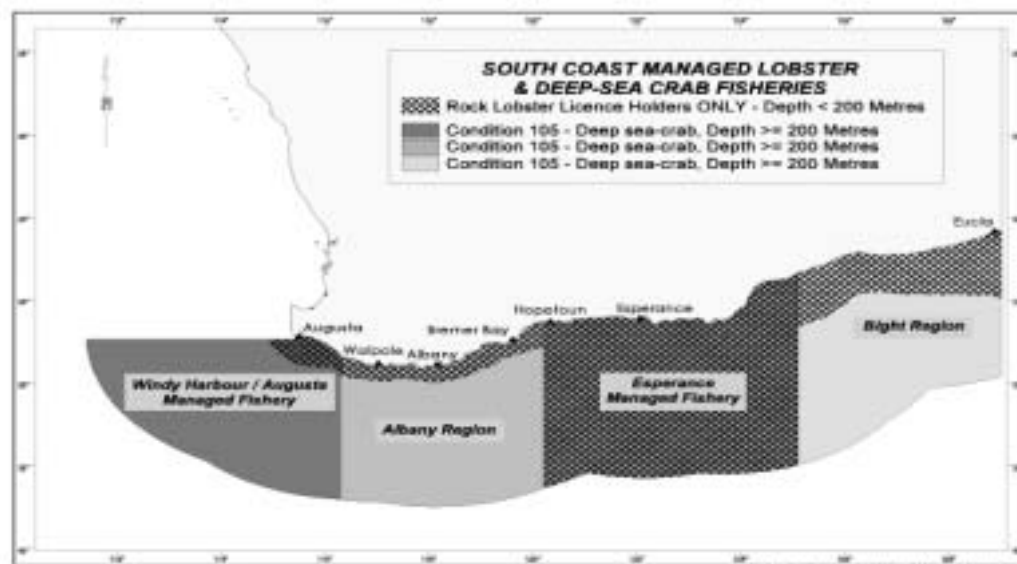


Figure 1. Boundaries of the four zones making up the South Coast Crustacean Fishery.

The crustacean fisheries on Western Australia's south coast have been operating since the late 1960s and for many years, only rock lobsters were targeted. In 1987, management plans were introduced for the two rock lobster fisheries in the Windy Harbour/Augusta area and the Esperance area. It was not until the early 1990s when landings of crabs (champagne, giant and crystal crabs) began to appear in the commercial catch landing statistics for all four zones.

Fishing Methods

The SCCF is a 'potting' fishery. This activity occurs from inshore regions in shallow waters out to the edge of the continental shelf with the only allowable method for capture being from the use of pots (traps). The pots used by the SCCF are mainly steel frame pots with chicken wire. At present, there are regulations regarding the design of rock lobster pots in the rock lobster fisheries. These include restrictions on pot size and requirements for a certain number and size of escape gaps. These are specified in the FRMR. At present, there are no restrictions on the design of pots that are used in the south coast deep-sea crab fishery. However, the majority of pots that are used in this fishery are the same as the pots used in the rock lobster fisheries. It is intended that under the new management plan for these fisheries, the pot design and size used in all four zones will be standardised.

Depending on the species being targeted, pots in the fishery are baited with any of a variety of lower value finfish species including amongst other things, salmon and pilchard. Baited pots are released (set) from boats in areas where lobsters and crabs

are thought to be, often near reefs where the lobsters usually reside. This is based upon a combination of information gained from depth sounders, global positioning system (GPS), previous experience and recent catch rates in the area. The pots are generally left overnight during which time lobsters are attracted to the baits and enter the pots. In some areas the pots can be left fishing for a number of days before retrieval. Pots are then retrieved (pulled) with the capture of lobsters and crabs of legal size and of appropriate reproductive status (e.g. not berried etc.) placed into holding tanks and returned to on-shore processing plants where the majority are prepared for live shipments to overseas and local markets.

The gear used in this fishery generates minimal bycatch and the design of the pots (one entrance with escape gaps) is such that they are not expected to 'ghost fish' if lost.

Management

In 1987, management plans were developed for the ERLMF and WHARLMF. Both fisheries are managed under section 65 of the FRMA. These two fisheries are input controlled, which are controls that affect the way fishing is undertaken in order to limit what can be caught. The management arrangements for the ERLMF and WHARLMF are as follows:

Limited Entry. Access to the ERLMF is limited to 11 vessels licensed to fish. There are 2 licensees allowed to fish in the WHARLMF.

Gear Restrictions. There is a cap on the total number of pots that can operate in each fishery. Each licence has a number of pots associated with it and this limits the amount of gear that they can be used at any given time within the fishing season. Both the managed fishery licences and the individual pot entitlements are transferable.

Furthermore, there are a number of biologically based measures to assist management. These are as follows and apply to all four zones of the SCCF:

Minimum Size Limits. There are legal minimum size limits for the giant and champagne crab under the FRMR and a voluntarily agreed minimum size for crystal crabs. The size limits for the crab species are based on research conducted by Andrew Levings (Deakin University, Victoria) and Kim Smith (Murdoch University, Western Australia) and are considered to ensure sufficient egg production to avoid recruitment overfishing. The biological basis behind the western rock lobster minimum size has been fully dealt with in the ESD report for that fishery. In both the case of the western and southern rock lobster fisheries, it is considered that recruitment to the region of the south coast crustacean fishery is from other regions where the species is found in significantly greater densities (however at the time of writing this assumption is being questioned for southern rock lobster – see 5.1.1.3). It would seem highly unlikely that the rock lobster populations in this fishery are self-sustaining and for that reason whether or not the minimum sizes are protecting the brood stock, would seem to be somewhat irrelevant. A more full complete discussion on minimum sizes for the crab and lobster fisheries can be found in sections 2.2 to 2.5.

The size limits are as follows:

- *Southern rock lobster*- 98.5 mm carapace length.
- *Western rock lobster*- 77 mm carapace length from 15 November to 31 January and 76 mm carapace length from 1 February to 30 June.
- *Champagne crab*- 92 mm carapace length.
- *King crab*- 140 mm carapace length.

Biological Restrictions. All under sized and egg bearing female crabs are to be returned to the water within five minutes of coming on board and before the next trap comes on board. In addition, it is illegal to take female lobsters carrying eggs, or tarspots.

Currently, the authority to take deep-sea crabs is provided through condition 105 on fishing boat licences. In many cases, a vessel may be endorsed with condition 105 and also be listed on a managed fishery licence.

The current management arrangements for crustacean fisheries on the south coast have been developed over a long period of time to address specific area issues. This has produced layers of complexity that contribute to inefficiencies in administration, management and compliance. The Department is currently developing management arrangements for the south coast crustacean fisheries that will synthesise the current management plans, regulation licences and deep-sea crab endorsements. After which all the crustacean fisheries in the south coast will be managed jointly as the SCCF. It is expected that a draft management arrangements will be available for consideration by stakeholders by December 2004.

History

The crustacean fishery on Western Australia's south coast has been operating since the late 1960s. For many years the fishery targeted only southern rock lobsters and was largely confined to the inshore areas and islands around Esperance with some spreading of the fishing effort to the Albany and GAB areas occurring in the late 1970s. In all cases the fishers that caught lobsters in the early years of the fishery were generalists who also fished for shark, tuna and pelagic species, and the lobster catches were very much a part-time operation. The product was marketed locally. The WHARLMF has had a slightly different history to the other three zones, in that because its historical catches have comprised largely of western rather than southern rock lobsters, this zone has been perceived more as a southern zone of the western rock lobster fishery than a western zone of the southern rock lobster fishery. Disregarding these distinctions in the catch, the WHARLMF has been fished by full-time and part-time fishers since the late 1970s.

Landings of crab (spiny/champagne, giant and even small amounts of crystal crab), began to appear in the commercial catch landing statistics of all four zones around the early 1990s. In many respects the late 1980s and early 1990s heralded a major transition in the south coast crustacean fishery. It was around 1987 that lobster fishers operating out of Esperance discovered a deep-water offshore component to the lobster fishery. Prior to this all the fishing had been in shallow waters of less than 50 m, but

with the discovery of lobsters on the shelf, some of the more seaworthy boats started exploiting these stocks in waters of 100-250 m.

This shift in the exploitation of rock lobster fishery in the late 1980s merged with another major development in the fishery. At the start of the 1990s a large processor (Esperance Lobster) opened their doors, thereby expanding marketing opportunities and both this new player as well as the existing processors fitted their operations out with live tanks. Now, instead of fishers fishing to the rate at which the processors were able to consign the frozen product mainly to the local market, with the greater competition of the additional processor and the ability to market product live to Asia, there was a virtually limitless opportunity for fishers to supply the factories. As a direct result of this there was a substantial increase in the rock lobster catches in all zones in the fishery. Crab catches also increased dramatically about this time, but it is less clear as to whether this was due to the development of markets for these products or simply the greater focus by fishers on catching crustaceans in general.

The WHARLMF has had a significant reduction in effort in recent years; it is now accepted that too much effort (14 fishermen, with 1103 pots) was allocated in the fishery when it became a managed fishery in 1987. A downturn in recruitment of western rock lobsters into the fishery in the 1994/95 season (western rock lobsters being the mainstay of this fishery), led to the licence holders in the fishery suffering severe economic hardship at that time. After considerable negotiation the management plan for the fishery was revised in 1996, and effort was reduced to its present level of only two fishers utilising a total of 350 pots. Unlike Albany and GAB zones, most of the licensees were full time rock lobster fishermen who had bought into the fishery expecting returns akin to those enjoyed in the West Coast Rock Lobster Managed Fishery.

Research

Compulsory catch and effort (CAES) data which are collected for the south coast crustacean fishery, have been used to model the southern rock lobster fishery (biomass production model, Melville-Smith and Wright (2001)) in the Esperance Rock Lobster Managed Fishery. The Esperance Zone is the only one for which such a model has been attempted, because the size of the catch and length of the datasets have not allowed the same analysis in other regions of the fishery. The Western Australian southern rock lobster fishery occurs on the western edge of the distribution range. A large amount of published biological research is available on the species in South Australia, Victoria, Tasmania and New Zealand, where it is more common and supports large fisheries.

Catches in the Windy Harbour/Augusta zone of the fishery are heavily dependent on western rock lobster landings, and indications on the strength of recruitment to that fishery is provided by puerulus settlement indices monitored out of Cape Mentelle (near Margaret River). This fishery is situated south of the main western rock lobster fishery, which has been extensively researched.

Aspects of the Giant Crab fishery have been researched by Mr Andrew Levings, with funding provided by the Fisheries Research and Development Corporation (FRDC) (Levings *et al.* 2001). Research on aspects of the Champagne crab fishery are

currently being undertaken by a Ph.D. student, Mr Kim Smith, under funding provided by FRDC Project 99/154.

The south coast crustacean fisheries are economically less important than many other commercial fisheries in the state. They are not considered to be threatened by recruitment overfishing and therefore Departmental research resources are directed at maintaining a watching brief on these fisheries. No data other than compulsory commercial catch and effort returns and a few voluntary catch log books are obtained from these fisheries. There is no intention to expand the current research effort directed at these fisheries.

2.2 BIOLOGY OF WESTERN ROCK LOBSTER

Distribution and Stock Structure

The western rock lobster, *Panulirus cygnus*, is a decapod crustacean of the family Palinuridae. Its area of distribution is the continental shelf on the west coast of Western Australia, with greater abundances off the mid west coast (Geraldton – Perth) than the northern and southern parts of the west coast. The stock of western rock lobster in the Windy Harbour/Augusta zone of the SCCF is at the southern edge of its distribution.



Figure 2. Western rock lobster distribution in WA.

Life History

The species can live for over 20 years and reach sizes of up to 5.5 kg, although animals over 3 kg are rarely caught under current harvesting practices. In the southern areas of its distribution, the lobsters become mature at about 6-7 years old at a carapace length of about 90 mm. In the northern waters near Kalbarri and at the Abrolhos Islands, they mature at smaller sizes, usually at about 70 mm carapace length.

When lobsters mate, the male attaches a package of sperm, which resembles a blob of tar, to the underside of the female. This “spermatophore” is generally called a tarspot and remains there until the female is ready to spawn her eggs. At spawning, the female releases eggs from small pores at the base of the third pair of walking legs, sperm is released at the same time by the female scratching the spermatophore and the eggs are fertilised as they are swept backwards and become attached to the sticky setae on the pleopods. Females with eggs attached under their abdomen are known as “berried” females. The eggs hatch in about 5-8 weeks (depending upon water temperature), releasing tiny larvae called phyllosoma into the water currents.

The phyllosoma larvae spend 9-11 months in a planktonic state, carried by ocean currents where they feed on other plankton before the last phyllosoma stage moults into what is called the puerulus stage. This stage is now capable of settling out of the plankton into suitable habitats, which are mostly shallow inshore reefs where they can begin life as a tiny juvenile rock lobster.

Recruitment

Most lobster larvae do not survive their long oceanic journey. Many are eaten by predators or are not carried close enough to the shallow reefs by the ocean currents to allow them to settle. Therefore, the number settling can vary greatly from year to year largely as a result of changes in environmental factors. When the Leeuwin Current is flowing strongly, a higher proportion of the larval lobsters return to the coast. Westerly winds at the time of year when the puerulus are ready to settle may also help more to reach the shallow reefs along the coast.

The puerulus that successfully return to the coast moult to become juveniles, which look like miniature adults. These juveniles feed and grow on the shallow inshore reefs for the next three or four years. About four years after settlement, the lobsters undergo a synchronised moult in late spring when they change from their normal red shell colour into a paler colour. They are then known as “white” lobsters until they return to their normal red colour at the next moult a few months later. The white phase of a rock lobster's life is the migratory phase. At this time (summer) they leave the coastal reefs and undergo a mass migration into deeper water where they become sedentary again on deeper reefs. A small percentage makes longer migrations, usually following the continental shelf in a northerly direction.

Since the Windy Harbour/Augusta zone is at the southern end of the western rock lobster distribution it is thought that puerulus settlement to this region is probably derived from the main location of the fishery, which is between Bunbury and Shark Bay including the Abrolhos Islands. The broodstock in the Windy Harbour/Augusta zone probably makes an insignificant contribution to the western rock lobster larval pool. There is ample evidence from which to infer that the strength of western rock lobster recruitment to the extreme southern parts of the fishery are sporadic and are driven by large-scale environmental factors rather than localised breeding stock levels in those areas (Caputi *et al.*, 1995a,b).

Ecology

Growth rates of rock lobster vary from place to place and also between individuals. In the central west coast region (the middle of the species distribution), most lobsters reach 76 mm carapace length (the legal size for most of the fishery – see 1.1) either in their third year after settlement, before they moult into the white phase or in their fourth year, after they have moulted into the white phase. The minimum size at the coast is well below size at maturity, but this is not considered a threat to the fishery because the offshore Abrolhos Islands, which has a much smaller size at maturity than at the coast, is considered to be the major contributor of egg production by contributing between 45 to 65% of egg production in the fishery Chubb (1991).

The western rock lobster is an opportunistic omnivore feeding on a wide range of food items from coralline algae to molluscan and crustacean fauna (Joll and Phillips, 1984; Edgar, 1990), the populations of which probably have high productivity, high turnover rates and short life cycles. Studies have found that juvenile rock lobsters show a range of diets and feeding strategies, varying greatly between seasons and between different habitats in the same season (Edgar, 1990). Edgar (1990) reported that the diet of *P. cygnus* reflected the abundance and size distribution of benthic macrofauna available on all sampling occasions.

As juveniles, *P. cygnus* are eaten by a number of fish species whilst at large sizes they are one of a number of prey items for octopus and a variety of larger finfish. There are no predators that rely on western rock lobster as their only prey item.

2.3 BIOLOGY OF SOUTHERN ROCK LOBSTER

Distribution and Stock Structure

Southern rock lobsters (*Jasus edwardsii*) are distributed from Coffs Harbour in northern NSW, around Tasmania, across southern Australia, to Dongara in Western Australia. They are also present throughout New Zealand waters. The stock of southern rock lobster in WA waters is at the western edge of its distribution.

Recent studies have shown no genetic or morphological evidence for discrete stocks of southern rock lobsters in Australian and New Zealand waters (Kailoa *et al.*, 1993).

Life History

Similar to the western rock lobster, southern rock lobster can live up to 20 years and grow to at least 230 mm carapace length. The size at which females reach sexual maturity varies with their distribution. In western South Australia females reach maturity at around 112-114 mm carapace length and 75-80 mm in south-eastern South Australia. Females seem to reach maturity at between 3.5 and 4.5 years of age. Size at maturity has not been measured for southern rock lobsters in Western Australia, but it would seem most likely to be similar to sizes that have been recorded in the western part of the South Australia grounds. Given that the minimum size for southern rock lobster in Western Australia (98.5 mm CL) may be below the size at maturity for the species, this could have serious implications for egg production in the fishery. However, as has been noted earlier, it is considered that because the Western Australian portion of the southern rock lobster stock is on the margins of the

distribution of the species, that recruitment to this fishery after the 12 to 24 month larval life, is unlikely to come from local stock.

The southern rock lobster has a similar reproduction life history as the western rock lobster. The male lobsters deposit a spermatophore under the female's body. At spawning, the female exudes eggs, which are fertilised by the sperm and these fertilised eggs are then carried under the abdomen for 4 to 6 months. Females with the eggs attached under their abdomen are known as 'berried' females. Most eggs hatch between September and November although mating and egg hatching tends to occur earlier in southern waters of the species' distribution.

The eggs hatch into naupliosoma larvae, which quickly moult into the phyllosoma larval stage. The phyllosoma larvae can spend up to 23 months in a planktonic state, carried by ocean currents where they feed on smaller plankton before the last phyllosoma stage moults into what is called the puerulus stage. The pueruli swim onto the continental shelf where they settle in coastal waters and begin life as a tiny juvenile rock lobster.

Ecology

Growth rates of southern rock lobsters differ greatly between locations and also between mature males and females. There is a general trend for the growth rate and resulting size of rock lobsters to decrease from northern Tasmanian to southern Tasmanian waters, and from the south-east of South Australia towards western South Australia.

The southern rock lobsters are carnivorous and eat molluscs, small crustaceans, echinoderms and other benthic invertebrates. Major predators of both adult and juvenile southern rock lobsters are octopus and gummy sharks. A variety of larger finfish are also predators of the lobsters.

2.4 BIOLOGY OF CHAMPAGNE CRABS

Distribution

Champagne crabs, or spiny crabs (*Hypothalassia acerba*) are distributed in and around the 200 m depth zone from east of Esperance on the south coast to north of the Abrolhos Islands on the west coast of Western Australia.

Life History

Mean sizes of Champagne crabs captured varies largely between the sexes (males are larger) and time of year captured. The mean size of females captured from the lower west coast in 2000 was 93.8 mm carapace length while the mean size for males was 97 mm (I. Potter, pers. comm.).

A limited number of crabs that were tagged during the course of FRDC-funded research (Project 99/154) undertaken by Mr Kim Smith (Murdoch University) has shown that the species has long intermoult periods and is therefore probably slow

growing. This research project is in the final stages of completion and considerably more will be known about the biology of Champagne crabs when the data have been fully analysed. The minimum size for champagne crabs is estimated to maintain a spawning biomass at 85% of the unfished level.

2.5 BIOLOGY OF GIANT CRABS

Distribution

Giant crabs also known as king crabs (*Pseudocarcinus gigas*) are distributed from Cape Naturaliste in Western Australia, throughout South Australia to mid-New South Wales in depths between 120 to 370 m (Gardner, 1998). They inhabit the steep terrain of the continental shelf where they move upwards into the warmer waters to access the more abundant benthic food resources and move into deeper waters to moult and to spawn. Males are captured from a wider depth range than females, with the majority of crabs captured in water depths less than 120m being male (Levings et al., 2001).

The warm Leeuwin Current flowing in an easterly direction around the lower West Coast of Australia acts as a boundary to giant crabs, requiring cooler temperate waters (between 7-11°C) to survive. The presence of champagne crabs, potentially aggressive competitors for food, may also deter giant crabs from further westerly migration (Levings et al., 2001). The results of allozyme electrophoresis indicate that there is genetic homogeneity across the whole species range (Levings et al., 2001).

Life History

Little is known about the life history for this species, but they are probably long-lived and slow growing. It is known that males grow faster than females increasing by 70-90% at moult and consequently reach larger sizes than females increasing only 45% at moult (R. Stevens, pers. comm.). Results of studies estimating average female size at first maturity indicate a carapace length of approximately 114 mm at first maturity for WA crab stocks (Levings et al., 2001). There are more berried females observed in WA (R. Stevens, pers. comm.) with maturity occurring at a smaller size than giant crabs in the eastern states (Levings et al., 2001). The minimum size limit of 140 mm carapace length is estimated to maintain the spawning at 35% of unfished levels.

2.6 BIOLOGY OF CRYSTAL CRABS

Distribution

Crystal crabs occurring off the Western Australian coast are considered, at this stage, to be *Chaceon bicolor*, a species which is also found in the central Pacific from the Emperor Seamount Chain to eastern Australia (Manning and Holthuis, 1989), as well as along the coast of northern and Western Australia (Jones and Morgan, 2002). The depth distribution of *C. bicolor* is reported to be between 275 to 1600 m (Manning and Holthuis, 1989). However on the Western Australian coast the species has been reported from 450 to 1220 m (Lance Hand pers. comm./Western Australian Museum

records), but most commercial fishing has concentrated on the depths between 500-1000 m.

Life History

The biology of this species is as yet, not well understood, but this situation is being addressed on the west coast by research being undertaken with FRDC funding (Project 99/154). Results to date show that in the Fremantle region, size at 50% maturity is 84.1 and 86.0 mm for male and female crabs respectively (Kim Smith, Murdoch University, unpub. data), well below the 120 mm carapace width legal minimum size. The current minimum size is estimated to protect over 80% of all breeding females. The crabs carry eggs throughout the year on the west coast and do not appear to have a particular breeding season.

Tagging studies, also conducted on the west coast, suggest that growth of these crabs is slow. A number of tag recaptures have been made after a year at large, without the crab having moulted. Tag recaptures also show that the species is capable of lengthy movements, with some individuals being recaptured up to 200 km from where they were released. However, the majority of the tag recaptures do not move particularly far from their point of release.

2.7 MAJOR ENVIRONMENTS

2.7.1 PHYSICAL ENVIRONMENT

The SCCF operates off the south coast of Western Australia from Augusta in the west to the South Australian border in the east. The region is characterised by coastal granite and limestone reefs covered in macroalgae.

2.7.2 ECONOMIC ENVIRONMENT

The beach value of the southern and western rock lobster fisheries was estimated as being about \$2.1 million p.a. in 2001/02, based on a beach price of \$31/kg and \$26.75/kg for southern and western rock lobsters respectively. The average beach prices paid to fishers for Giant crabs (\$25/kg) and Champagne crabs (\$9.50/kg) in the 2000/01 season put its value at approximately \$0.5 million per annum, giving a total value to this fishery of around \$2.5 million.

The large amount of available pot fishing effort, particularly in the Albany and GAB zones and as a result fishing competition, discourages fishers from trying to specialise in this form of fishing or overcapitalising in the related fishing gear. In recent years, the increased interest in deep sea crabs has encourage some fishers to focus more on this part of the fishery, particularly in the Albany zone and exploit areas and species not traditionally targeted by rock lobster fishing.

2.7.3 SOCIAL ENVIRONMENT

There are a large number of licensed pots in this fishery, but not a large number of active fishers. Currently, there are 2 fishers licensed in the Windy Harbour/Augusta zone and 11 licences in the Esperance zone. For the Albany and GAB zones there are 28 licences issued but usually only 10 or 12 of these licences are active in a season and only a fraction of these fish for rock lobster with consistency.

As the nature of the fishery means that rock lobster and deep sea crab catches alone cannot provide them with a livelihood, most fishers use it to supplement income from other fishing activities or supplement their fishing income with other non-fishing businesses or employment. Fishers, particularly in the Albany and GAB Zones tend to vary their rock lobster and deep-sea crab fishing effort according to the local abundance of stock and market prices.

3. METHODOLOGY

3.1 SCOPE

This application is based upon the ESD report for the SCCF. The ESD report was generated by assessing “**the contribution of the SCCF to ESD**”. This assessment examined the benefits and the costs of the SCCF across the major components of ESD (see Table 1). In doing so, it will eventually provide a report on the performance of the fishery for each of the relevant ecological, economic, social and governance issues associated with this fishery. 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 1) were generated for this application.

Table 1. 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 SCCF. 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 this fishery were determined through an internal workshop. This process was facilitated by adapting the set of “Generic ESD Component Trees” into a set of trees specific to the SCCF. Due to the similarities between the SCCF and WCRLMF, issues raised and information generated during the two external workshops for the WCRLMF were used in the development of the application for this fishery.
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 were, however, 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 fishery.

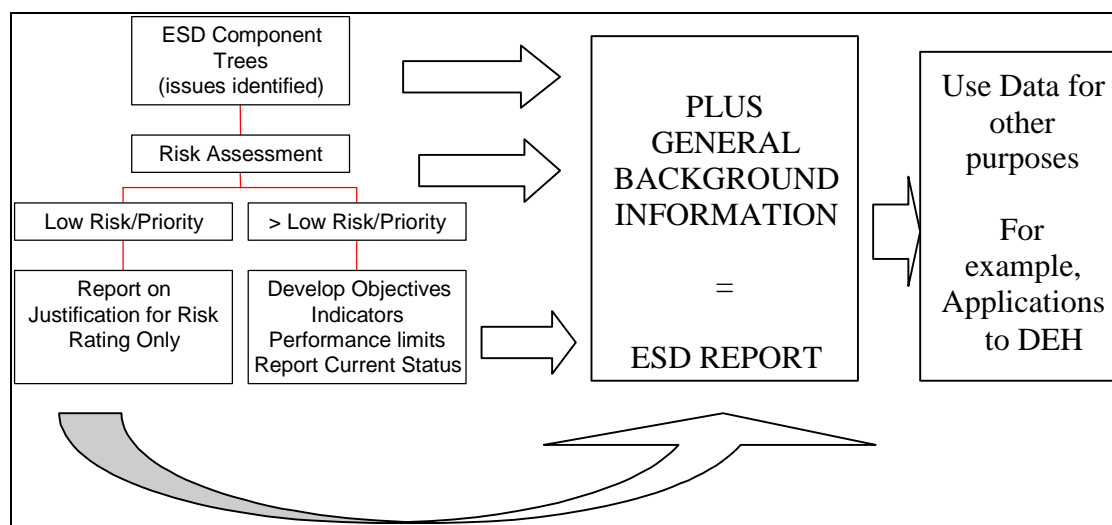


Figure 3. Summary of the ESD Reporting Framework Processes.

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 1). 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 SCFA 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 SCCF fishery during an internal workshop. This was achieved by expanding (splitting) or contracting (removing/lumping) the number of sub-components as required (see Fig. 4).

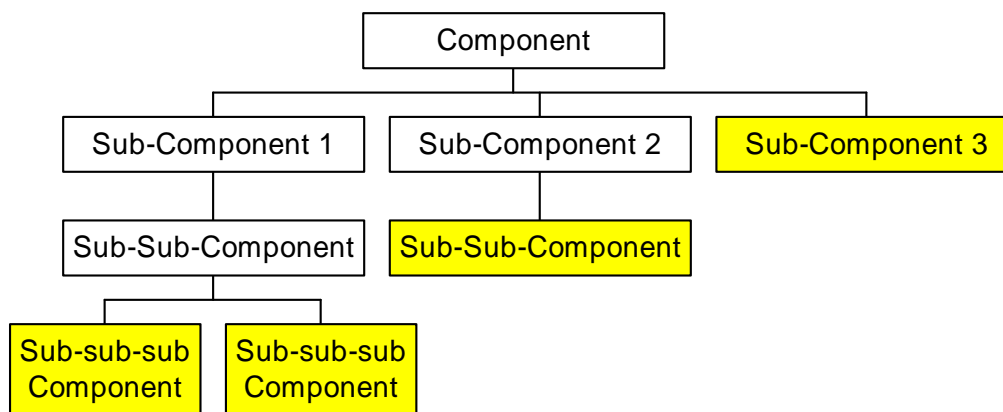


Figure 4. Example of a component tree structure.

The trees for the SCCF were developed at an internal workshop held in July 2002. Information generated by two external workshops for the WCRLMF was also used throughout this application. The stakeholders present during these two workshops for the WCRLMF included commercial industry members, recreational fishers, environmental groups, Environment Australia, Department of Environmental Protection and the Department of Fisheries staff.

3.4 RISK ASSESSMENT/PRIORITISATION PROCESS

After the components/issues were identified, a process to prioritise each of these needs was completed using a risk assessment process. The risk assessment framework that was applied at the 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.

A realistic estimate of the consequence level for each issue was made by the group at the workshop (internal or external). This level was from 0-5, with 0 being negligible and 5 being catastrophic/irreversible (see Appendix 4 for details of consequence tables). This assessment was based upon the combined judgement 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 SCCF 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, the workshop group again considered the likelihood of

the “hazardous” event (consequence) actually occurring based upon their 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 2).

Table 2. 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 3 (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 3). 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 3. The National ESD Reporting Framework headings used in this report.

<ol style="list-style-type: none">1. Rationale for Inclusion2. Operational Objective (+ justification)3. Indicator4. Performance Measure (+ justification)5. Data Requirements6. Data Availability7. Evaluation8. Robustness9. Fisheries Management Response<ul style="list-style-type: none">-Current-Future-Actions if Performance limit is exceeded10. Comments and Action11. External Drivers

Due to the similarities of this fishery with the Western Australian Rock Lobster Managed Fishery (which went through the full assessment workshop, two external workshops), only an internal workshop was held. The completion of these component reports was initiated at the initial internal workshop back in July 2002. Progress towards completing these reports was subsequently made by a variety of Departmental staff. The draft application was then sent to DEH and stakeholders (i.e. industry licensees and industry groups) for review. The final application was generated after the completion of the review process.

4. ASSESSMENT OF THE SCCF MANAGEMENT REGIME AGAINST THE GUIDELINES FOR ASSESSING THE ECOLOGICALLY SUSTAINABLE MANAGEMENT OF FISHERIES

4.1 GENERAL REQUIREMENTS OF THE GUIDELINES

The management arrangements must be:

Documented, publicly available and transparent

As per the FRMA (1994) “*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 the office during normal office hours.”*

In addition to these legislative requirements, the current management regime, as documented in the formal set of management regulations, can be purchased by interested parties from the State Law Publisher or viewed on line at <http://www.slp.wa.gov.au/statutes/subsidiary.nsf/Fisheries>.

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

Finally, once completed, the full ESD Report on the Fishery will be made publicly available via publication and electronically from the Departmental website. This will provide increased transparency through explicitly stating objectives, indicators, performance measures, management arrangements for each issue and how the fishery is currently performing against these criteria.

There is also a proposal to formally publish the relevant objectives and performance measures for each fishery, including the SCCF, in a series of Ministerial Guidelines, which would form an adjunct to the management plan.

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 requirements for procedures that must be undertaken before determining or amending all management plans. More specifically, the management arrangements for the SCCF are being developed through formal consultation with industry and also from requested submissions by industry groups (eg WA Fishing Industry Council - WAFIC), other stakeholder groups (eg

Conservation Council of WA) and the general public. Comment would also be sought from Environment Australia on the proposed management arrangements for the fishery, and any proposed future changes to those arrangements.

The Department of Fisheries conducts an annual industry meeting to discuss management arrangements and issues concerning the fishery. In addition, the regional office for the Department of Fisheries in Albany holds a public night once a year providing information to the public regarding the different fisheries in the region.

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 and community interests that have been involved in the process of determining management and reviewing stock assessments is extensive. The groups that have been involved in the generation and review of the information contained in this application include:

- Department of Fisheries, WA;
- Department of Environmental Protection, WA;
- The industry members;
- Western Australian Fishing Industry Council (WAFIC); and
- Conservation Council of WA;

The general consultation methods used for this fishery are summarised in the Governance Section 5.4.3.1.

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

The ESD Component Reports (see Section 5) contains the objectives, indicators and performance measures for determining the effectiveness of the management arrangements for the SCCF¹. 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 ESD Reports in Section 5.

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

The FRMA, and specifically the soon to be developed management arrangements for the SCCF will provide the legislative ability to control the level of harvest within this fishery. Currently, the WHARLMF and ERLMF are both limited entry fisheries based on input controls. There is a limit on the number of licensees that can operate in the fisheries and there is also a cap on the total number of pots that can operate in each fishery. Each license has a number of pots associated with it and this limits the amount of gear that they can use at any given time within the fishing season. There

¹ These will also be formally published in a set Ministerial Guidelines

are also a number of biologically based measures to assist management such as minimum sizes for each primary species in the SCCF.

Contain the means of enforcing critical aspects of the management arrangements.

The Department employs a large number of operational staff to ensure compliance with the critical aspects of the management arrangements for all of its fisheries including the SCCF. This includes landing patrols and occasionally at sea inspections. In addition, compliance staff carry out licence and gear inspections and provide advice to industry during the season.

Given the value of the licences, fishers themselves are also a source of information on illegal activities. A full summary of these compliance activities and their effectiveness is provided in Section 5.4.1.3.

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

There is an annual review of the performance for the major aspects of the Fishery through the completion of the “State of the Fisheries” report. This is updated and published each year including periodic reviews 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.

The ESD Component Reports contain comprehensive performance evaluations of the Fishery based upon the framework described in the Fisheries ESD policy (Fletcher, 2002). This includes the development of objectives, indicators and performance measures for most aspects of this fishery and includes status reports for those components that are not subject to annual assessment. This full assessment, including an examination of the validity of the objectives and performance measures, is planned to be completed and reviewed externally 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.

Capabilities for the assessment, monitoring and avoidance, remedying or mitigating any adverse impacts on the wider marine ecosystem are documented in “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. The Risk Assessment workshop was a critical part of the mechanisms to identify potential impacts of the SCCF on the wider marine ecosystems. This process did not identify any issues that posed greater than a minor risk and hence there is currently no need to implement specific monitoring for such impacts.

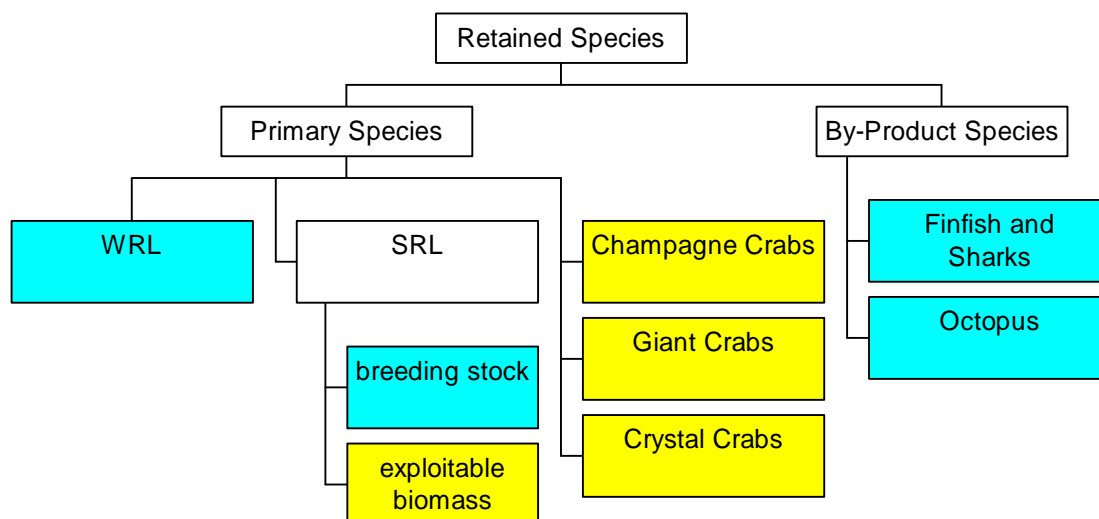
Require compliance with relevant threat abatement plans, recovery plans, the National Policy on Fisheries Bycatch, and bycatch action strategies developed under that policy.

The management regime for the SCCF complies with all the relevant threat abatement plans for species where there are significant interactions.

4.2 PRINCIPLE 1 OF THE COMMONWEALTH GUIDELINES

OBJECTIVE 1. MAINTAIN VIABLE STOCK LEVELS OF TARGET SPECIES

The 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 stocks of retained species relevant for this fishery is shown above. There are five primary species retained in this fishery, western rock lobster (*Panulirus cygnus*), southern rock lobster (*Jasus edwardsii*), champagne crabs (*Hypothalassia acerba*), giant crabs (*Pseudocarcinus gigas*), and crystal crabs (*Chaceon bicolor*). These five species have been assessed with the appropriately detailed reports having been completed. The full reports are located in Section 5.1. Only the five primary species shown above are caught in sufficient quantities by this fishery to warrant detailed attention. There are, however, reports for the other retained species (shown above as by-products) in Section 5.1.2.

The risk assessment determined that the fishery was of **Low or Negligible risk** to western rock lobster and breeding stock of the southern rock lobster because of the low exploitation by the SCCF. It was concluded that the fishery was of **Moderate risk** to the southern rock lobster exploitable biomass, champagne crabs and giant crabs. Crystal crabs were classified as a **High risk**.

Analysis of the current performance by the SCCF demonstrates that all the retained species stocks are being maintained above levels necessary to maintain ecologically viable stock levels in each area. Thus, in summary:

- The exploitable biomass for the southern rock lobster is examined annually and has been kept below 40 tonnes per annum which has been shown to be sustainable.
- The champagne and giant crabs stock are being sustainably maintained by the enforcement of a legal minimum size which allows the spawning stock for both

crab species to be maintained above levels that might cause recruitment overfishing.

- Currently, there is a prohibition on the take of crystal crabs until more information is collected to progress operational objectives for this species. The research project is due to be complete by the end of July 2004.
- The level of capture of other by-product species by this fishery is too small to have a significant impact on their dynamics.

Consequently, this fishery is meeting the requirements of Principle 1. The information relevant to this principle for these species is detailed below.

Information Requirements

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

Data are collected through a combination of fishery dependent and fishery independent systems, the former having been in place for decades. These on-going monitoring programs are supported by a number of research programs that have been conducted on the biology and ecology of the crab and rock lobster species along the west and south coast of WA as well as in other States.

Currently, the fishery dependent data collection systems in place to monitor the fishery are catch and effort data. These data are collected by a compulsory catch and effort data filled out by all fishers. The Department of Fisheries has and continues to recognise the need for more fishery independent data collection systems and thus has two projects underway to investigate the effectiveness and appropriateness of the minimum size limit currently being used as well as the catch and distribution of the commercial fishery and specific characteristics of the crystal crab caught by this fishery.

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

Monitoring Program	Information Collected	Robustness
Commercial Catch and Effort data	Hours fished; Daily catch number of individuals caught per day; Species caught	Medium
Fishery independent research on crab species FRDC Project 1999/154	Estimates of natural mortality, age/growth and fecundity to examine the appropriateness of the current legal minimum size.	High
FRDC Projects 1993/220 and 1997/132 by Levings, WA Fisheries Contract	Assessment of the appropriateness of the 140 mm legal minimum size	High

Report, 2001	for giant crabs and estimates of natural mortality, age/growth and fecundity	
FRDC Project 2001/055	Catch and distribution of commercial fishery. The size, sex ratio and relative abundance by depth of crystal crabs.	High
Climatic data	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 species/fishery and periodic review of the process and the data collected. Assessment should include a process to identify any reduction in biological diversity and/or reproductive capacity. Review should take place at regular intervals but at least every three years.

There are five main target species for the Fishery although there is a prohibition on the take of crystal crabs in place in the SCCF. An annual review for each main target species as well as a review of the performance for the fishery is conducted annually.

Western Rock Lobster

The stock of the western rock lobsters is at the southern edge of its distributional range and comprises a minor proportion of the landings in the SCCF as a whole. The only part of the SCCF where the western rock lobster forms a significant proportion of the overall crustacean landing is in the Windy Harbour/Augusta zone although it is variable. In the last few years the catch of western rock lobsters has been between 4 and 8 tonnes (Figure 5). In the last three of seasons the Albany zone has recorded an annual catch of 1.1 to 1.3 tonnes per season (Figure 5).

Puerulus settlement to this fishery is probably derived from the main location of the fishery (Western Rock Lobster Managed Fishery), which is between Bunbury and Shark Bay including the Abrolhos Islands. Based on numbers of breeding animals in this southern part of the distributional range, it is believed that much less than 0.1% of the spawning biomass is in this zone of the SCCF. There is ample evidence from which to infer that the strength of western rock lobster recruitment to the extreme southern parts of the fishery are sporadic and are driven by large-scale environmental factors rather than localised breeding stock levels in those areas (Caputi *et al.*, 1995a, b).

In terms of the western rock lobster fishery as a whole, substantial research and management attention has been focussed on ensuring that the brood stock should not become over-exploited. As a result of a decline in the brood stock, a number of management measures were introduced into the fishery in the early 1990s aimed at rebuilding the size of the brood stock. The effectiveness of the management measures have been assessed by way of an age-structured model (Hall and Chubb, 2001). The

model suggests that, by 1999/2000, egg production in the fishery was 134% of the target level (i.e. egg production in the 1980/81 season). The full performance report is located in Section 5.1.1.1.

The peaks and troughs in catches of western rock lobsters in the SCCF are due to the big variation in seasonal lobster recruitment, combined with the multispecies nature of this fishery; when western rock lobsters are abundant due to good puerulus settlement several years earlier, then the fishery (particularly the Windy Harbour licencees) target western rock lobster. When there is poor recruitment, the fishery targets crabs and southern rock lobsters.

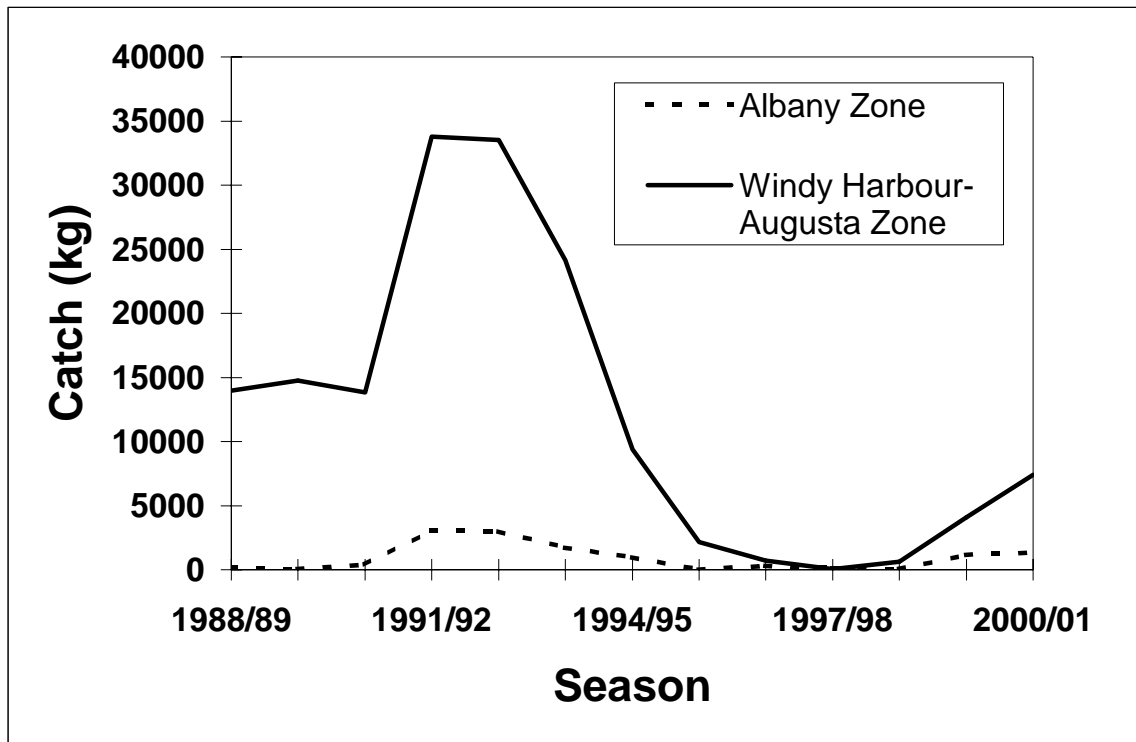


Figure 5. Catches of western rock lobster by the SCCF.

Southern rock lobster

Through a biomass dynamics model of the Western Australian portion of the south coast rock lobster resource, and from a postal survey in which commercial fisheries were asked to quantify the amount of available ground colonised by lobsters, suggest that the GAB and Albany zones are not suited to the southern rock lobster colonisation. The survey showed that these zones only have about 10% of the amount of ground available for lobster colonisation compared with what can be found in the optimal fishing areas inside the ERLMF.

The Esperance area has a long history of sustained exploitation and model results (Melville-Smith and Wright, 2001), though inconclusive would suggest that the virgin biomass of legal size south coast lobsters for this part of the fishery was substantial and in the face of exploitation remains reasonably solid. Model outputs, show that the ERLMF is sustainable at current catch levels of ~40 tonnes p.a.

Catches in the GAB and Albany zones are small in relation to the vast stretch of coastline that they cover. The annual catch of rock lobster in the Albany fishery appears to have been stabilised at around 7 tonnes p.a. but effort has increased over this period of stabilisation (Figure 6). Landings in the GAB zone are from a number of shallow-water inshore areas, which are dispersed along the coast. Catches from this zone in the fishery appear to have stabilised at around 20 to 30 tonnes p.a (Figure 6). The full performance report is located in Section 5.1.1.3.

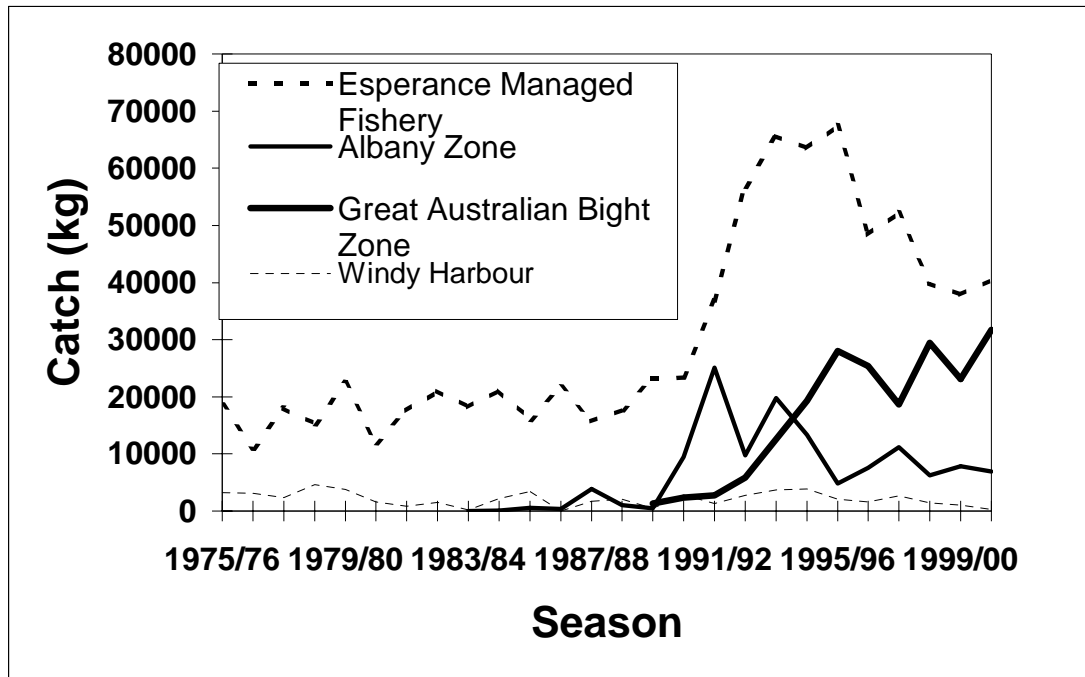


Figure 6. Catches of southern rock lobster by the SCCF.

Champagne Crabs

The total catch of champagne crabs on the south coast has been largely influenced by the catch in the Albany zone. Other than a sharp increase in the catch of champagne crabs in Albany during the 1997-1998 season (32 tonnes), the overall catch has risen slowly (with a small drop in 1999-2000) over the past 5 years. The 2000-2001 catch of 23 tonnes is 3 tonnes above the 5-year average of 20 tonnes (Figure 7).

While there are no performance measures in place for this fishery, a current FRDC project 99/154 is underway with one of the main objectives being the production of a yield per recruit and egg per recruit model. This model will provide the ability to evaluate the appropriateness of the current legal minimum size. However, until this model is evaluated if there are any major changes in annual landings within a season (eg. the champagne crab catch in the South Coast Crustacean Fishery increasing above 20 or below 5 tonnes), then investigations would be undertaken to identify the cause of these changes. The full performance report is located in Section 5.1.1.4.

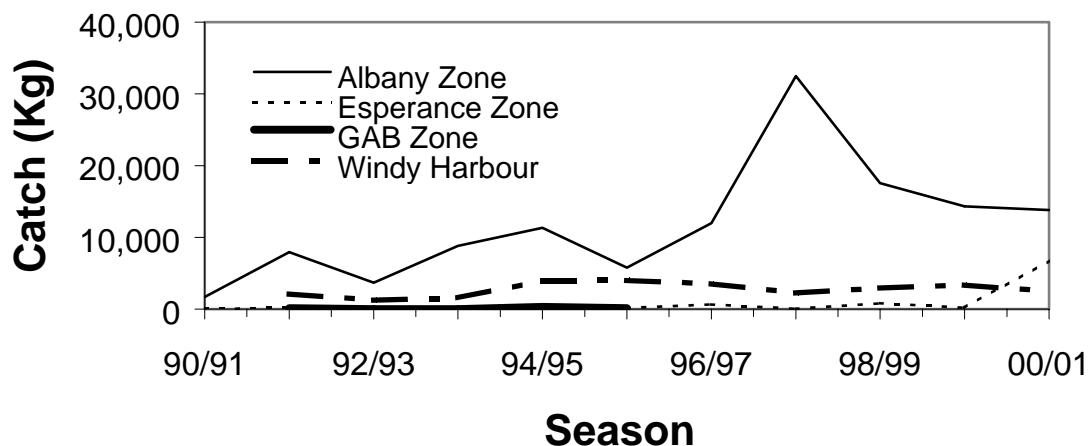


Figure 7. Catches of champagne crabs in the SCCF.

Giant Crabs

Information sourced through catch returns show that the high catches of giant crabs (particularly in the Albany zone) during the early 1990's have now declined to lower but more stable catches. The extreme low of 8 tonnes of giant crabs caught across all areas in the 1999-2000 year was followed by a combined catch of nearly 12.5 tonnes in the 2000-2001 season. This is still well below the 10-year average catch of 18 tonnes, but only just below the average catch over the more stable 5-year average of 14 tonnes.

As can be seen in Figure 8 below, the Albany zone has seen the greatest fluctuation in giant crab catches during the last ten years. Catches from this area largely drive the trends in total giant crab information sources from the south coast.

While there are no performance measures in place for this fishery, a current FRDC project 99/154 is underway with one of the main objectives being the production of a yield per recruit and egg per recruit model. This model will provide the ability to evaluate the appropriateness of the current legal minimum size. However, until this model is evaluated if there are any major changes in annual landings within a season, (eg. the giant crab catch in the South Coast Crustacean Fishery increasing above 20 or below 3 tonnes), then investigations would be undertaken to identify the cause of these changes. The full performance report is located in Section 5.1.1.5.

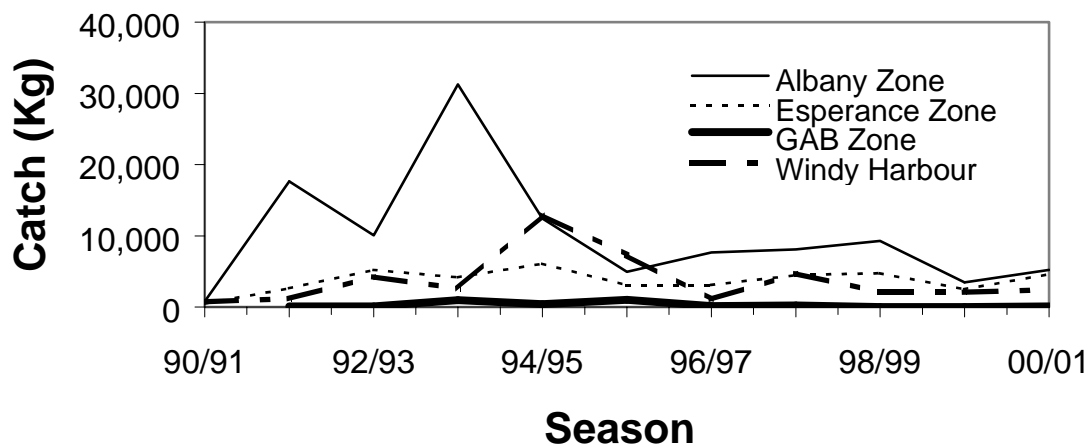


Figure 8. Catches of giant crabs by the SCCF.

Crystal Crabs

Fishermen have generally targeted other deep-sea crab species until recently because crystal crabs exist in deeper water and need to be fished with specialised gear. However, as a result of interest generated from the West Coast Deep Sea Crab fishery, effort to catch south coast crystal crabs is likely to increase if left unchecked.

The overall catch of crystal crabs on the south has been minimal. The first catches were reported in the 1993-1994 season, and remained very low (well under 100 kg) until the 2000-2001 season where the overall catch increased to 240 kg.

In October 2002 a prohibition on the take of crystal crabs was declared. This is to ensure that a well considered management plan for the potential new fishery can be formulated and secondly, until more research information on the species is available from the fishery that is both operating and being researched on the west coast.

In addition, there is a FRDC project (2001/055) underway that is collecting and evaluating data on the distribution of the commercial fishery and the size, sex ratio and relative abundance by depth of crystal crabs. The full performance report is located in Section 5.1.1.6.

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

The distribution and population parameters of southern rock lobsters are reasonably well known and in the case of western rock lobster, very well known and documented. The detailed voluntary logbook system for southern rock lobster and deep-sea crab fishing is designed to enhance this understanding. Those voluntary log book data that are available produce good data but with large gaps. While the assistance by fishers in completing the log books has not been comprehensive (for example, none of the licence holders in the Esperance Managed Fishery complete voluntary log books) there are currently no moves to make the log books compulsory. Previous experience

has shown that forcing fishers to complete log books results in poor quality data being submitted.

Southern rock lobsters are distributed along the coast of Southern Australia as far west as Cape Leeuwin. As such, the Windy Harbour/Augusta zone is considered to be at the extreme western range of the southern rock lobster distribution. There is significant published biological research available on the southern rock lobster species in South Australia, Victoria, Tasmania and New Zealand, where it is more common and supports large fisheries.

Indications from a biomass dynamics model of the Western Australian proportion of the south coast rock lobster resource, and from a postal survey (conducted in 1996) in which commercial fishers were asked to quantify the amount of available ground colonised by lobsters, suggest that the Great Australian Bight and Albany zones of the SCC fishery are not suited to southern rock lobster colonisation.

Catches in the Windy Harbour/Augusta zone of the fishery are heavily dependent on western rock lobster landings, and indications on the strength of recruitment to that fishery is provided by puerulus settlement indices monitored out of Cape Mentelle (near Margaret River). The distribution for the giant and champagne crab species is well documented. The giant crab is distributed along the southern continental shelf of Australia from the Perth Canyon in southwest Western Australia to central New South Wales (Kailoa *et al.*, 1993). It is found in depths from 18 to 400 metres with the greatest concentration of the population occurring on the outer shelf at depths between 140-270 metres (Levings *et al.*, 1995).

There is less known about the distribution of the crystal crab than the other two crab species caught in the SCCF. The precise distribution for crystal crabs is unknown but the species is found in west, north and eastern Australia. In WA the species has been reported off the WA coast from 450-1220 metres (WA Museum records) although most fishing has concentrated in the depths between 600-800 metres. The crystal crab occurs offshore at depths between 200-2000 metres in sand, mud or shell debris (Jones and Morgan, 2002). Since there is a limited amount of information on the distribution and stock dynamics for the crystal crab, the Minister placed a prohibition on the take of crystal crabs in this fishery. The Department hopes to conduct and collect more information regarding the stock dynamics and distribution for this species along the south coast through the FRDC Project 2001/055.

1.1.4 There are reliable estimates of all removals, including commercial (landings and 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 SCC fishery, data covering each of these sources of removal are outlined. In most cases, these data are collected annually or at least on a sufficiently frequent basis to ensure robust estimates are available.

Sector	Catch Data Collected	Frequency
Commercial	Catch Disposal Records	Annually
Recreational	Mail surveys	Annually
Indigenous	N/A	N/A
Illegal	Estimated from compliance data	Annually

There is a good time series of data describing the commercial catch of southern rock lobsters since the mid 1970s. The detailed catch and effort information is described in guideline 1.1.2 of this document. With reference to discards, there are discards of southern rock lobster when the rock lobster season is closed and fishermen are still taking deep-sea crabs. The quantity of discards is not assessed. However, the lobsters are always released live, and research in the WCRLMF has shown that survival rates of lobsters being returned to deep water are high (Brown and Caputi, 1986). Data on berried and undersize animals returned to the sea are recorded by the voluntary logbook program.

The recreational component of the SCCF in particular rock lobsters is assessed by a mail survey of recreational rock lobster licence holders. Based on survey results, the catch of southern rock lobsters by recreational fishers is less than 10 tonnes per year.

There is a large amount of very reliable information concerning recreational western rock lobster catches on the West Coast (outside of the area assessed by this report) and in the Windy Harbour/Augusta zone. Mail surveys of a subsample of 3,000 to 4,000 licenced recreational fishers are undertaken each year at the end of the fishing season according to the methods described in Melville-Smith and Anderton (2000). Recreational catches of western rock lobsters from the South Coast Crustacean Fishery region of the coast are negligible compared to the rest of the west coast.

1.1.5 There is a sound estimate of the potential productivity of the fished stock/s and the proportion that could be harvested.

Stock assessments using a biomass dynamics model, have been updated annually for the southern rock lobster fishery in the Esperance, Albany and Bight regions of the fishery, since the mid to late 1990s. In recent times more emphasis has been placed on the model for the Esperance fishery than the other two zones, because the Esperance southern lobster fishery is much larger and has a far longer time series than the other two areas and in addition, the data is more suited to the model. The problem with using catch and effort data for the Albany and Bight zones, is that catch rates in the Albany zone is confounded by the multi species nature of that fishery, while in the case of the Bight, the fishery is a series of localised pockets of lobster abundance rather than a continuous fishing ground. These assessments are undertaken by staff from the Western Australian Department of Fisheries.

The Esperance area has a long history of sustained exploitation of rock lobsters and model results (Melville-Smith and Wright, 2001), although inconclusive, suggests that the virgin biomass of legal size southern rock lobsters for this part of the fishery was substantial (of the order of 400-1,000 tonnes) and despite exploitation remains reasonably stable (at round 350 tonnes). Model outputs show that the ERMLF fishery is sustainable at current catch levels around 40 tonnes p.a., but not if the catches of 60

tonnes p.a. were being taken, means that if latent effort is utilised in the future, that localised depletion will likely result.

Stock assessments for the GAB and Albany zones show that sustainable yields in both zones are small and, given the excessive amount of latent effort in these zones, any large scale activation of this effort could easily lead to either or both of these zones becoming uneconomic. The potentially economically unsustainable fishing pressure in the neighbouring zones should not affect the ERLMF, as recruitment to that zone is not considered to necessarily be dependent on egg production from Western Australian waters – a view shared by the detailed study of the larval biology and ecology of the southern rock lobster fishery Bruce *et al.* (undated), which concluded that it is “possible that egg production in certain regions is more important in sustaining the fishery than from others”.

Catches of southern rock lobster in the Windy Harbour/Augusta zone have historically never been particularly high. There were a few seasons in the 1980s when the catch was around 4 tonnes, but over most of the last 16 years the catch has been in the vicinity of 1 to 2 tonnes p.a. Importantly, this zone is on the extreme western edge of the southern rock lobster puerulus settlement limits, and as such, settlement is therefore probably very sporadic. Catches reflect the availability of stock rather than effort. Since recruitment to this part of the fishery is almost certainly from regions of the fishery where the stock is in greater abundance there is no risk of localised depletion of this small southern rock lobster population.

At present, minimum carapace sizes are in place for champagne (92 mm) and giant crabs (140 mm). Research conducted by Levings *et al.* suggests that the minimum size for giant crabs will maintain the spawning biomass at 35% of the unfished level. It is also thought that the minimum size for champagne crabs will maintain a spawning biomass at 85% of the unfished level.

As part of the new management arrangements, the Department is considering the introduction of a minimum carapace size for crystal crabs of 120 mm. It is expected that this will provide protection to at least 80% of breeding female crystal crabs.

Management Responses

1.1.6 There is a reference point (target and/or limit), that trigger management actions including a biological bottom line and/or a catch and effort upper limit beyond, which the stock should not be taken.

Currently, there are no reference points for the catch of western rock lobster in the SCCF due the minor catches that are made by this fishery although there is a biologically based measure to assist management. The legal minimum size for western rock lobster is 77 mm carapace length from 15 November to 31 January and 76 mm carapace length from 1 February to 30 June.

Catches of western rock lobsters in the SCCF reflect the availability of stock rather than effort. Since recruitment to this part of the fishery is undoubtedly from settlement with origins from the more northerly regions of the fishery where the stock is in greater abundance, there is no risk to the SCCF fishery from depleting this periodic flush of western rock lobster recruitment.

In the Esperance zone for the catch of southern rock lobster however there is a reference point. The upper catch limit before management and research strategies are reviewed for this fishery is 40 tonnes (see 1.1.5 above).

At this stage there are no reference points or catch trigger limits in the Windy Harbour/Albany zones or the Albany and GAB zones for southern rock lobster. However, given the high likelihood that the parent stocks are in South Australian, Victorian or Tasmania waters, any catch triggers placed on these fisheries would be in an effort to sustain the fisheries in an economic as opposed to biological sense.

There is a legal minimum for southern rock lobster in all zones of the fishery, which is 98.5 mm carapace length. As noted in Phillips *et al.* (2000), there are various minimum sizes for the sexes in the five states over which the species occurs. These size differences are due to differences in size at maturity in the different areas and non-biological historic decision, which in some cases were based on a size that the market would accept. No information is available on size at sexual maturity of the sexes in Western Australia and the minimum size in this state would appear therefore to have been made on non-biological grounds.

The take of the crab species within the SCCF is controlled by minimum legal sizes to ensure that the spawning stock size is at a level above which risk to recruitment overfishing is not apparent. The minimum legal sizes are as follows:

- Champagne crabs 92 mm.
- Giant crabs 140 mm.
- Crystal crabs 120 mm.

Crystal crabs are not a primary target of the SCCF, however landings on the west coast of Western Australia have created an expectation that there might be a similar bonanza on the south coast. To limit exploitation of crystal crabs on the south coast a one-year ban on fishing has been declared, until such time as a well considered management plan for the potential new fishery can be formulated and secondly, until more research information on the species is available from the fishery that is both operating and being researched on the west coast.

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

A full description of the management arrangements for the fishery is located in Section 2. A full discussion of the main regulations and their justifications are located in Section 2.2. The fishery is managed through input controls, which include:

- Defined pot sizes and designs (i.e. required to be fitted with escape gaps);
- Limits to the number of pots that may be fished per vessel;
- Fixed period for the annual fishing season;
- Biological restrictions;
- Compliance policing includes gear checks; and
- Legal minimum sizes for the rock lobster and crabs.

Licences to fish for rock lobster off the south coast are issued in accordance with either the WHARLMF management plan or the ERLMF management plan as managed fishery licences. There are (or have been) specific criteria in each plan regarding the issue of licences. There are 11 licences in the ERLMF and 2 licences in the WHARLMF. It is very unlikely that more managed fishery licences will be issued under the authority of these plans. The authority to issue a new licence has been removed from the ERLMF management plan.

As previously mentioned in Section 2, the take of rock lobster on the south coast outside of the areas described by the Esperance and Windy Harbour/Augusta zones are currently managed under Regulation 125 of the FRMR. This regulation provides for the issue of rock lobster pot licences. The 28 licences issued for these two zones currently endorse the use of a total of 3837 rock lobster pots. Usually only 10 or 12 of these licences are active in a season and only a fraction of these fish for rock lobster with any consistency.

The large number of pots in the fishery has worked to the advantage of management by discouraging specialised or intensive rock lobster fishing. As a result, the fishery consists of fishermen who set pots in conjunction with other diversified fishing operations or only fish at times of relatively high local abundance.

The level of take in the lobster fisheries is also controlled by minimum sizes. The minimum carapace size for all southern rock lobsters is 98.5 mm. In addition, while there are no restrictions on pot sizes for the rock lobster fishery aspect, positions and sizes are set for escape gaps in the pots to minimise the capture of undersized lobsters.

Seasonal restrictions also limit the level of take. At present, the rock lobster season on the south coast mirrors the west coast rock lobster season (15 November to 30 June each year).

Management arrangements for the other species of crustaceans (deep-sea crabs) taken commercially off the south coast of Western Australia is provided for in a condition [endorsements] on fishing boat licences.

As a result of the complex and developing nature of this fishery since the late 1960s, the current management arrangements for crustacean fisheries on the south coast have been developed over a long period of time to address specific area issues. In turn, this has produced layers of complexity that contribute to inefficiencies in administration, management and compliance. The Department is currently developing management arrangements for the south coast crustacean fisheries that synthesise the current management plans, regulation licences and deep-sea crab endorsements. This will result in one fishery the SCCF that will encompass the currently two managed fisheries and two zones.

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

The design of the pots (i.e. positioning of the escape gaps) are so as to allow small animals (including under-size lobsters, octopus, fish etc) to pass through the escape

gap as the pot is hauled to the surface if they have not already escaped while the pot is soaking. Therefore, the fishery only catches 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 SCCF are located in sections 5.1.2.1 and 5.1.2.2. None of the by-product species were rated as having a sufficient risk to require specific ongoing monitoring.

Finfish and Sharks - Summary

ERA Risk Rating (C0 L4 NEGLIGIBLE)

Compulsory catch and effort statistics submitted by Southern Coast Crustacean pot fishers show large year-to-year fluctuations of fish and shark by-product. The only consistent fish species to appear in the catches is the leather-jacket and that species has generally accounted for an annual catch of about 3 tonnes. Wobbegong sharks also appear regularly each year, but only account for about 100 kg p.a. Since rock lobster pots are a very inefficient way to catch fish, only small numbers of fish are caught. Those fish caught in pots that are above their respective legal minimum size are retained, while all others are released.

Octopus – Summary

ERA Risk Rating (C0 L4 NEGLIGIBLE)

Anecdotal evidence from fishers indicates that these animals are a regular part of the catch in low numbers in shallow waters (B. Kent, retired rock lobster license holder and skipper, pers. comm.). Estimates from logbooks indicate that approximately one octopus is caught every 50 pots in inshore areas, but data from compulsory catch and effort sources show annual landings to only be about 500 kg per season. The octopus that are caught are generally kept. The low numbers of octopus caught and returned by pot fishers is considered to pose a negligible risk to the octopus breeding stock.

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

There are management responses that are currently in place for the SCCF and are detailed for current actions, future actions and if the performance limits are reached/approached (see Section 5.1.1.1 – 5.1.1.6). As was previously discussed in Guideline 1.1.7, this fishery is managed through input controls, which has been effective in managing the fishery.

Strategies, which are readily available to offer further protection to the stocks if required include:

- Decreasing the number of licensed pots;
- Reduction in the length of the fishing season; and
- Revision of the legal minimum size.

OBJECTIVE 2. RECOVERY OF STOCKS

Where the fished stock(s) 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 the SCCF that are currently below defined reference points/limits.

Management Responses

1.2.1 A precautionary recovery strategy is in place specifying management actions, or stages management responses, which are linked to reference points. The recovery strategy should apply until the stock recovers, and should aim for recovery within a specific time period appropriate to the biology of the stock.

N/A.

1.2.2 If the stock is estimated as being at or below the biological and/or effort bottom line, management responses such as a zero targeted catch, temporary fishery closure or a 'whole of fishery' effort or quota reduction are implemented.

N/A.

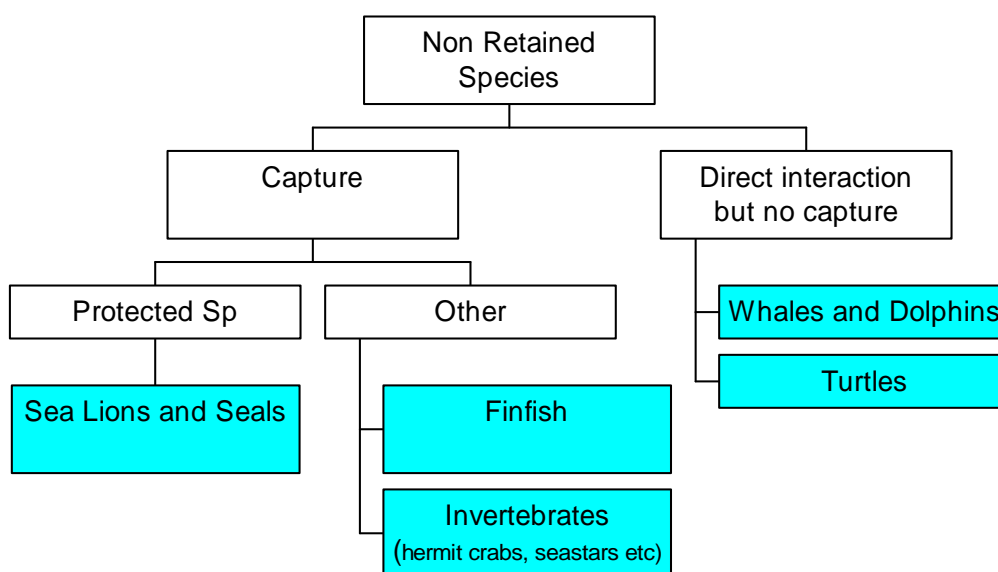
4.3 PRINCIPLE 2 OF THE COMMONWEALTH GUIDELINES

OBJECTIVE 1. BYCATCH

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

There are relatively few non-retained species caught by the SCCF. As a potting fishery utilising pots designed to catch lobsters of a certain size, it is relatively selective method of fishing. Only a few non-retained species were identified of significance in this fishery which are shown in the component tree below and two of these are not actually captured in the pots but interact with the ropes.

Comprehensive reports on each of these bycatch (non-retained) species are presented in Section 5.2 NON-RETAINED SPECIES. This assessment indicates that the performance of the SCCF is currently adequate in not threatening 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.

Data is collected by the Department of Conservation and Land Management on the interactions between the fishers in the SCCF and turtles. Data has been collected on interactions between fishers and turtles since 1973.

Research has also been conducted on the interactions of sea lions and seals with fishers in the south coast of Western Australia. Mawson and Coughran have collected records of sick, injured and dead pinnipeds in Western Australia between 1980-1996.

Assessments

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

A formal risk assessment for the identified non-retained/bycatch species (including those caught by pots and entangled within ropes) was completed (see Section 3.4 for details). This assessment concluded that the Fishery was of negligible risk to finfish and invertebrates.

Finfish– Summary

ERA Risk Rating (C0 L5 NEGLIGIBLE)

Anecdotal evidence from conversations with fishers indicates that a range of fish is caught in pots, generally infrequent, in small numbers. According to Mr Ross Daniels (Didyoubingabeer Fish Processors, Esperance), in the deep, these include Banana yellow leather jackets, Cherokees (small species of queen snapper), occasional eel species and a species of knife jaw, all of which are used for bait in the pots. In the shallows breaksea cod, Bight red fish, gummy shark, a species of queen fish and harlequins are all occasionally taken and these are usually brought ashore and sold if they are big enough. Most fish that do enter the pots are able to escape either through the entrance at the top of the pot or through the rock lobster escape gaps at the base of the pot. Due to the placement of the escape gaps small animals are able to pass through the escape gap as the pot is hauled to the surface if they haven't already escaped while the pot is soaking.

Invertebrates – Summary

ERA Risk Rating (C0 L4 NEGLIGIBLE)

According to Mr Bill Kent (retired rock lobster licence holder and skipper, Esperance), a range of invertebrate animals other than octopus is infrequently caught in pots. This includes starfish, hermit crabs, spider crab, shellfish and cuttlefish. The invertebrate species caught in the pots are discarded as the pot is emptied. Most invertebrates are able to exit the pots through the escape gaps, the few that do not escape such as starfish (which get their legs caught in the pot) are returned to the sea quickly and, based on Mr Kent's judgement, are unlikely to suffer mortality from being brought to the surface.

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 current pot designs, particularly since the introduction of escape gaps, minimise the capture of most bycatch species. The bycatch information is currently monitored through compulsory catch and effort returns and conversations with fishers.

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.

Given the relatively low levels of interactions of the Fishery with non-retained species and the relatively selective method of fishing used in the fishery it is likely that that the level of interaction will continue to be only minimal and acceptable levels of impact will occur.

If there are inappropriate and/or the level of interactions increases, appropriate alterations to practices will be taken.

OBJECTIVE 2. PROTECTED, THREATENED AND ENDANGERED 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.

The Department of Conservation and Land Management has been collecting information on the interactions between fishers and turtles since 1973. This has been discussed in further detail in Section 5.2.2.2.

Mawson and Coughran have collected and published information on records of sick, injured and dead pinnipeds in Western Australia. These records span from 1980 – 1996 and have been discussed in Section 5.2.1.1.

The Department of Conservation and Land Management has also collected information on whale interactions throughout the Western Australian state between 1985 and 2002.

Assessments

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

A risk assessment for each of the identified non-retained/bycatch species (including those caught by the pots and entangled within the ropes or hit by boats) was

completed. In the capture category, this assessment concluded that the fishery was of low risk to sea lions and seals. For the direct interaction but no capture category for non-retained species, this assessment concluded that the fishery was of negligible risk to whales and dolphins and turtles.

Capture

Sea Lions and Seals – Summary

ERA Risk Rating (C1 L4 LOW)

The Australian sea lion (*Neophoca cinerea*) and the New Zealand fur seal (*Arctocephalus forsteri*) are both residents of the south coast of Western Australia and breed along the coast and island areas.

While no specific south coast data is available, data for all Western Australian waters show that the Australian sea lion was the most common species killed (92%) by human influences (shot, boat propellers, lobster pot/line, fishing line/hooks, nets, speared, plastic bands, clubbed)(Mawson and Coughran, 1999a). Of the 51 pinnipeds that are believed to have died from human influences between 1980 and 1996, 7 (13%) were from interactions between lobster fishing gear and pinnipeds (ibid). This equates to an overall low number of pinnipeds killed by lobster fishing gear in Western Australian waters (7 dead in 17 years) and thus would have little impact on the breeding stock.

Direct Interaction

Whales and Dolphins – Summary

ERA Risk Rating (C0 L4 NEGLIGIBLE)

Two species of whales are regularly observed migrating along the south coast of Western Australia, the Humpback whale (*Megaptera novaengliae*) and the Southern Right Whale (*Eubalaena australis*). Of the 18 whale encounters, specifically attributed to lobster ropes reported for WA between 1985 and 2002, 17 involved Humpback whales and one with a Southern right whale (D. Coughran, Department of Conservation and Land Management, Perth Office, pers. comm.). None of those resulted in the death of a whale. No data specifically dealing with the south coast of WA is currently available however from what is known of the migration patterns of the two commonly found species, at least one incident with the Southern Right whale most likely occurred on the south coast. The lack of any whale mortalities attributable to lobster fishing gear justifies the negligible risk rating for this issue.

In addition, reports from the whole of the WA state from 1985 to 1994 did not record a single incidence where lobster fishing gear interfered with dolphins (D. Coughran, Department of Conservation and Land Management, Perth Office, pers. comm.). This lack of interaction justifies the negligible risk rating accorded to this issue.

Turtles – Summary

ERA Risk Rating (C0 L3 NEGLIGIBLE)

The two types of sea turtles found on the south coast are the Leatherback turtle (*Dermochelys coriacea*) and the Loggerhead turtles (*Caretta caretta*). The main risk of interactions between fishing operations and turtles in the SCC fishery are from boat strikes and entanglement in ropes and lines, not from being caught in pots. Turtle interactions reported by Department of Conservation and Land Management are few, ~8 cases from 1973 to 2001 have been reported on the south coast of Western Australian (R. Prince, Department of Conservation and Land Management, Perth Office, pers. comm.). The occasional (<1 per year) entanglement of turtles in pot lines (R. Prince, Department of Conservation and Land Management, Perth Office, pers. comm.) indicates a low risk associated with using crustacean fishing gear.

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 the Fishery.

Management Responses

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

The current pot designs, particularly since the introduction of escape gaps, minimise the capture of most bycatch species. As previously mentioned in 2.1.3, data is being collected on the interactions fishers are having with turtles, whales and dolphins and sea lions and seals. At present, the interactions with all protected species is minimal but if it there was an increase seen in the interactions management actions would be implemented.

For the Western Rock Lobster Managed Fishery, monitoring of the rate of capture of sea lion juveniles is currently being conducted. If this indicates that there is a higher risk than presently believed with the interactions between fishers and sea lions, trials on changes to the gear will result which would be incorporated into the SCCF.

If there is evidence of increasing levels of capture or interaction with sea lions and seals, whales and dolphins and turtles then the Department will look into trialling a range of methods to minimise the interactions or captures (eg weighted pot ropes for interactions with large pelagic species).

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.

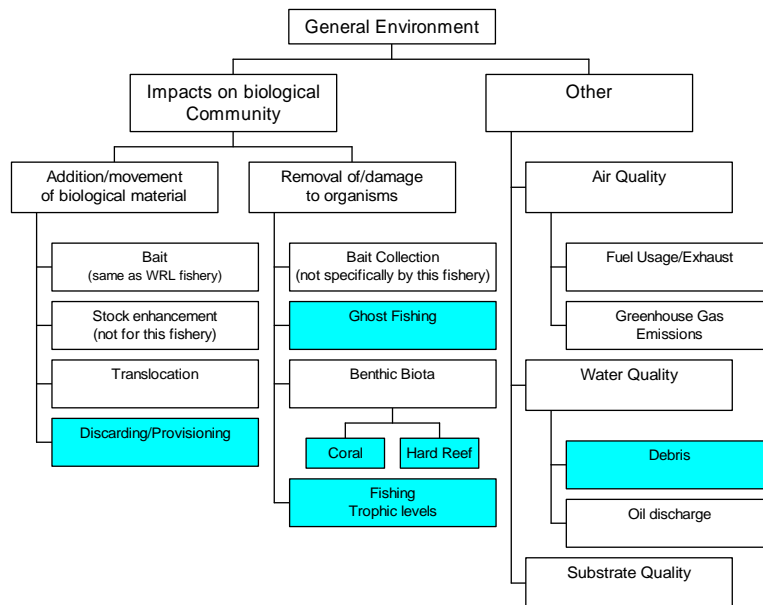
Given the relatively low levels of interactions of the SCCF with non-retained species, it is likely that the current situation of only having minimal and acceptable levels of impact on these threatened species by the SCCF will continue or diminish further. Nonetheless, as monitoring data becomes more available, the suitability of the current performance limits may need to be reviewed. If there 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, which were identified for this fishery are shown below in the 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.

All six of the issues identified were rated as negligible risks. Consequently, the Fishery’s current performance is meeting Objective 3 and this acceptable performance is likely to at least continue or improve in the future due to the implementation of further management arrangements.



Information Requirements

2.3.1 Information appropriate for the analysis in 2.3.2 is collated 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 collected directly related to the Fishery – in terms of the levels of catch and effort, biomass dynamics model, postal survey, legal minimum sizes and gear designs. There are also a number of research projects (FRDC Project 99/154) underway, which are improving in particular, our understanding of the biology and ecology of the crab species (see Section 5.1.1.4.). These FRDC-funded projects are providing data on the depth distributions of the deep-water crabs on the

south coast, movement patterns, in some cases growth rates and associated fauna. This information has been critical in the development of appropriate management responses.

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.

The complete list within the guidelines are: Impacts on ecological communities – benthic communities, ecologically related, associated or dependent species, water column communities; Impacts on food chains- structure, productivity/flows; and Impacts on the physical environment- physical habitat, water quality. Table 4 shows the issues that were identified for this SCCF that fall under the above guidelines.

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 4- complete justification are located in the performance reports in Section 5.3.

Table 4. Summary of Risk Assessment Outcomes for Environmental Issues Related to the SCCF.

ISSUE	RISK	SUMMARY JUSTIFICATION	FULL DETAILS
Impact on biological community by the addition of biological material:			5.3.1
Discarding/Provisioning	Negligible	The amount of finfish and invertebrates that are discarded is small for the fishery due to the relative selectivity of pot fishing resulting from the design of the pots. There are three escape gaps and one entrance hole in each pot, which allows for finfish and invertebrates to exit the pots when it is soaking and when it is being lifted.	5.3.1.1
Impact on biological community from the removal of/damage to organisms:			5.3.2
Impact from ghost fishing	Negligible	The gear used in this fishery generates minimal non-retained species and the design of the pots is such that they do not 'ghost fish' if lost. Anecdotal evidence and underwater observations by Fisheries staff clearly shows that rock lobsters (and other large animals) are rarely seen in any type of pot without bait. It is intended that under the new management plan, the pot design and size used in all the different zones of the SCC fishery will be standardized.	5.3.2.1
Impact to benthic biota	Negligible	Coral is occasionally brought to the surface	5.3.2.2

- Coral		after being entangled in the chicken wire used on the pots, but these occurrences are infrequent and damage is considered to be minimal.	
Impact to benthic biota – Hard Reef	Negligible	The fishery largely operates over granite habitat although the license area includes limestone habitats. The impact of the pots on the granite and limestone habitat is considered to be minimal due to the hard nature of the habitats.	5.3.2.3
Impacts to fishing trophic levels	Negligible	Southern rock lobsters and giant and champagne crabs are considered to be high up the trophic food chain and their exploitation is therefore unlikely to have had a significant impact on species in higher trophic levels. In terms of the effect that their exploitation might have had on the lower trophic levels, the minimum sizes are such that only a relatively small portion of the standing stock is harvested. Furthermore, the fishery covers over 1000 km of coastline and only produces around 10 tonnes of product per year.	5.3.2.4
Other Impacts- Water Quality:			5.3.3
Debris	Negligible	There is a general code of practice among rock lobster fishers to return packaging and garbage back to the wharf. Waste disposal bins are located at all points where commercial boats tie up. Fishermen are aware of the related public perception and sensitivities and do not discard pollutants overboard.	5.3.3.1

Thus, all of these issues were rated as negligible 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 methods required to ensure that there is minimal impact on the broader ecosystem are ensuring there is sufficient stock/biomass levels of rock lobsters and crabs are maintained. In most cases this serves to achieve both objectives (eg a sustainable fishery and minimal impacts on any trophic interactions). Additionally, since this fishery uses a very selective means of fishing, this helps to preclude any damage to the surrounding habitat and environment (eg by-product and bycatch species are minimal). Other management measures such as limiting the number of fishers and pots, setting of minimum legal catch sizes, seasonal closures, designs of the pots, and future research also further minimise the potential for impacts.

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 of sufficient risk to require specific target levels as they are effectively covered by the other management arrangements.

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

Given that the risk assessment identified that under current management arrangements there have been minimal or negligible impacts from the SCCF on the broader ecosystem even after around 30 years of fishing, it is highly likely that the fishery will continue to meet the objectives of having only acceptable levels of impacts. 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 Western Rock Lobster	No-Negligible Risk	N/A	N/A	N/A	N/A	1.1.1 – 1.1.7	Review Risk at next major assessment.
5.1.1.2 Southern Rock Lobster- Breeding Stock	No-Negligible Risk	N/A	N/A	N/A	N/A	1.1.1 – 1.1.7	Review Risk at next major assessment.
5.1.1.3 Southern Rock Lobster- Exploitable Biomass	Yes	Analysis of the biomass dynamic model and catch and effort	Catch remain around 40t for Esperance fishery	Acceptable	Medium	1.1.1 – 1.1.7	Continue current monitoring, management and assessment arrangements.
5.1.1.4 Champagne Crabs	Yes	Catch	N/A	Acceptable	Low	1.1.1 – 1.1.7	Continue current monitoring, management and assessment arrangements.
5.1.1.5 Giant Crabs	Yes	Catch	N/A	Acceptable	Low	1.1.1 – 1.1.7	Continue current monitoring, management and assessment arrangements.
5.1.1.6 Crystal Crabs	No as there is a ban on take of this species.	N/A	N/A	N/A	N/A	1.1.1 – 1.1.7	The take of this species will be reassessed following the results of the research project.
5.1.2.1 Finfish and Sharks	No-Negligible Risk	N/A	N/A	N/A	N/A	1.1.1 – 1.1.7	Review Risk at next major assessment.
5.1.2.2 Octopus	No-Negligible Risk	N/A	N/A	N/A	N/A	1.1.1 – 1.1.7	Review Risk at next major assessment.

Issue	Objective Developed	Indicator Measured	Performance Measure	Current Performance	Robustness	Guidelines Covered	Actions
NON-RETAINED SPECIES (Component Tree)						2.1,2.2	
5.2.1.1 Sea Lions and Seals	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 Finfish	No- Negligible Risk	N/A	N/A	N/A	N/A	2.1.1 – 2.1.6	Review Risk at Next Major Assessment
5.2.1.3 Invertebrates	No- Negligible Risk	N/A	N/A	N/A	N/A	2.1.1 – 2.1.6	Review Risk at Next Major Assessment
5.2.2.1 Whales and Dolphins	No- Negligible Risk	N/A	N/A	N/A	N/A	2.2.1 – 2.2.6	Review Risk at Next Major Assessment
5.2.2.2 Turtles	No- Negligible Risk	N/A	N/A	N/A	N/A	2.2.1 – 2.2.6	Review Risk at Next Major Assessment
GENERAL ENVIRONMENT (Component Tree)						2.3	
5.3.1.1 Discarding/Provisioning	No- Negligible Risk	N/A	N/A	N/A	N/A	2.1.1 – 2.1.6	Review Risk at Next Major Assessment
5.3.2.1 Impacts from Ghost Fishing	No- Negligible Risk	N/A	N/A	N/A	N/A	2.2.2 – 2.2.6	Review Risk at Next Major Assessment
5.3.2.2 Impacts to Benthic Biota- Coral	No- Negligible Risk	N/A	N/A	N/A	N/A	2.2.2 - 2.2.6	Review Risk at Next Major Assessment
5.3.2.3 Impacts to Benthic Biota- Hard Reef	No- Negligible Risk	N/A	N/A	N/A	N/A	2.2.2 - 2.2.6	Review Risk at Next Major Assessment
5.3.2.4 Impacts to Fishing Trophic Level	No- Negligible Risk	N/A	N/A	N/A	N/A	2.2.2 - 2.2.6	Review Risk at Next Major Assessment

Issue	Objective Developed	Indicator Measured	Performance Measure	Current Performance	Robustness	Guidelines Covered	Actions
GENERAL ENVIRONMENT (cont.)						2.3	
5.3.3.1 Debris	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 SCCF

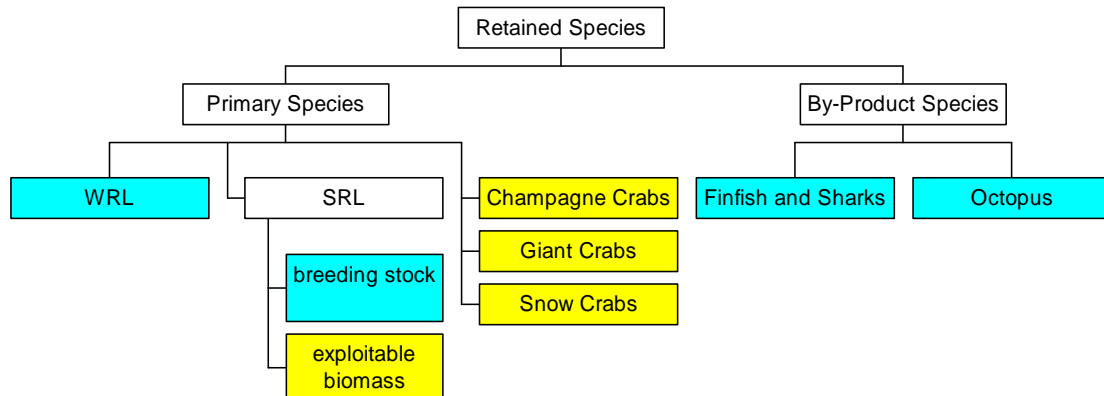


Figure 9. Component tree for the retained species.

Yellow boxes indicate that the issue was considered high enough risk at the July 2002 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 – generally only the justification is presented.

5.1.1 PRIMARY SPECIES

5.1.1.1 WESTERN ROCK LOBSTER

Rationale for Inclusion:

The western rock lobster (*Panulirus cygnus*) comprises a minor proportion of the landings in the SCCF. The only part of the SCCF where western rock lobster form a significant proportion of the overall crustacean landings, is in the Windy Harbour/Augusta zone but small catches of Western rock lobster are also made in the Albany zone (Figure 10).

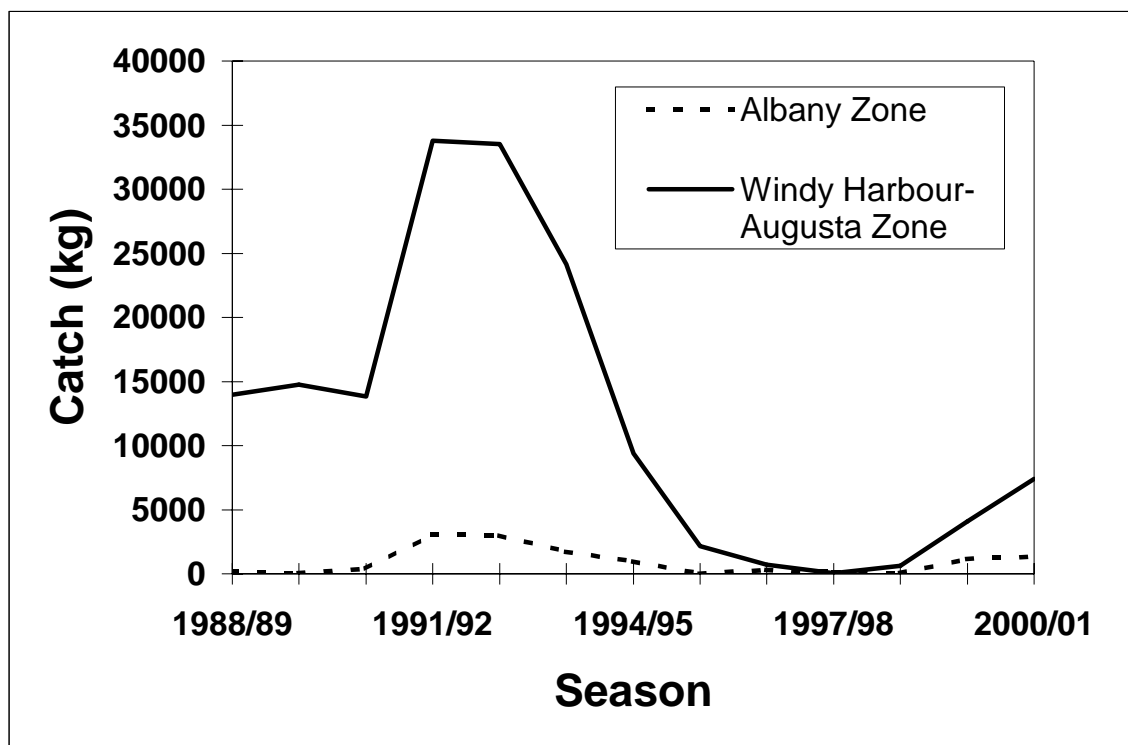


Figure 10. Seasonal catches of western rock lobster by management area, 1988/89 to 2000/01.

ERA Risk Rating: Impact on breeding stock (C0 L4 NEGLIGIBLE)

The stock of the western rock lobster in the Windy Harbour/Augusta zone is at the southern edge of its distributional range. Puerulus settlement to this region is probably derived from the location where the main fishery operates (Western Rock Lobster Managed Fishery), which is between Bunbury and Shark Bay including the Abrolhos Islands. It is considered that the broodstock in the Windy Harbour/Augusta zone makes an insignificant contribution to the western rock lobster larval pool. Based on numbers of breeding animals in this southern part of the distributional range, it is believed that much less than 0.1% of the spawning biomass is in this region/zone. There is ample evidence from which to infer that the strength of Western rock lobster recruitment to the extreme southern parts of the fishery are sporadic and are driven by large-scale environmental factors such as the Leeuwin Current rather than localized breeding stock levels in those areas (Caputi *et al.*, 1995a,b).

In terms of the Western rock lobster fishery as a whole, substantial research and management attention has been focused on ensuring that the brood stock should not become over-exploited. As a result of a decline in the brood stock, a number of management measures were introduced into the fishery in the early 1990s aimed at rebuilding the size of the brood stock. The effectiveness of the management measures has been assessed by way of an age-structured model (Hall and Chubb, 2001). The model suggests that, by 1999/2000, egg production in the fishery was 134% of the target level (i.e. egg production in the 1980/81 season).

While management measures such as those introduced in the 1993/94 season are in place to protect the brood stock, there seems to be little likelihood of recruitment to the fishery declining in the future due to overfishing. With the breeding stock at levels, which are considered adequate for the fishery, environmental effects will be the major factors driving future variation in catch abundance.

Since the 1970s fishers in the Windy Harbour/Augusta zone have been fishing for western rock lobster. In recent years, there has been a significant reduction in effort for this zone due to the now accepted view that too much effort (14 fishers with 1103 pots) was allocated in the fishery when it became a managed fishery in 1987. In the 1994/95 season there was a downturn in recruitment of western rock lobsters into the fishery, which led to the license holders in the fishery suffering severe economic hardship at that time. Subsequently, the management plan was revised in 1996 and a direct result was the reduction of effort to its present level of only two fishers utilizing a total of 350 pots. The catch of western rock lobsters in the Windy Harbour/Augusta zone is variable, but in the last few years has been between 4 to 8 tonnes per season compared to 10,000 tonnes off the west coast.

In the last couple of seasons the Albany zone has recorded an annual catch of 1.1 to 1.3 tonnes per season.

The fact that the contribution of the breeding stock to the Windy Harbour/Augusta and Albany zones is considered to be of no consequence to the SCCF, led to the fishery for these lobsters on the south coast being allocated a 'negligible' risk rating.

5.1.1.2 SOUTHERN ROCK LOBSTER - BREEDING STOCK

Rationale for Inclusion:

The SCCF lands substantial (between 40-105 tonnes over the last decade) quantities of southern rock lobsters (*Jasus edwardsii*). The species is a primary target of the SCCF.

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

Southern rock lobsters have a lengthy larval life (current estimates 12 to 24 months) and travel great distances from where they are released (Booth and Breen 1994, Bruce et al., undated). The annual landings of Southern rock lobster in Western Australia represent approximately 2% of the total landings for Australia. Recruitment to this fishery is presumed to be derived from the significantly larger stocks located in South Australian, Tasmanian and Victorian waters and as such, the brood stock in Western Australian waters probably makes an insignificant contribution to the southern lobster larval pool in Australian waters. It should also be noted that the WA coast is on the western extremity of the distribution of the species and probably only gets sporadic puerulus settlement in years when current circulation is favourable.

The Western Australian southern rock lobster fishery has a legal minimum size of 98.5 mm CL, which offers some protection to the brood stock. Actual size at maturity (SOM) is unknown for the species off the Western Australian coast and is known to be very variable in other states, ranging from 41 mm in the cold south western waters

off Tasmania to 112 mm in parts of Victoria and South Australia (Hobday and Ryan, 1997). Given the relatively warm water off the Western Australian south coast compared to other regions of the southern rock lobster distribution, it would seem likely that the SOM would be similar to the size found in parts of Victoria and South Australia.

The negligible risk rating of the fishery on the breeding stock is justified by the belief that recruitment to the Western Australian south coast rock lobster fishery is largely independent of the local brood stock.

5.1.1.3 SOUTHERN ROCK LOBSTER – EXPLOITABLE BIOMASS

Rationale for Inclusion:

The SCCF lands substantial (between 40-105 tonnes over the last decade) quantities of southern rock lobsters (*Jasus edwardsii*). The species is a primary target of the SCCF.

ERA Risk Rating: Impact on exploitable biomass (C2 L5 MODERATE)

Southern rock lobsters are long-lived and it is recognized that the long history of exploitation has led to the virgin biomass having been depleted to a new equilibrium level.

In the case of the Esperance Zone the impact of the fishery on the exploitable biomass is considered to be sustainable at catch levels of about 40 tonnes per annum (p.a.), but not at 60 tonnes p.a. levels that were experienced in the early to late 1990s (Melville-Smith and Wright, 2001).

In the case of the Windy Harbour/Augusta fishery the limited number of participants (2) and multi-species nature of the fishery, means that effort can be varied in a sustainable fashion according to the availability of southern rock lobsters.

In the GAB and Albany Zones, however, there is less certainty about the impact of exploitation. There is considerable latent effort in these zones and it is recognized that if this effort were to be utilized, that it would lead to local depletions of south coast lobsters and lobster fishing in these zones would become uneconomic. There is good evidence to suggest that this point has already been reached in the Albany Zone.

Given the potential for economically unsustainable lobster fishing in the Albany and GAB zones, the overall risk rating for the SCCF was accorded a 'moderate' risk rating.

Operational Objective

In the Esperance fishery, to maintain catch at an optimum sustainable level by keeping exploitable biomass catch levels at appropriate levels.

In the Albany, GAB and Windy Harbour/Augusta zones, to manage the fishery as an adjunct to fishers' other activities (Melville-Smith, 2001).

Justification:

If the management objective were to ensure that the Albany and GAB zones are fished at economical levels, then current effort levels would need to be substantially reduced. However, it has been accepted that reducing fishing effort in these zones to such levels is unattainable in the medium term. Therefore the agency has adopted a policy whereby it will reduce the number of pot entitlements as the opportunity arises and manage the fishery as an adjunct to fishers' other activities.

Catches of southern rock lobster in the Windy Harbour-Augusta fishery have historically never been particularly high. There were a few seasons in the 1980s when they reached around 4 tonnes, but over most of the last 17 years they have been in the vicinity of 1 to 2 tonnes per annum.

Indicator

In the Esperance fishery a delay-difference biomass dynamics model has been utilized to calculate biomass values, which are then used to produce scenarios of changes in the population biomass over time. Given the limited understanding that we have on the biology of southern rock lobsters in Western Australian waters, it is considered that the biomass dynamics model that is being utilised provides the best available option for quantifying the status of this fishery.

Although catch and effort data are collected for other parts of the SCC fishery, the operational objectives do not require indicators to be produced.

Performance Measure

In the Esperance zone changes in the population biomass over time are examined annually using the delay-difference biomass dynamics model to confirm that the exploitable biomass catch levels are remaining stable which should occur if there is only a catch of 40 t a year.

Although catch and effort data are collected for other parts of the SCCF, there are no performance measures as these fisheries are considered to be adjuncts to these fishers' other activities.

Justification:

The modeling suggests that if 40 tonnes is taken annually the exploitable stock of lobsters in the Esperance region will be stable and no future declines will be seen or experienced.

Data Requirement for Indicator (and Availability)

Data Required	Availability
Commercial catch and effort data	Yes; since the mid-1970s compulsory commercial catch and effort data have been supplied by fishers.

Evaluation

Indications from a biomass dynamics model of the Western Australian portion of the south coast rock lobster resource, and from a postal survey in which commercial fishers were asked to quantify the amount of available ground colonised by lobsters, suggest that the GAB and Albany zones are not suited to south coast lobster colonisation.

The survey of fishers showed that the western and eastern zones only have about 10% of the amount of ground available for lobster colonisation compared with what can be found in the optimal fishing areas inside the ERLMF. The Esperance area has a long history of sustained exploitation (Figure 11) and model results (Melville-Smith and Wright, 2001), although there were uncertainties, suggest that the virgin biomass of legal size Southern rock lobsters for this part of the fishery was substantial (of the order of 400-1,000 tonnes) and in the face of current exploitation remains reasonably solid (at around 350 tonnes).

Model outputs, show that the ERLMF fishery is sustainable at current catch levels of ~40 tonnes p.a., but not at the 60 tonnes p.a. levels that were experienced in the early to mid-1990s. The fact that the amount of effort in this fishery is similar to what it was during the period that catches of 60 tonnes p.a. were being taken, indicates that if latent effort is utilised in the future, this will probably result in localised depletion.

There has already been a substantial increase in effort in the recent season (i.e. utilisation of latent effort), for only a minimal increase in catch. One explanation for this may be that there is localised depletion occurring. However, an alternative explanation is that a change in management arrangements may have influenced the long-term catch per unit effort data series. In the 2000/01 season, the majority of licence holders in this fishery requested that the maximum number of pots permitted per boat should be increased from 60 to 90 whilst not increasing the overall number of pots in the fishery (i.e. any increase in pot numbers used per boat would need to be achieved by reductions in the numbers of pots used by other vessels in the fishery). Experienced fishers in this fishery had warned that it was not practical to deploy more than 60 pots per day per boat and this may be the reason for the decrease in catch per unit effort in the fishery.

Catches in the GAB and Albany zones are small in relation to the vast stretch of coastline that they cover. The annual catch of rock lobster in the Albany fishery appears to have stabilized at around 7 tonnes p.a. (Figure 8), but effort has increased over this same period. While superficially this could suggest that the lobster stock in the Albany zone is being steadily depleted, the other possible explanation is that much of this extra effort is being directed at deep-water crabs given that this is a multi-species crustacean fishery. Landings in the GAB zone are from a number of shallow-water inshore areas, which are dispersed along the coast. Catches of southern rock lobsters from this zone appear to have stabilized at around 20 to 30 tonnes p.a. (Figure 11).

At the time of writing this report, new information has come to light (D. Griffin, CSIRO, Hobart) from modelling work that has been undertaken on southern rock

lobster larval movements as influenced by large scale currents. Indications from that work are suggesting, contrary to previous opinion, that egg production from local stock may be much more important to recruitment of southern rock lobster pueruli than was previously considered. Further information on this matter is dependent on David Griffin's modelling work, the outcomes of which will only be available at the end of that FRDC-funded project.

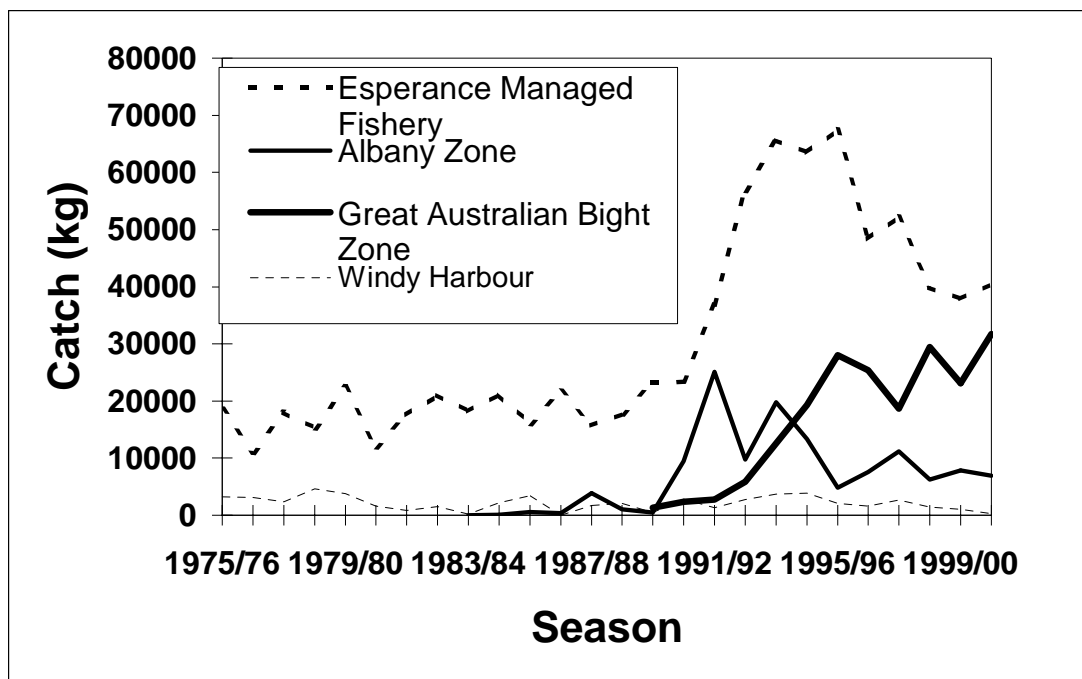


Figure 11. Seasonal catches of southern rock lobster by management area, 1975/76 to 2000/01.

**Robustness:
Medium**

The indicator for the Esperance zone has a medium robustness due to the long time-series of catch and effort information. The only significant impact on the robustness of this indicator is that it does not take improvements in gear technology and electronic equipment (e.g. colour echo sounder) into account. It is considered that such improvements may have significantly influenced catch rates through increase in catch efficiency of the fishers in the fishery over time and we can assume a % of increase as per the Western Rock Lobster Managed Fishery.

Fisheries Management Response

Current:

The fishery is managed through input controls:

- There are only a limited number of licenses

- Pot sizes are defined and all pots are required to be fitted with escape gaps;
- There are limits to the number of pots that may be fished per vessel;
- The annual fishing season is for a fixed period; and
- Compliance policing includes gear checks.

Future:

It is intended that reductions will be made to the potential fishing effort in the Albany/GAB zone as opportunities arise.

Actions if Performance Limit is Exceeded:

The following strategy will be adopted if performance limits are exceeded:

- The data will be examined for possible reasons that might explain shifts in catch or effort that might account for the biomass dynamics model producing a result suggestive of a downturn in harvest biomass relative to pre-exploitation biomass.
- If there is no obvious reason for such a situation, then some form of effort limitation will be imposed. The most likely options in this regard are either a cut in the number of licenced pots, or a shortening of the fishing season.

Comments and Actions

None.

External Drivers

The factor considered most likely to affect harvestable biomass, is decreased recruitment to the fishery. As has been mentioned, the SCCF is on the edge of the range for southern rock lobster puerulus settlement. It is conceivable that decreases in the size of the southern rock lobster brood stock in other southern states, could lead to less pueruli finding their way to settle on the Western Australian SCCF grounds. A second possibility that might influence puerulus settlement on the WA south coast might be a sustained change in the wind or current directions that are responsible for leading some pueruli to end up settling in the western sector of their distributional range.

5.1.1.4 CHAMPAGNE CRABS

Rationale for Inclusion:

The SCCF lands substantial (between 3-40 tonnes p.a. over the last decade) quantities of champagne crabs (*Hypothalassia acerba*), particularly in the Albany and Windy

Harbour/Augusta zones. The species is, therefore, a primary by-product or target species within the SCCF depending on the area and depth of fishing operations.

ERA Risk Rating: Impact on breeding stock and exploitable biomass (C2 L5 MODERATE)

Champagne crabs are considered to be relatively long-lived (Kim Smith, Murdoch University, Perth, pers. comm.). The history of exploitation for this species is likely to have resulted in the virgin biomass having been substantially reduced from pre-exploitation levels.

Operational Objective

To maintain, by way of an appropriate legal minimum size, the spawning stock of champagne crabs above levels that might risk recruitment overfishing.

Justification:

Meeting this objective will ensure that there is sufficient breeding stock to continue recruitment at levels that will replenish what is taken by fishing, predation and other environmental factors.

Indicator

Although catch and effort data are collected for the champagne crab fishery, the by-catch nature of this fishery and the simple operational objective (see earlier) do not require specific indicators to be produced. The catch by the fishery is the only indicator that is monitored on an annual basis. There is currently a student project funded by the FRDC (99/154) which has collected information on sex ratios, size composition of the catch, and relationship between size/sex of champagne crabs and depth of capture. The project is in the final stages of completion and there is no intention of continuing any monitoring of champagne crabs in the SCCF once the project ends.

Performance Measure

There are no explicit performance measures currently required for this fishery. If major changes in annual landings were to be recorded within a season, then investigations would be undertaken to identify the cause of these changes but there is no performance measure in place to respond to such changes if they were to occur. Research data are in the process of being collected and evaluated under FRDC Project 99/154, with one of the objectives being the production of a yield per recruit and egg per recruit model. The project is to be finalised in 2004 and the model will provide the ability to evaluate the appropriateness of the current legal minimum size.

Justification:

The development of performance measures based on catch per unit effort (CPUE) are not possible in this fishery with current data. It is not possible from the available

catch statistics for the fishery, to identify effort targeted at champagne crabs, from effort targeted at rock lobster or giant crabs.

With a legal size well in excess of the size at maturity (Kim Smith, Murdoch University, Perth) means that a large percentage of the spawning stock should be protected. Examining the appropriateness of the legal minimum size for protecting egg production by way of an egg per recruit model is justifiable on the basis of it being well known and often used for this purpose in fisheries literature.

Data Requirement for Indicator (and Availability)

Data Required	Availability
Estimates of natural mortality, age/growth and fecundity	These data are currently being researched under FRDC Project 99/154.

Evaluation

Catches of champagne crabs in the SCCF are small (Figure 12) in relation to the vast stretch of coastline that they cover. The annual catch of champagne crab in the SCCF zones where substantial quantities of crabs are caught (Windy Harbour/Augusta, Albany), fluctuate quite markedly. The by-product nature of the fishery and its overall low dollar value means that any management and corresponding performance measures need to be simple to administer.

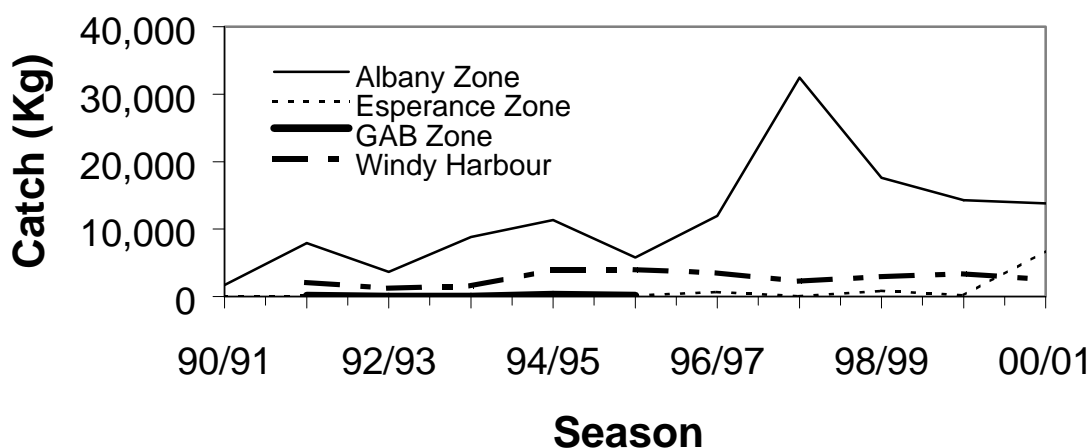


Figure 12. Seasonal catches of champagne crabs by management area, 1990/91 to 2000/01.

Robustness

A legal minimum size that is well above size at maturity could be expected to be a robust means of protecting the brood stock. The appropriateness of this legal minimum size is to be re-evaluated in the near future as more data become available from FRDC Project 99/154. Discarded undersize animals are likely (from tag

recapture information) to have a high rate of survival. Most tagging and tag recapture information comes from experiments conducted by Kim Smith (Murdoch University, Perth), on the west coast Champagne crab stock. Results of this work have yet to be published (date of publication expected to be mid-2004), but they do indicate that the crabs are slow growing and are capable of quite extensive movement.

Fisheries Management Response

Current:

The fishery is managed through input controls:

- Limited number of licences
- Pot sizes are defined and all are required to be fitted with escape gaps to allow the escapement of undersize rock lobsters;
- There are limits to the number of pots that may be fished per vessel during the rock lobster fishing season; and
- Compliance policing includes gear checks.

Future:

At present it is possible for fishers to use any quantity of pots that they chose for areas outside of the rock lobster fishing season. It is proposed to limit numbers of pots in the lobster off-season in the future.

Actions if Performance Limit is Exceeded:

The legal minimum size will be revised if it is shown by egg per recruit work to be inappropriate.

Comments and Actions

None.

External Drivers

The factor considered most likely to affect harvestable biomass, is decreased recruitment to the fishery. A second possibility that might influence crab megalopae settlement on the WA south coast might be a sustained change in the wind or current directions, leading to an increase in the number of megalopae being lost to their normal distributional range.

5.1.1.5 GIANT CRABS

Rationale for Inclusion:

The SCCF lands substantial (between 5-40 tonnes p.a. over the last decade) quantities of Giant crabs (*Pseudocarcinus gigas*), particularly in the Albany and Windy

Harbour/Augusta zones. The species is therefore a primary by-product and/or target species of the SCCF

ERA Risk Rating: Impact on breeding stock and exploitable biomass (C2 L5 MODERATE)

Giant crabs are known to be long-lived (Levings *et al.* 2001). The history of exploitation for this species within this region is likely to have resulted in the virgin biomass having been substantially reduced from pre-exploitation levels.

Operational Objective

To maintain, by way of an appropriate legal minimum size, the spawning stock of giant crabs above levels that might risk recruitment overfishing.

Justification:

Meeting this objective will ensure that there is sufficient breeding stock to continue recruitment at levels that will replenish what is taken by fishing, predation and other environmental factors.

Indicator

Although catch and effort data are collected for the giant crab fishery, the by-product nature of this fishery and the simple operational objective (see earlier) do not require specific indicators to be produced. The only indicator that is monitored on an annual basis is the landed catch

Performance Measure

There are no explicit performance measures for this fishery currently required for this species. Nonetheless, if major changes in annual landings were to be recorded within a season, then investigations would be undertaken to identify the cause of these changes, but there is no performance measure in place to respond to such changes if they were to occur. Work on appropriate minimum sizes for giant crabs (Levings *et al.*, 2001) has been extended for the Western Australian fishery under a separate contract undertaken by Mr Levings and funded by the Department of Fisheries WA.

Justification:

The development of performance measures based on catch per unit effort (CPUE) is not possible in this fishery with current data. It is not possible from the available catch statistics for the fishery, to identify effort targeted at giant crabs, from effort targeted at rock lobster or champagne crabs.

Examining the appropriateness of the legal minimum size for protecting egg production using an egg per recruit model is justifiable on the basis of it being well known and often used for this purpose in fisheries literature.

Data Requirement for Indicator (and Availability)

Data Required	Availability
Estimates of natural mortality, age/growth and fecundity	Some of these data are currently available from FRDC Projects 93/220 and 97/132 (Levings <i>et al.</i> , 2001). In other cases (eg. natural mortality) estimates have been based on estimates for other large, slow-growing, cool water species.

Evaluation

Catches of giant crabs in the SCCF are small (Figure 13) in relation to the vast stretch of coastline that they cover. The annual catch of giant crab in the SCCF fishing zones where substantial quantities of crabs are caught (Windy Harbour/Augusta, Albany), fluctuate quite markedly but have been about 5 tonnes for the past 5-6 years. The by-product nature of the fishery and its overall low dollar value means that any management and corresponding performance measures need to be simple to administer.

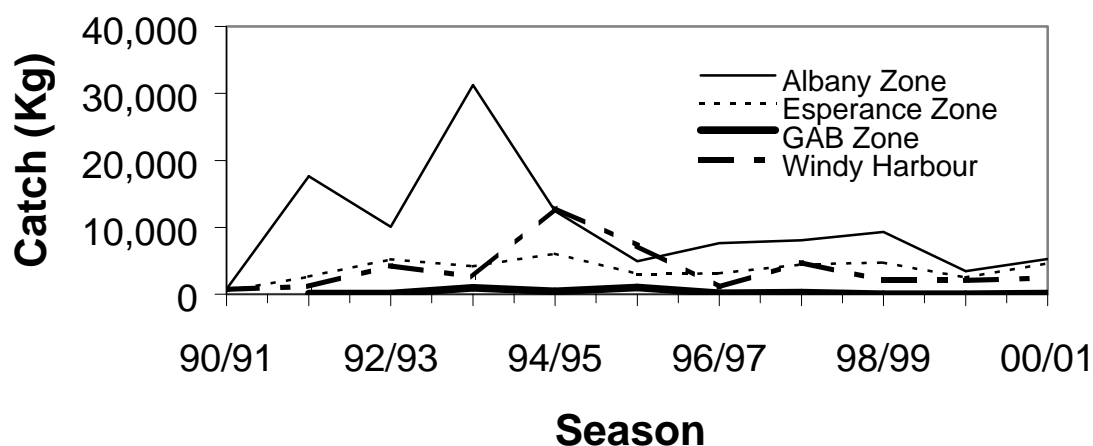


Figure 13. Seasonal catches of Giant crabs by management area, 1990/91 to 2000/01.

Robustness

A legal minimum size that is well above size at maturity could be expected to be a robust means of protecting the brood stock. The appropriateness of this legal minimum size has been generally assessed for all regions in the Giant crab fishery (Levings *et al.*, 2001) and for Western Australia specifically (Levings, WA Fisheries Department Contract Report, 2001). According to Levings (WA Fisheries Department Contract Report, 2001) the 140 mm legal minimum size that is in place in

Western Australia protects 40% of pristine egg production in the population. This is well above the levels (generally 25% of pristine egg production) that are considered to provide sufficient egg production to avoid recruitment overfishing.

Discarded undersize animals are believed (from tag recapture information) to have a high rate of survival (Levings et al., 2001).

Fisheries Management Response

Current:

The fishery is managed through input controls:

- Pot sizes are defined and all are required to be fitted with escape gaps to allow the escapement of undersize rock lobsters.
- There are limits to the number of pots that may be fished per vessel during the rock lobster fishing season.
- Compliance policing includes gear checks.

Future:

At the present it is possible for fishers to use any quantity of pots that they chose outside of the rock lobster fishing season. In the future it is proposed under the new management plan that there will be a limit numbers of pots in the lobster off-season.

Actions if Performance Limit is Exceeded:

The legal minimum size will be revised if it is shown in the future to be inappropriate.

Comments and Actions

None.

External Drivers

The factor considered most likely to affect harvestable biomass, is decreased recruitment to the fishery. A second possibility that might influence crab megalopae settlement on the WA south coast might be a sustained change in the wind or current directions, leading to an increase number of megalopae being lost to their normal distributional range.

5.1.1.6 CRYSTAL CRABS

Rationale for Inclusion:

Crystal crabs (*Chaceon bicolor*) are not a primary target of the SCCF, however landings on the west coast of Western Australia have created an expectation that there might be a similar bonanza on the south coast.

ERA Risk Rating: Impact on breeding stock and exploitable biomass (C2 L4 MODERATE)

Operational Objective

To limit exploitation of crystal crabs on the south coast by way of a one-year ban on fishing, until such time as a well considered management plan for the potential new fishery can be formulated and secondly, until more research information on the species is available from the fishery that is both operating and being researched on the west coast.

Justification:

The genus Chaceon, to which the crystal crabs belong, are well known deep water crabs. They form the basis of fisheries in other countries and are known to be very slow-growing and therefore vulnerable to overexploitation.

Indicator

No indicator is required. The ban will be in place for at least one year to progress the operational objectives (above).

Performance Measure

No performance measure is required. The ban on fishing will be in place for at least one year to progress the operational objectives (above).

Justification:

No justification of the performance measure is required. The ban on fishing will be in place for at least one year to progress the operational objectives (above).

Data Requirement for Indicator (and Availability)

Data Required	Availability
In the short to medium term, estimates of the extent and depth distribution of crystal crabs is required. In the longer run other information will be required, in particular estimates of growth.	Not available at present, but plans are afoot to undertake a survey of the crystal crab grounds on the South Coast during the one-year period that commercial fishing for the species has been banned.

Evaluation

No evaluation is required. The ban on fishing will be in place for at least one year to progress the operational objectives (above). During this period some experimental fishing will be undertaken to improve our understanding of the extent of crystal crab fishing grounds on the South Coast of Western Australia.

Robustness

N/A.

Fisheries Management Response

Current:

There are no licences available to fish for crystal crab in the SCCF.

Future:

No future predictions can be made until some research fishing has been undertaken on the South Coast grounds.

Actions if Performance Limit is Exceeded:

N/A.

Comments and Actions

N/A.

External Drivers

N/A.

5.1.2 BY-PRODUCTS

5.1.2.1 FINFISH AND SHARKS

Rationale for Inclusion:

This section deals with the finfish and sharks that are caught in lobster traps as by-product, not fish and sharks caught by line or using fish traps. It is believed that relatively few finfish are actually caught in the lobster traps. Based on compulsory catch and effort data, the finfish species most frequently caught are leatherjackets. Anecdotal evidence from Bill Kent (B. Kent, retired rock lobster license holder and fishing skipper, pers. comm.) indicates a range of fish is caught in pots in inshore and offshore areas, generally infrequently and in small numbers.

ERA Risk Rating: Impact on breeding stock (C0 L4 NEGLIGIBLE)

Few finfish and sharks enter south coast rock lobster pots. Most that do enter are able to escape either through the entrance at the top of the pot or, through the rock lobster escape gaps at the base. Escape gaps are purposefully placed at the rear end of the pot, so that small animals (under-size lobsters, octopus, fish etc) pass through the escape gap as the pot is hauled to the surface if they have not already escaped while the pot is soaking.

Anecdotal evidence from conversations with fishers indicates that a diverse range of fish is caught in pots in inshore and offshore areas, but in very small numbers (B. Kent, retired rock lobster license holder and skipper, pers. comm.). In shallow inshore waters, lobster pots infrequently catch the blue-lined leatherjacket (*Meuschenia galii*), queen snapper (*Nemadactylus valenciennesi*), breaksea cod (*Epinephelides armatus*), harlequin fish (*Othos dentex*), and pink snapper (*Chrysophrys auratus*) (ibid.). In deeper water (outside the 100 fathom mark), pots catch the chinamen leatherjacket (*Nelussetta ayraudi*), and occasionally rock ling (*Genypterus tigerinus*) and pink snapper (*Chrysophrys auratus*) (ibid.).

Compulsory catch and effort statistics submitted by South Coast Crustacean pot fishers show large year-to-year fluctuations in fish and shark by-product. The only consistent fish species to appear in the catches is leatherjacket and that species has generally accounted for an annual catch of about 3 tonnes. Wobbegong sharks also appear regularly each year, but only account for about 100 kg p.a. Rock lobster pots are a very inefficient way of catching fish and consequently the numbers of fish caught in this way are small. Those fish caught in pots that are above their respective legal minimum size are retained, while all others are released. The low numbers of fish caught would not noticeably impact the spawning stock of these species and consequently the risk has been categorized as negligible.

5.1.2.2 OCTOPUS

Rationale for Inclusion:

Anecdotal evidence from fishers indicates that octopuses are a regular part of the catch in low numbers in shallow waters (B. Kent retired rock lobster license holder and skipper, pers. comm.; T. Roberson, rock lobster fisher, pers. comm.).

ERA Risk Rating: Impact on breeding stock (C0 L4 NEGLIGIBLE)

Rock lobster pots are a very inefficient way of catching octopus. Most that enter are able to escape either through the entrance at the top of the pot or, through the rock lobster escape gaps at the base. Escape gaps are purposefully placed at the rear end of the pot, so that small animals (under-size lobsters, octopus, fish etc) pass through the escape gap as the pot is hauled to the surface if they have not already escaped while the pot is soaking.

At least one species of octopus is found in lobster pots predated on crustaceans, the Maori octopus (*Octopus maorum*) and possibly a local variant of the common Sydney octopus (*Octopus tetricus*) (Norman 2000; Norman and Reid 2000). Predating octopuses are commonly found in inshore areas (Joll, 1977). Bycatch records from voluntary logbooks indicate that octopus occasionally predate on rock lobsters caught in pots on the south coast. Estimates from logbooks indicate that approximately one octopus is caught every 50 pots in inshore areas, but data from compulsory catch and effort sources show annual landings to only be about 500 kg per season. Anecdotal evidence from fishers indicates that these animals are a regular part of the catch in low numbers in shallow waters (B. Kent, retired rock lobster license holder and skipper, pers. comm.). Octopus caught are generally kept.

The low number of octopus caught and returned by pot fishers is considered to pose a negligible risk to the octopus breeding stock.

5.2 NON-RETAINED SPECIES

COMPONENT TREE FOR NON-RETAINED SPECIES IN THE SCCF

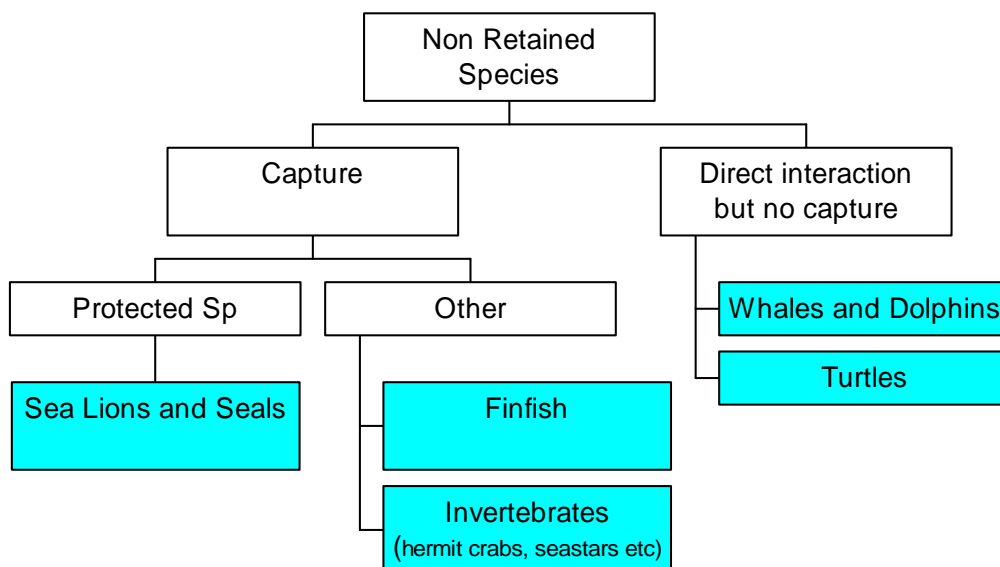


Figure 14. Component tree for the non-retained species.

Yellow boxes indicate that the issue was considered high enough risk at the July 2002 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 – generally only the justification is presented.

5.2.1 CAPTURED BY POTS

5.2.1.1 PROTECTED/LISTED SPECIES SEA LIONS AND SEALS

Rationale for Inclusion:

An estimated one pinniped is killed every two years from lobster pots, mainly on the south coast of Western Australia (Mawson and Coughran, 1999a). They are afforded special protection under the provisions of the Western Australian *Wildlife Conservation Act 1950*. All species in the Family Otariidae (eared seals) and Family Phocidae (“true” seals) are protected under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC). The Family Otariidae includes the Australian sea lion and New Zealand fur seal, which are both residents of the south coast of WA. In addition, the sub-Antarctic fur seal (*Arctocephalus torpicalis*) is listed as vulnerable under the EPBC and infrequently visits the WA south coast though well outside its range.

ERA Risk Rating: Impact on breeding stock (C1 L4 LOW)

The Australian sea lion (*Neophoca cinerea*) and the New Zealand fur seal (*Arctocephalus forsteri*) are both residents of the south coast of Western Australia and breed along the coast and island areas (Gales *et al.*, 1994; Shaughnessy *et al.*, 1994). They are afforded special protection under the provisions of the Western Australian *Wildlife Conservation Act 1950*. Four further species; the sub-Antarctic fur seal, the leopard seal (*Hydrurga leponyx*), the southern elephant seal (*Mirounga leonina*) and the crabeater seal (*Lobodon carcinophagus*) infrequently visit the south coast though well outside their normal Antarctic and sub-Antarctic ranges. Two breeding records of *M. leonine* were reported in 1996 (Mawson & Coughran, 1999b).

The sea lion (*N. cinerea*) was the most common species killed (92%) by all human influences (shot, boat propellers, lobster pot/line, fishing line/hooks, nets, speared, plastic bands, clubbed) (Mawson & Coughran, 1999a). Of the 51 pinnipeds that are believed to have died from human influences between 1980 and 1996, only 7 (13%) were concluded to have been through interactions between lobster fishing gear and pinnipeds (*ibid*). This amounts to an average of one pinniped killed every two years. A similar number of reports of deaths due to boat propellers have been made throughout the state for the same period (*ibid*).

There is more of a risk of an interaction between pinnipeds and fishing gear in inshore areas where pups enter pots and drown, however the cases where this has happened would seem, based on published information (Mawson and Coughran, 1999), to be relatively infrequent. Further offshore on the continental slope, where deepwater fishing occurs, pinnipeds are unlikely to be caught in pots due to the deep water though they have been sighted on the surface where a small risk of boat strikes is present. As with all large animal deaths in remote locations, the level of under reporting may be significant. The proportion of pinnipeds found dead or sick on beaches is high compared to the numbers where cause of interaction is known (Mawson and Coughran, 1999a), but reporting of these mortalities were mostly by public response and CALM rangers, which means that there is some uncertainty surrounding the result and that the amount of mortality may have been underestimated.

While it has been recognised that there is some uncertainty regarding mortality rates, the low number of pinnipeds killed by lobster fishing gear (7 dead in 17 years) would have little or no impact on the breeding stocks and justifies the low risk rating accorded this item.

5.2.1.2 FINFISH

Rationale for Inclusion:

Anecdotal evidence from conversations with fishers indicates a range of fish is caught in pots in inshore and offshore areas, generally infrequently, in small numbers and returned to the sea (B. Kent retired rock lobster license holder and skipper, pers. comm.). All finfish caught in the pots that are below the legal minimum size are returned.

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

Few finfish enter south coast rock lobster pots. Most that do enter are able to escape either through the entrance at the top of the pot or, through the rock lobster escape gaps at the base. Escape gaps are purposefully placed at the rear end of the pot, so that small animals (under-size lobsters, octopus, fish etc) pass through the escape gap as the pot is hauled to the surface if they have not already escaped while the pot is soaking.

Anecdotal evidence from conversations with fishers indicates that a range of fish is caught in pots in inshore and offshore areas, in small numbers. All fish below the legal minimum size are returned to the sea (B. Kent, retired rock lobster license holder and skipper, pers. comm.). In shallow inshore waters, lobster pots infrequently catch the blue-lined leatherjacket (*Meuschenia galii*), queen snapper (*Nemadactylus valenciennesi*), breaksea cod (*Epinephelides armatus*), harlequin fish (*Othos dentex*), and pink snapper (*Chrysophrys auratus*) (ibid). In deeper water (passed the 100 fathom mark), pots commonly catch the chinamen leatherjacket (*Nelusetta ayraudi*), and occasionally catch the rock ling (*Genypterus tigerinus*) and pink snapper (*Chrysophrys auratus*) (ibid).

Some fish that are returned to the sea because they are smaller than the legal minimum size, are dead. However, overall numbers of fish caught in the pots are small and are considered to pose a negligible risk to the finfish brood stocks.

5.2.1.3 INVERTEBRATES

Rationale for Inclusion:

A range of invertebrate animals other than octopus are infrequently caught in pots and generally discarded including starfish, hermit crabs, spider crab, shellfish and cuttlefish. The invertebrate species caught in the pots are discarded as the pot is emptied.

ERA Risk Rating: Impact on breeding stock (C0 L4 NEGLIGIBLE)

Few invertebrates enter south coast rock lobster pots. Most that do enter are able to escape either through the entrance at the top of the pot or through the rock lobster escape gaps at the base. Escape gaps are purposefully placed at the rear end of the pot, so that small animals (under-size lobsters, octopus, fish etc) pass through the escape gap as the pot is hauled to the surface if they have not already escaped while the pot is soaking.

Invertebrates caught by the rock lobster pots are returned to the sea quickly and would be unlikely to suffer mortality from being brought to the surface. It is considered that their capture would have a negligible impact on the breeding stocks of those species.

5.2.2 DIRECT INTERACTION BUT NOT CAPTURED IN POTS

5.2.2.1 PROTECTED/LISTED SPECIES WHALES AND DOLPHINS

Rationale for Inclusion:

Two species of whales are regularly observed migrating along the south coast of Western Australia, the Humpback whale (*Megaptera novaeangliae*) and the Southern Right whale (*Eubalaena australis*). Both types of whales are protected species covered under the provisions of the Western Australian *Wildlife Conservation Act 1950*. Furthermore, all native cetacean species are protected under the EPBC and the Southern right whale is listed as endangered.

Unpublished data from CALM dealing with whale interactions throughout Western Australian between 1985 and 2002 report a total of 20 incidences of migrating whales becoming entangled in rope (D. Coughran, CALM Perth Office, pers. comm.). An increasing population on the south coast and expanding fishing areas to deeper water may mean more reporting of these interactions. None of these resulted in deaths.

Two species of dolphins, the Bottlenosed dolphin (*Tursiops truncates*) and the Common dolphin (*Delphinus delphis*) have been reported following lobster and crab boats, possibly feeding on discarded bait. Dolphins are protected under the provisions of the Western Australian *Wildlife Conservation Act 1950* and the EPBC.

ERA Risk Rating: Impact on breeding stock (C0 L4 NEGLIGIBLE)

Of the 18 whale encounters specifically attributed to lobster ropes reported for WA between 1985 and 2002, 17 involved Humpback whales, and one with a Southern right whale (D. Coughran, CALM Perth Office, pers. comm.). None of those encounters resulted in the death of a whale (ibid).

Anecdotal evidence from south coast fishers suggests few interactions with whales have been reported from the SCCF (B. Kent, retired rock lobster license holder and skipper, pers. comm.). Through what is currently known of whale migration patterns suggest that the Humpback whale migrates from winter breeding grounds in the tropics to polar and sub polar feeding areas (Jefferson *et al.*, 1993). The Southern right whale breeds in winter and spring close to the southern coastline (ibid). No data specifically dealing with the south coast of WA is currently available however from what is known of the migration patterns of the two commonly found species, at least one incident (with *E. australis*) most likely occurred on the south coast. The lack of any whale mortalities attributable to lobster fishing gear justifies the negligible rating for this item.

Two species of dolphin that are observed on the south coast frequently and in large numbers are the Bottlenosed dolphin (*Tursiops truncates*) and the Common dolphin (*Delphinus delphis*). Reports from the whole of the WA state from 1985 to 1994 did not record a single incidence where lobster fishing gear interfered with dolphins (D. Coughran, CALM Perth Office, pers. comm.). This lack of interaction justifies the negligible risk rating accorded to this item.

5.2.2.2 PROTECTED/LISTED SPECIES TURTLES

Rationale for Inclusion:

The two types of sea turtles found on the south coast are the leatherback turtle (*Dermochelys coriacea*), listed as “vulnerable” in the EPBC and “Special Protected Fauna” under WA Legislation, and the loggerhead turtle (*Caretta caretta*) also a protected species under the provisions of the Western Australian *Wildlife Conservation Act 1950*. All forms of mortality need to be minimized for the leatherback and loggerhead turtles.

ERA Risk Rating: Impact on breeding stock (C0 L3 NEGLIGIBLE)

The two main species found on the south coast of WA are the leatherback turtle and the loggerhead turtle (R. Prince, Department of Conservation and Land Management, Perth Office, pers. comm.). Both turtles are apparently scarce but regular, non-nesting feeding migrant visitors to Western Australian waters. Both species are long ranging foragers with large residence areas found offshore throughout the south coast to South Australia. The leatherback turtle breeds in very specific regions in the tropics (SE Asia, Indonesian archipelago, Malaysia Peninsula) consequently these animals make migratory journeys of thousands of kilometres. The loggerhead turtle is commonly found, and breeds in a focused area between Shark Bay and Exmouth but has infrequently been found on the south coast.

The main risk of interactions between fishing operations and turtles in the SCCF are from boat strikes and entanglement in ropes and lines, not from being caught in pots. Turtle interactions reported by Department of Conservation and Land Management are few, ~8 cases from 1973 to 2001 have been reported on the south coast of Western Australia (R. Prince, Department of Conservation and Land Management, Perth Office, pers. comm.). The occasional (<1 per year) entanglements of turtles in pot lines (R. Prince, Department of Conservation and Land Management, Perth Office, pers. comm.) indicate a low risk associated with using crustacean fishing gear.

From discussions with R. Prince (Department of Conservation and Land Management, Perth Office) there may be a lot of under reporting of interactions by fishers. There may also be a bias in reporting live releases as the majority of reports come from sightings from dead animals washed ashore. Reports from Department of Conservation and Land Management from 1973 to date indicate that only 1 of 8 leatherback turtles observed were released alive. However, based on recent information collected from the western rock lobster fishermen there was only 1 dead turtle recorded from 13 interactions with gear. The small number of mortalities attributable to lobster fishing gear and lack of significant impact that this would have on turtle breeding stock justifies the negligible risk rating for this item.

5.3 GENERAL ENVIRONMENT

COMPONENT TREE FOR THE GENERAL ENVIRONMENT FOR THE SCCF

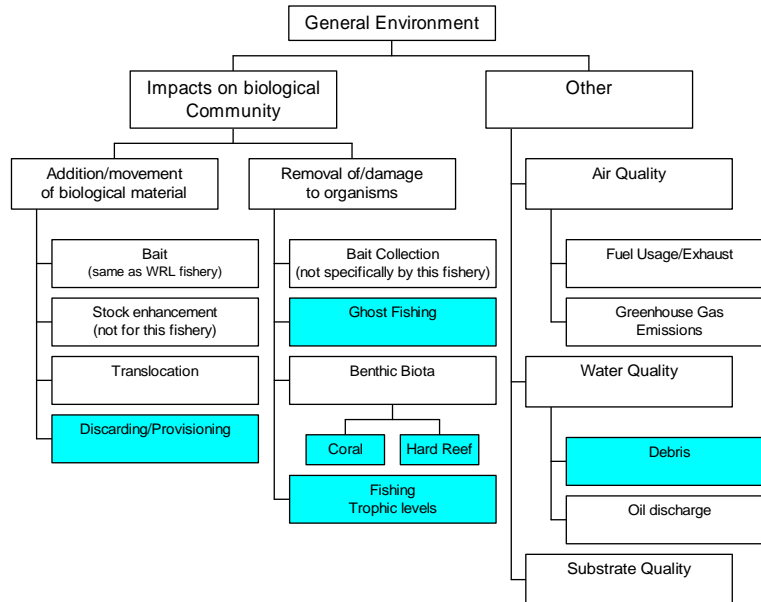


Figure 15. Component tree for the general environment.

Yellow boxes indicate that the issue was considered high enough risk at the July 2002 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 – generally only the justification is presented.

5.3.1 ADDITION/MOVEMENT OF BIOLOGICAL MATERIAL

5.3.1.1 DISCARDING/PROVISIONING

Rationale for Inclusion:

There are some non-retained species in this fishery which when discarded might be considered to provide a food source to other species either following the vessel (e.g. sharks, dolphins) or on the bottom (e.g. sharks, finfish and invertebrates).

ERA Risk Rating: Impact on breeding stock (C0 L4 NEGLIGIBLE)

As has already been noted, the amount of finfish and invertebrates that are discarded is small. It is considered that these small quantities of discard catch would have an insignificant impact on marine foodwebs, thereby justifying the negligible risk rating that was accorded this item.

5.3.2 REMOVAL OF/DAMAGE TO ORGANISMS

5.3.2.1 IMPACTS FROM GHOST FISHING

Rationale for Inclusion:

The gear used in this fishery generates minimal non-retained species and the design of the pots (one entrance, with 3 escape gaps) is such that they do not 'ghost fish' if lost. Fishers in the SCCF use mainly steel frame pots with chicken wire. It is intended that under the new management plan, the pot design and size used in all the different zones of the SCCF will be standardized. The number of commercial pots lost throughout the fishery each season is unknown. Moreover, anecdotal evidence and underwater observations by Fisheries staff clearly shows that rock lobsters (and other large animals) are rarely seen in any type of pot without bait, showing that animals are able to escape from the pot if given enough time.

ERA Risk Rating: Impact on breeding stock (C0 L4 NEGLIGIBLE)

The fact that there is no retention of animals in pots that are not baited, justifies the negligible risk rating.

5.3.2.2 IMPACTS TO BENTHIC BIOTA – CORAL

Rationale for Inclusion:

Coral is occasionally brought to the surface after being entangled in the chicken wire used on the pots.

ERA Risk Rating: Impact on breeding stock (C0 L3 NEGLIGIBLE)

Occurrences are infrequent and damage is considered to be minimal, justifying the negligible risk rating that has been accorded to this category.

5.3.2.3 IMPACTS TO BENTHIC BIOTA – HARD REEF

Rationale for Inclusion:

The license area of the SCCF includes limestone and granite habitats. The fishery largely operates over granite habitat.

ERA Risk Rating: Impact on breeding stock (C0 L3 NEGLIGIBLE)

The pots in this fishery are mostly steel framed covered by chicken wire. Their impact on granite habitat is considered to be minimal and the risk has therefore been accorded a negligible rating.

5.3.2.4 IMPACTS TO FISHING TROPHIC LEVEL

Rationale for Inclusion:

All fisheries give rise to concerns about the impact that large-scale removals of an abundant species might have on lower trophic levels (in this case the prey of southern rock lobsters and giant and spiny crabs) and higher trophic levels (in this case other animals preying on southern rock lobsters and giant and spiny crabs).

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

The risk rating has in this instance been accorded a negligible rating. Southern rock lobsters and giant and spiny crabs are considered to be high up the trophic food chain and their exploitation is therefore unlikely to have had a significant impact on species in higher trophic levels. In terms of the effect that their exploitation might have had on the lower trophic levels, the minimum sizes are such that only a relatively small portion of the standing stock is harvested. This combined with the fact that the fishery covers over 1000 km of coastline and only produces around 100 tonnes of product per year, justifies the negligible risk rating accorded to the impact of the fishery on food chains.

5.3.3 OTHER IMPACTS – WATER QUALITY

5.3.3.1 DEBRIS

Rationale for Inclusion:

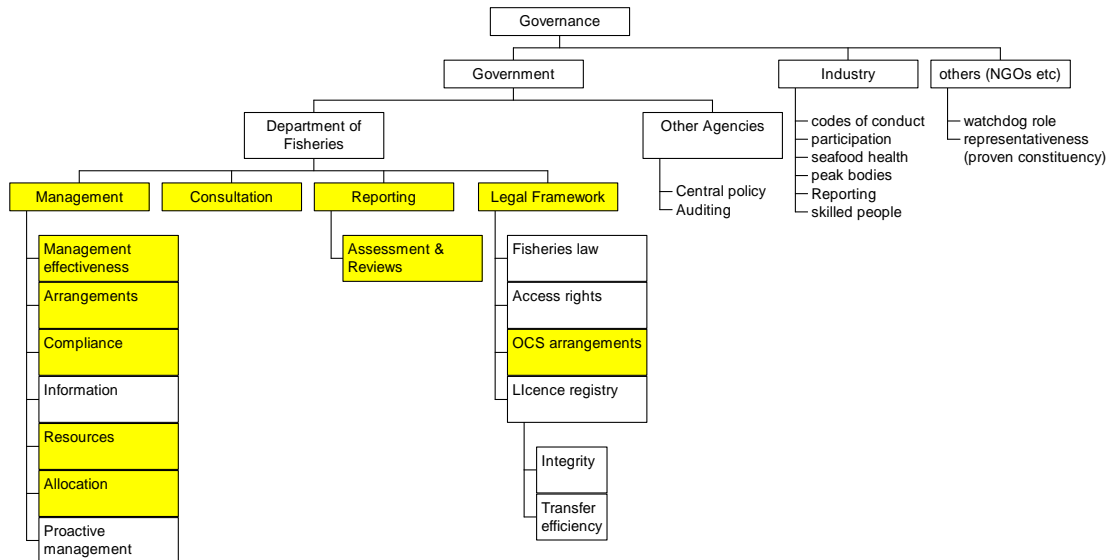
There is the potential for lost lines of pots, discarded bait boxes and bands and other flotsam to impact on water quality.

ERA Risk Rating: Impact on breeding stock (C0 L4 NEGLIGIBLE)

There is a general code of practice among rock lobster fishers to return packaging and garbage back to the wharf. Waste disposal bins are located at all points where commercial boats tie up. Fishermen are aware of the related public perceptions and sensitivities and do not discard pollutants overboard.

5.4 GOVERNANCE

COMPONENT TREE FOR THE GOVERNANCE OF THE SCCF



5.4.1 DEPARTMENT OF FISHERIES – MANAGEMENT

5.4.1.1 MANAGEMENT EFFECTIVENESS (OUTCOMES)

Rationale for Inclusion:

The effectiveness of management arrangements in south coast crustacean fisheries is ultimately measured by assessing the outcomes of various strategies employed to manage the fisheries. As it is very likely that rock lobster fisheries on the south coast of Western Australia are reliant on recruitment from the eastern states of Australia, management arrangements in this fishery have in recent times been more geared towards maximising economic efficiencies, and the need to ensure that effort levels do not impinge upon other associated species in the fishery (such as deep sea crabs). The Department of Fisheries in Western Australia is also striving to improve communication with industry members and Government agencies in South Australia.

Given that deep-sea crab fishing in this part of the State is relatively new and effort has been minimal, it is thought that deep-sea crab stocks are under exploited at the present time. The operational objectives with regard to management are largely directed towards capping potential effort, and determining an appropriate sustainable catch level for the fishery.

Operational Objective

To introduce a comprehensive management plan for all south coast crustacean fisheries that will enable the sustainable harvesting of deep sea crab species while ensuring the economic sustainability (and viability) of the rock lobster fishery.

Justification:

The focus of management and research has traditionally centred on the south coast rock lobster fisheries. Given that fishermen are now looking to target deep sea crab species, and that these species are probably more vulnerable to overfishing, a comprehensive management plan for all crustacean species is required and should be developed.

Indicator

That management arrangements exist to permit the take of a predicted, sustainable quantity of deep sea crab while also being flexible enough to facilitate changes in effort (and therefore catch) if the predicted level of catch is not achieved.

Performance Measure

A comprehensive management plan that achieves the operational objective is in place for the south coast crustacean fisheries before 30 September 2005.

Justification:

DEH has approved a special circumstances exemption for south coast deep sea crab species until 20 September 2004, And in October 2002 the Western Australian Minister for Agriculture, Forestry and Fisheries introduced a prohibition on the take of crystal crabs on the south coast while management arrangements are developed..

5.4.1.2 MANAGEMENT ARRANGEMENTS

Rationale for Inclusion:

In Western Australia, a number of instruments are used to articulate the management arrangements for fisheries. The *Fish Resources Management Act 1994* (FRMA) has elements that affect all fisheries. The FRMA provides for the creation of Management Plans, Orders, Regulations, Ministerial Policy Guidelines and Policy Statements.

The management plans (rules) for the Esperance rock lobster, Windy Harbour-Augusta rock lobster, and rock lobster pot fisheries were originally developed in 1987 under the authority of the *Western Australian Fisheries Act 1905* as limited entry fishery notices. Under Section 266 and Schedule 3 (Savings and Transitional Provisions) of the *Fish Resources Management Act 1994*, limited entry fisheries declared under the "old Act" became managed fisheries for the purposes of the FRMA.

Table 5. Objects of the Fish Resources Management Act 1994.

<p>3. Objects</p> <p>(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.</p> <p>(2) In particular, this Act has the following objects-</p> <ul style="list-style-type: none">(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.
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The FRMA sets out the objects for the sustainable management of fish resources in Western Australia, and provides for the framework for developing and implementing management plans for each of the State's fisheries. The south coast rock lobster management plans are effectively a set of rules for each fishery and include, *inter alia*, clauses concerning the spatial boundaries of the fishery, gear restrictions, temporal closures and transferability arrangements.

Rock lobster fishing in areas not covered by the management plans is provided for under Regulation 125 and 126 of the *Fish Resources Management Act 1994*. Regulation 125 requires that:

“125 Rock Lobster Pot Licence

1. *A person who uses one or more rock lobster pots to engage in the commercial fishing of rock lobster must hold a rock lobster pot licence.*
2. *A person who holds a rock lobster pot licence must not use any rock lobster pots in excess of the number specified in that licence as being the number authorised to be used under that licence.*
3. *This regulation does not apply to a person using a rock lobster pot in a managed fishery in accordance with an authorisation granted in respect of that fishery.”*

Regulation 126 provides for the Executive Director of the Department of Fisheries to grant rock lobster pot licences if the Executive Director is satisfied that the person is a fit and proper person to hold the licence, and it is the better interests of the fishing industry to grant the licence.

Management arrangements for the other species of crustaceans (deep-sea crabs) taken commercially off the south coast of Western Australia is provided for in a condition [endorsements] on fishing boat licences. Fishing Boat Licence Condition 105 specifies that:

“Condition 105

The fishing boat named herein is authorized to take deep sea crabs in the waters situated on the south coast of the State bounded by a line commencing at the intersection of the high water mark and 115 degrees 8 minutes east longitude

(Cape Leeuwin) extending south to the intersection of 115 degrees 8 minutes east longitude and 34 degrees 24 minutes south latitude, thence west along 34 degrees 24 minutes south latitude to the outer limit of the Australian fishing zone, thence along that boundary to its intersection with the eastern edge of the waters adjacent to the State, thence north along the eastern edge of waters adjacent to the State to the high water mark, thence along the high water mark to the commencing point, excluding all waters between 120 degrees east longitude and 125 degrees east longitude subject to the following conditions:

- 1. Rock lobster boats may only use their pot allocation during the rock lobster season, but can use crab traps during the rock lobster off-season, but are not permitted to have any rock lobster on board during the rock lobster off-season.*
- 2. Boats other than rock lobster boats can use traps all year round provided that no rock lobsters are on board.*
- 3. Boats other than rock lobster boats at all times and rock lobster boats operating during the rock lobster off season, will only be permitted to operate outside the 200 meter depth contour for the purposes of taking deep sea crabs.*
- 4. The Minister for Fisheries can, at his discretion, withdraw access to the fishery at any time.”*

Minimum size limits for species and gear restrictions are defined in the FRMR.

Operational Objective

In consultation with the industry members and other stakeholders, periodically review the legislation, regulations and Ministerial policy guidelines to ensure the management framework remains relevant and aligned with the fishery’s management objectives.

To have an effective and understandable plan for the management of this fishery.

Justification:

Management arrangements ultimately enable the sustainable exploitation of a natural resource where the potential to harvest the resource could exceed the ability of the resource to replenish itself. The development of rules can restrict the potential to harvest (effort) to an appropriate level, and management arrangements can define

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

Indicator

The extent to which the Fish Resources Management Act 1994, Regulations, Management Plans, Ministerial Policy guidelines 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

To date, no formal evaluation of the management arrangements of the various south coast crustacean fisheries has been completed. However, the Department is committed to developing a comprehensive management plan for the south coast rock lobster fisheries and south coast deep-sea crab fisheries by September 2005.

Preliminary investigations suggest that management arrangements for the fishery are inadequate in that the potential exists for fishermen to activate inappropriately high levels of effort that could place the deep-sea crab resource at risk. To mitigate this risk, the Department recently introduced a prohibition on the take of crystal crabs while management arrangements are developed because of a likely increase in effort.

The performance of current management arrangements can be evaluated on two levels – the micro level, i.e. the relevance of individual clauses/regulations and the role they play; and on the macro level, i.e. the relevance of the plans, endorsements or arrangements as a whole and the role that they play.

Current Performance against each of the areas required within the “plan”²:

1. **An explicit description of the management unit** – The management unit for rock lobster fisheries is explicitly described at Section 11 of both the Esperance Rock Lobster Management Plan 1987 and the Windy Harbour-Augusta Rock Lobster Management Plan 1987. The management unit for the rock lobster pot fishery is defined in the Fish Resource Management Regulations at regulation 125(2). The dimensions for rock lobster pots are defined in Schedule 13 of the Regulations.

The management unit for the deep-sea crab fishery is not defined at the time of writing.

² “Plan” – includes all management arrangements

2. **The issues addressed by the plan** –The issues that need to be addressed by the south coast rock lobster and deep sea crab 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 south coast rock lobster stocks are described in Section 2.1 and the fishing activities are described in Section 2.2. Although less is known about deep sea crab stocks, a general description of their habitat and fishing activities are provided in section 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 articulation 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 rock lobster and deep sea crab fisheries are located in both the Esperance Rock Lobster Management Plan, the Windy Harbour-Augusta Management Plan, the FRMR and specific orders (A set of which has been provided to DEH).
8. **The reporting and assessment arrangements** – These arrangements are documented in Section 5.8.4.1 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. A review of the south coast rock lobster fishery plans and management arrangements for deep sea crabs is currently underway with a view to developing a comprehensive set of management arrangements for all south coast crustacean fisheries.
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
High

The management arrangements and related legislation have provided a diverse but reasonably complete set of fisheries management legislation. The fact that the management arrangements are contained within legislation provides a high degree of stability with respect to how the fishery is managed.

Fisheries Management Response

Management has successfully administered the management arrangements and related legislation to achieve and pursue the stated objectives for the rock lobster fisheries. Changes have occasionally occurred to address key concerns or issues.

Comments and Actions

The Department is in the process of consultation with industry members regarding the development of a comprehensive south coast crustacean management plan. It is expected that during this process, current management arrangements will be replaced by a new management plan (set of rules) for the fishery.

External Driver Check List

- Potential resistance of fishers to support Department initiated management arrangements.
- 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. The ability to conduct at sea compliance patrols on the south coast of the State is limited because of patrol boat size and availability. Indeed, it is not possible for compliance staff to conduct at sea inspections using Departmental vessels in most of the areas of the fishery. However, compliance officers do occasionally travel with fishermen to check adherence with pot numbers and area in the rock lobster fishery. Instead, landing inspections are conducted randomly throughout the year to ensure that fishermen are adhering to fishing rules specified in the management plans and other requirements listed in the Regulations.

Operational Objective

To have sufficiently high levels of compliance with the FRMA, FRMR and various rock lobster management plans, regulations, conditions [endorsements] and notices (including regulations and Notices regarding the take of deep sea crabs).

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 illegal landings.

Degree of understanding and acceptance of rules governing the operation of the south coast rock lobster and deep sea crab fisheries by licensees and the broader fishing community.

Performance Measure

That 100% of inspected landings have no illegal catch.

Data Collection Requirements and Processes

Random Inspections of landings

Ongoing collection of intelligence data on illegal activities.

Comparative data on the relative effectiveness of certain compliance techniques.

Evaluation

Landing patrols and factory inspections only detected a low level of non-compliance with the management of this fishery during the 2001/2002 season. The only at sea inspection conducted during the year detected an offence. Fisheries Officers carried out licence and gear inspections and provided advice to industry during the season. A compliance risk assessment involving industry has not been held for any of the south coast crustacean fisheries at this time, but such an assessment will be conducted during the development of the comprehensive management plan for all crustacean fisheries.

Robustness

Low

The Department has limited patrol boat capacity on the south coast of the State. In addition, the compliance resources dedicated to the south coast crustacean fisheries (when considering competing compliance requirements in other fisheries) are also considered insufficient to accurately determine the level of non-compliance with fishery rules. The Department is addressing this issue by investigating the potential of including Vessel Monitoring Systems (VMS) on rock lobster and deep sea crab vessels. The Department is also committed to exploring new initiatives that will improve the assessment of compliance levels within the fishery.

Fisheries Management Response

The Regional Services Branch of the Department continues to gather intelligence on suspected and known illegal activity within the fishery.

Comments and Actions

The Department will continue to provide high standard compliance service within budgetary and resourcing constraints to the south coast crustacean fisheries. It is expected that the completion of a compliance risk assessment for the fishery will enable the Department to better direct resources to further increase the effectiveness of the limited compliance activities.

External Driver Check List

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

5.4.1.4 ALLOCATION AMONG USERS

Rationale for Inclusion:

In addition to the commercial southern rock lobster fishery there is also a small recreational fishery for rock lobster on the south coast of the State. The majority of recreational fishing is thought to occur close to shore and near the larger population centres along the coast. Regardless of the motivation for extractive fishing it should be noted that the sustainability parameters of the resource remain the same. It is therefore important that all extractive users are considered when implementing arrangements designed to secure the resource and ecological sustainability.

With regard to deep-sea crab species, the recreational component of the fishery is negligible. The fishery occurs up to 35 nautical miles offshore in very deep water (150m – 750m) and as such, recreational fishing is possible but very unlikely. The allocation of deep-sea crab species is therefore not addressed below.

There are other non-extractive interests in the resource and its related ecosystem that also need to be considered within the management process.

Operational Objective

To ensure that adequate management processes are in place that allow for the inclusive management (i.e. including a variety of stakeholders) in the south coast crustacean fishery. The processes should serve as a means of facilitating debate on management arrangements that will achieve an appropriate allocation of the south coast rock lobster resource amongst the various extractive and non-extractive stakeholders.

Indicator

The percentage of catch taken by each sector (recreational and commercial)

The level of resource sharing conflict amongst user groups.

The level of participation of interested groups / parties in any focused resource sharing process.

The willingness of the various interest groups to participate in the resource sharing process and include other user-groups.

Performance Measure

To be determined as part of the Integrated Fisheries Management Process.

Data Requirements

Information on the catch by the recreational sector.

Information on incidental mortality as a result of recreational fishing.

Projected potential increases in recreational fishing effort for SCCF.

The costs associated with various management options and the identification of potential funding sources – particularly relevant for those measures targeted at the recreational sector.

Appropriate advice and framework as a part of the Integrated Fisheries Management Process on the question of resource allocation mechanisms across user groups.

Evaluation

The recreational component of the south coast rock lobster fishery is thought to be less than 10 tonnes across the entire south coast.

Robustness

Medium

Presently, there is no specific allocation made to the recreational sector. However, it is considered unlikely that the level of catch from either sector will increase before the further development of the Integrated Fisheries Management process.

If there were a significant increase in the percentage of catch from the recreational sector, this would prompt a reassessment of the current management arrangements (possibly for both sectors)

Fisheries Management Response

Recreational fishers interests are catered for through the Recreational Fishing Advisory Committee that advises the Minister for Fisheries on matters relating to recreational fishing and the peak recreational fishing group in the State, Recfishwest.

Comments and Actions

Through the processes already established and underway, the Department will continue to promote the integration of fisheries management across user groups. To this end the Department has a number of initiatives related to improving the governance of allocation and reallocation. An Integrated Fisheries Management policy was released in early 2000. This was followed up by the formation of the “Toohey Committee” which has reported to the Minister on a framework to try and achieve these objectives.

External Driver Check List

The potential for resource sharing issues being raised with the Minister independently of the Department, the Recreational Fishing Advisory Committee or Recfishwest.

5.4.2 DEPARTMENT OF FISHERIES - LEGAL ARRANGEMENTS

5.4.2.1 OCS ARRANGEMENTS

Rationale for Inclusion:

The Offshore Constitutional Settlement (OCS) arrangements between Western Australia and the Commonwealth Government of 1988 established that it is the sole responsibility of the State of Western Australia to manage the south coast rock lobster and deep-sea crab fisheries. The OSC “*was developed to simplify legal arrangement for the management of fisheries operating in both State and Commonwealth waters*”. (Anon., 1988).

This OCS agreement, jointly signed by Ministers Kerin, for the Commonwealth Government, and Grill for Western Australia, prescribes that all rock lobster fishing in Western Australia (which includes the Western Rock Lobster Managed Fishery) out to the limit of the Australian Fishing Zone is under the jurisdiction of WA. This simplified the management of the fishery from the previous system where jurisdiction was split between WA within 3 nm of the coast and the Commonwealth, outside of this area.

These arrangements were developed using Part 3 of the FRMA relating to the Commonwealth State management of fisheries and Section 12H of the Fisheries Act of 1952 of the Commonwealth.

Operational Objective

To uphold the existing jurisdictional arrangements for the management of this fishery.

Indicators

Approaches from the Commonwealth Government to alter the existing OCS.

Performance Measure

Maintenance of the existing responsibility of the State for the management of the fishery.

Data Requirements

None specific

Evaluation

The current jurisdictional arrangements are appropriate given the distribution of southern rock lobster and deep-sea crab and the good track record that exists under these arrangements for the management of these fisheries.

Robustness

Very high.

Fisheries Management Response

The Department has successfully managed the rock lobster fishery for many years and sees no reason to alter the jurisdictional arrangements that currently exist as they relate to rock lobster.

Comments and Action

No action required.

External Driver Check List

Pressure to change any of the OCS arrangements.

5.4.3 DEPARTMENT OF FISHERIES – CONSULTATION

5.4.3.1 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 south coast crustacean fisheries is based around a robust communication process.

There are sections in the FRMA that relate to the development of management plans (Section 64) and to the amendment of a management plan (Section 65). Given that the Esperance and Windy Harbour Rock Lobster fisheries already have management plans, Section 65 is the most relevant. However, the Albany and Bight rock lobster fisheries and the deep sea crab fisheries do not currently fall under a management plan (or plans). For these fisheries, Section 64 will apply in the development of management plans.

Section 65 of the FRMA states:

Section 65. Procedure before amending 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.

The persons who must be consulted prior to amending the Esperance rock lobster fishery management plan are specified in the plan as the licence holders in the fishery. The Windy Harbour/Augusta rock lobster fishery management plan does not at this stage specify who must be consulted prior to amending the plan. It is expected that this will be resolved in the next amendment to the plan.

Each year in late October or early November, the Department holds meetings with Esperance rock lobster and Windy Harbour/Augusta rock lobster authorisation holders on the south coast. These meetings typically involve discussions about management, research and compliance issues in the fishery, and provide a forum for industry to raise concerns and/or ask questions of the Department concerning management arrangements.

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
- 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.

Data Requirements

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

When an amendment is proposed, documentation of the formal consultation procedures.

Evaluation

Consultation on management of the south coast rock lobster fisheries are conducted in an open, accountable and inclusive environment where all sectors of the industry and the Departments managers 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

High

The 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 south coast crustacean fisheries through regular correspondence and encouraging phone communications with the fishery manager. Given the remote location of many of the operators (especially those residing east of Esperance), it can be logistically difficult and costly to undertake field trips and plan meeting dates more than once every year. However, the Department staff have travelled to Eucla and worked back towards Esperance meeting fishermen at fishing camps. The Department strives to hold an annual meeting with industry members and fishery processors in Esperance to discuss issues in the fishery. Similar meetings are also held in Albany and Augusta.

Consultation regarding the development of new management arrangements for the SCCF will be extensive, and will include the community, the recreational sector, the conservation sector, indigenous representatives, processors and industry members.

Comments and Actions

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

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.

5.4.4 DEPARTMENT OF FISHERIES - REPORTING

5.4.4.1 ASSESSMENTS AND REVIEWS

Rationale for Inclusion:

It is important that the outcomes of the fisheries management processes administered by the Department for the south coast crustacean fisheries 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 reports that are currently developed annually include: the State of the Fisheries Report and the Annual report to the Auditor.

Operational Objective

Current - To report annually to the Parliament and community on the status of the fishery.

Indicators

- The extent to which external bodies with knowledge on the management of fisheries resources have access to relevant material.
- 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 is already collected in the course of pursuing resource management objectives. The Department conducts an annual survey of the community with respect to its opinion on the status of the State's fisheries and their 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 ensured that the community has access to this information.

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 Office of the Auditor General (OAG).

The OAG also periodically audits that the information (both the data and processes) used to generate these reports.

ESD

The Department is currently completing a full ESD report (of which the material presented in this application is a subset) which will cover not only the environmental aspects of the fishery but the full social and economic issues. Once completed this too will be available from the web site.

Reports to Industry

Each year, the status of the resource and effectiveness of current management are presented to industry in a series of meetings in major population centres on the south coast.

Robustness High

Fisheries Management Response

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

External Driver Check List

The assessments provided by independent review bodies and the community.

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APPENDIX 1 ACRONYMS

CAES	Catch and Effort System
CPUE	Catch per Unit Effort
ED	Executive Director
EPBC	Environment Protection and Biodiversity Conservation Act, 1994
ERLMF	Esperance Rock Lobster Managed Fishery
ESD	Ecologically Sustainable Development
FRDC	Fisheries Research and Development Corporation
FRMA	Fisheries Resources Management Act, 1994
FRMR	Fisheries Resources Management Regulations, 1995
BAG	Great Australian Bight
OAG	Office of Auditor General
OCS	Offshore Constitutional Settle
SCCF	South Coast Crustacean Fishery
SCFA	Standing Committee for Fisheries and Aquaculture
SOM	Size at Maturity
SRL	Southern Rock Lobster
VMS	Vessel Monitoring Systems
WA	Western Australia
WAFIC	Western Australia Fishing Industry Council
WCRLMF	West Coast Rock Lobster Managed Fishery
WHARLMF	Windy Harbour/Augusta Rock Lobster Managed Fishery
WRL	Western Rock Lobster

APPENDIX 4 DETAILS OF CONSEQUENCE TABLES

Level	Ecological
Negligible	<p>General - Insignificant impacts to habitat or populations, Unlikely to be measurable against background variability</p> <p>Target Stock/Non-retained: undetectable for this population</p> <p>Byproduct/Other Non-retained: Area where fishing occurs is negligible compared to where the relevant stock of these species reside (< 1%)</p> <p>Protected Species: Relatively few are impacted.</p> <p>Ecosystem: Interactions may be occurring but it is unlikely that there would be any change outside of natural variation</p> <p>Habitat: Affecting < 1% of area of original habitat area</p> <p><i>No Recovery Time Needed</i></p>
Minor	<p>Target/Non-retained: Possibly detectable but little impact on population size but none on their dynamics.</p> <p>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.</p> <p>Take and area of capture by this fishery is small compared to known area of distribution (< 20%).</p> <p>Protected Species: Some are impacted but there is no impact on stock.</p> <p>Ecosystem: Captured species do not play a keystone role – only minor changes in relative abundance of other constituents.</p> <p>Habitat: Possibly localised affects < 5% of total habitat area</p> <p><i>Rapid recovery would occur if stopped - measured in days to months.</i></p>
Moderate	<p>Target/Non-retained: Full exploitation rate where long term recruitment/dynamics not adversely impacted</p> <p>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</p> <p>Protected Species: Levels of impact are at the maximum acceptable level</p> <p>Ecosystem: measurable changes to the ecosystem components without there being a major change in function. (no loss of components)</p> <p>Habitat: 5-30 % of habitat area is affected.</p> <p>:or, if occurring over wider area, level of impact to habitat not major</p> <p><i>Recovery probably measured in months – years if activity stopped</i></p>
Severe	<p>Target/Non Retained: Affecting recruitment levels of stocks/ or their capacity to increase</p> <p>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.</p> <p>Protected Species: Same as target species</p> <p>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.</p> <p>Habitat: 30- 60 % of habitat is affected/removed.</p> <p><i>Recovery measured in years if stopped</i></p>

<p>Major</p>	<p>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 <i>Recovery period measured in years to decades if stopped.</i></p>
<p>Catastrophic</p>	<p>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 <i>Long-term recovery period will be greater than decades or never, even if stopped</i></p>