

Southern Prospects 2004 - 2009
Draft South Coast Regional Strategy
for Natural Resource Management

Background Paper 6

Marine Biodiversity, Management and Planning
in the South Coast

For the South Coast Regional Initiatives Planning Team (SCRIPT)

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1.0 Introduction

This report provides an overview of marine biodiversity and fisheries management within the South Coast bioregion of Western Australia. It also presents information on threatened species and species considered at risk, threats affecting marine species and environments and potential management directions.

2.0 The South Coast Marine Environment

A number of marine regions have been identified around Australia on the basis of biological and physical attributes, through a process called the Interim Marine and Coastal Regionalisation of Australia (IMCRA). A total of 60 regions have been defined for Version 3.3 of IMCRA and one, the WA South Coast Region, completely encompasses the South Coast State NRM marine region. The IMCRA WA South Coast Region (or WSC) extends from Black Point near Cape Augusta in the west, to Israelite Bay, on the Great Australian Bight in the east. Within this, the South Coast State NRM marine region extends from Walpole Inlet in the west, to the Shire of Esperance border in the east, and offshore to the 3 nautical mile limit, including all offshore islands.

The South Coast marine environment is characterised by clear, oligotrophic (nutrient-poor) temperate waters, strongly influenced by Southern Oceanic weather systems and the Leeuwin Current, which flows from tropical latitudes north of Shark Bay, around Cape Leeuwin and gradually diminishes in the east at the Great Australian Bight. The South Coast marine land edge is the longest, south-facing coastline in the Southern Hemisphere and has a Mediterranean climate of winter rainfall and hot summers.

2.1 Marine Biodiversity

Due to the influence of the warm subtropical Leeuwin Current, and the interface with the Southern Ocean and Great Australian Bight, the South Coast marine environment supports a unique combination of subtropical, temperate and subantarctic marine species, many species at the extreme limit of their range of occurrence.

Marine biodiversity is affected by natural forces such as oceanography, trophodynamics and basin topography and also by local scale phenomena such as benthic habitat, biological interactions and physical intrusions, such as river/estuarine flushing (Commonwealth of Australia, 1997a). More recently however, an increasing force affecting marine biodiversity is human use and exploitation. In areas where human population has increased substantially there appears to be a general and noticeable trend toward loss of biodiversity (Commonwealth of Australia, 1997b). Fish life may suffer greatest with flow on effects to other commensal and symbiotic species probably due to changes in trophic function.

It is expected that the high level of species endemism throughout the South Coast terrestrial area will also occur in the sea due to the long geological isolation of South Coast seas and the influence of various changes in currents and water temperature over millions of years. It is estimated that approximately 90-95% of the marine life of temperate southern Australia is endemic (Poore, 1995). While very little is known about marine biodiversity of the South Coast marine bioregion it is expected that endemism will be high, particularly amongst invertebrates such as sponges. As an example, approximately 150 new sponge species have been found in the Recherche Archipelago in the last two years. It is also expected that several new alga will be described (Thomson-Dans C, Kendrick G, Bancroft K, 2003).

Recent marine benthic and biological surveys and a rapid assessment of biodiversity values using side-scan sonar and surrogate mapping analyses have been undertaken in Esperance waters of the Recherche Archipelago, and east of Bremer offshore of the Fitzgerald River National Park (Harman et al 2003, Thompson-Dans et al, 2003). The more comprehensive studies currently underway in the Recherche Archipelago (co-ordinated by Dr G Kendrick of University of Western Australia) have collected six new fish species and more than 140 new species of sponges within the first year of study. Results of this work will be published in Nov 2004. The Department of Conservation and Land Management's Marine Conservation Branch has also been developing benthic habitat maps for the nearshore South Coast marine region with broader scale mapping (1:100,00) undertaken by the Commonwealth Scientific and Industrial Research Organisation (CSIRO).

Community groups have also been involved with marine benthic and biota surveys on the South Coast. The Oyster Harbour, Wellstead, Bremer Bay and Esperance communities have undertaken localised fish surveys and benthic habitat and seagrass mapping, providing a reference for changes in habitat structure around Oyster Harbour, Cheyne Island, Bremer Harbour and Esperance Port.

Most surveys undertaken to date have been restricted to depths of less than 20 metres, although the 'Characterising Fish Habitats' study underway in the Recherche Archipelago is using new methods involving the use of underwater video cameras. This has allowed information to be collected to a depth of approximately 80 metres (Euan Harvey pers. comm).

The majority of marine biological studies undertaken, to date, off the South Coast have been investigations into target fish species such as Salmon, Herring, Pilchards and Abalone. In addition the distribution, population and behaviour of Australian Sea Lions, New Zealand Fur Seals and Southern Right Whales, all of which are listed as threatened or vulnerable, have been given some attention (Serventy 1953, Abbott 1979, Gales & Lambert 1985, Shaughnessy 1990, 1991, Shaughnessy & Gales 1990, Gales 1990, Gales & Cheal 1992, Cousins et al 1993, Gales et al 1994, Shaughnessy et al 1994, Bennett 1996, Oswald 1997) Sea Lion and Fur Seal counts can be undertaken by boat but are an expensive and time consuming exercise given the number of islands and the size of the Region. Aerial surveys of Southern Right Whale populations are undertaken annually under the coordination of the Western Australian Museum and a review of information is provided to the Department of Conservation and Land Management for management purposes (Bannister 1994a, 1994b).

There are also many species of oceanic and migratory seabirds to be found inhabiting the waters and skies over the Southern Ocean. Many are dependent on the islands throughout the Region to breed (Serventy 1953, Storr 1959, Fullagar & Van Tets 1976, Abbott 1981a, 1981b, Lane 1982a, 1982b, 1982c, Tingay & Tingay 1982a, 1982b, Johnstone & Smith 1987, Garnett 1992). The endangered Cape Barren Goose is an island dependent bird (Burbridge et al, 1993a, 1993b), and Little Penguins, which are considered under threat in the metropolitan and central coast areas of the State, are numerous in the South Coast on most islands. The Department of Conservation and Land Management on Mutton Bird Island, Mistaken Island, Breaksea Island and Bald Island have undertaken recent seabird nesting surveys. Surveys have also been undertaken by community groups on Cheyne Island and the Recherche Archipelago in recent years.

The terrestrial fauna of the islands includes at least one endemic fauna species *Pseudonaja affinis tanneri* and several threatened species including Quokka, Recherche Rock Wallaby, Australian Sealion, New Zealand Fur Seal and a translocated population of the Noisy Scrub bird. A significant threat to island ecology with predicted climate change is fire – a post fire monitoring project has been commenced on Mondrain Island following the wildfire of 2002. Further community initiated surveys are currently being undertaken by community groups on islands of the Recherche Archipelago (Elaine Siemer pers comm.).

2.2 Threatened Species and Species at Risk

Vertebrate marine fauna species identified by the Commonwealth as threatened or vulnerable that potentially occur along the South Coast are:

- Southern Right Whale (*Eubalaena australis*) – Endangered.
- Humpback Whale (*Megaptera novaeangleae*) – Vulnerable.
- Blue Whale (*Balaenoptera musculus*) – Endangered.
- Sei Whale (*Balaenoptera borealis*) – Vulnerable.
- Fin Whale (*Balaenoptera physalus*) – Vulnerable.
- Australian Sea Lion (*Neophoca cinerea*) – Considered Threatened status by State, currently being assessed for consideration as Vulnerable status under EPBC act.
- Loggerhead turtle (*Caretta caretta*) – Endangered.
- Leatherback turtle (*Dermochelys coriacea*) – Vulnerable.
- Grey Nurse shark (*Carcharias Taurus*) – Vulnerable.
- Great White shark (*Carcharodon carcharias*) – Vulnerable.
- Southern Great Petrel (*Macronectes giganteus*) – Endangered.
- White-Bellied Storm Petrel (*Fregatta grallaria grallaria*) – Vulnerable.
- Wandering Albatross (*Diomedea exulans*) – Vulnerable.
- Sooty Albatross (*Phoebastria fusca*) – Vulnerable.
- Indian Yellow-nosed Albatross (*Thalassarche carteri*) – Vulnerable
- Cape Barren Goose (*Ceriopsis novaehollandiae grisea*) – Vulnerable

2.3 Fisheries Management

Under an arrangement with the Australian Government (the Offshore Constitutional Settlement), the Western Australian Department of Fisheries is responsible for the management of fish resources (with a few exceptions) in all the waters off Western Australia to the 200 nautical mile outer limit of the Australian Fishing Zone.

In recent years, the Department of Fisheries has continued to shift to a more integrated fisheries management approach across the State's commercial and recreational fisheries. Integrated fisheries management involves managing the total impacts on marine and aquatic resources. This includes not only the impacts of commercial and recreational fishers, but also takes into account customary fishing, aquaculture and wider ecological and community considerations.

Commercial Fishing: The Southern Region of the Department of Fisheries extends from near Tims Thicket (north of Bunbury) to the South Australian border. A Regional fisheries management officer is located at the Albany Regional office of the Department, and is responsible for the management of the majority of the commercial fisheries in the southern region. Fisheries including the commercial abalone fishery, the purse seine fishery and the demersal gillnet and longline fishery are managed by the Department in Perth.

Most commercial fisheries off the South Coast occur beyond 3 nautical miles from shore. Although technically outside the scope of the Southern Prospects Strategy, the sustainability of these fisheries is reliant on the correct management of the inshore aquatic environment and is mentioned here for the purposes of completeness, as species and operators in these "offshore" fisheries are likely to interact with inshore areas within the scope of the Strategy. There are also a number of commercial fisheries that occur wholly within 3 nautical miles of the shore (e.g. the Salmon and Herring fisheries).

Many commercial fisheries in the State rely on relatively high-value, low-volume products for their economic viability (e.g. Rock Lobster, Abalone). However, on the South Coast, there are a number of smaller scale commercial fisheries, and fisheries that rely on higher volume, lower value species (e.g. purse seine fishery, Salmon and Herring fisheries). Other fisheries on the South Coast include multi-species fisheries (e.g. the South Coast estuarine fishery and the wetline fishery). All fisheries are managed by the Department on a longterm sustainable basis so that the resources will continually be available to the community.

Fishing controls are vital to ensuring that each fishery remains sustainable. These include:

- Input controls, including limitations on the number of licences; gear restrictions; and seasonal closures and limits on total fishing time (effort quotas).
- Output controls (catch quotas) that directly limit the quantity of fish that can be landed.

Permanent closed areas or other measures, under both input and output quota regimes, are also in place to protect juvenile or breeding fish, or to protect important habitats. These measures are usually put in place in the form of a management plan (essentially a set of rules), or are defined under various Regulations or Orders that are published in the Government Gazette under the Fish Resources Management Act 1994. These legislative requirements are subsequently enforced by the respective Fisheries and Mariner Officers based within the Southern Region.

The successful management of commercial fisheries depends on robust education and compliance regimes and industry support of management arrangements.

It is a requirement under the EPBC Act that all exporting commercial fisheries must undergo Ecological Sustainable Development (ESD) assessment to gain continued export approval beyond December 2005. Those fisheries that do not meet the requirements, ie cannot demonstrate that they are ecologically sustainable against ESD requirements, will no longer be able to export. All WA non-export fisheries will also be undergoing a similar ESD assessment process under State Government policy. A key task for the Department of Fisheries since 2002 has been the development of ecological sustainability reports to the Department of Environment and Heritage to ensure continued export approval for a number of export based fisheries. These reports can be viewed online at the Department of Environment and Heritage website (www.deh.gov.au).

The Natural Heritage Trust currently funds the SeaNet program. SeaNet currently has one extension officer based in Perth working with commercial fishers in a variety of fisheries across the State. SeaNet officers work with the commercial fishing industry and researchers to develop innovative ways to reduce bycatch and to continually improve commercial fishing practices. The Western Australian SeaNet extension officer is currently working on an Industry Code of Practice for responsible fishing for the South Coast Purse Seine Managed Fishery. In addition to the work being done by SeaNet, the State commercial fishing peak industry body (the Western Australian Fishing Industry Council), industry members and Department of Fisheries staff are working to develop an Industry Code of Practice for the South Coast and South West Coast salmon managed fisheries. The draft code includes statements about the capture and handling of fish, and guidelines for interacting with other user groups.

Recreational Fishing

Based on research advice, risk management and precautionary principles, numerous recreational fishing management measures are in place. These include:

- Bag limits, possession and size limits on species of fish.
- Defined legal fishing gear.
- Spatial or temporal separation of conflicting fishing activities.
- Closed seasons to protect spawning aggregations.
- Fishing licences for some species.
- Closed areas or fisheries to protect stocks considered at risk of being overfished.

Nine major recreational fisheries along Western Australia's 12,000km coastline operate within four broad marine and two freshwater bio-geographic regions.

(From: <http://www.fish.wa.gov.au/annualreport/ar2003/esd/environment/oroutput>)

- A draft five year strategy for managing the recreational component of fishing catch on the South Coast has been developed by DoF, due to be finalised during 2004 (Department of Fisheries, July 2004: Fisheries Management Paper No. 182).

2.4 Bioregional Marine Planning

During 2004, the Department of Premier and Cabinet of the Government of Western Australia developed a draft policy framework for bioregional marine planning which sets out the goals, objectives and principles within which bioregional marine planning will operate, and which will be the basis for a proposed trial for the development of a bioregional marine plan for the South Coast and Eucla IMCRA bioregions, from Black Point to Eucla, over the next three years. The intention is that the policy framework will be applied to all bioregional marine plans developed in Western Australia.

The draft overall goal for bioregional marine planning is to develop: *A clear and agreed strategy for sustainable use of the marine environment that protects ecological integrity of the bioregion and minimises conflict between sectors over resource access and allocation whilst recognising the social, economic and cultural values that the marine environment holds for current and future generations.*

It is envisaged that the state co-ordinated process of development of a bioregional marine plan for the South Coast marine waters to the 3 nautical mile offshore boundary will be done concurrently and co-operatively over the next 5 years with the development of a large ecosystem regional marine plan for the south west and South Coast federal marine waters to the 200 nautical mile offshore boundary, to be conducted by the National Oceans Office (see http://www.oceans.gov.au/regional_marine_plan_overview.jsp)

2.5 Marine Conservation Planning

The Conservation and Land Management Act 1984 defines 3 categories of Marine Reserves: Marine Parks, Marine Nature Reserves and Marine Management Areas. At present there are no marine reserves in the South Coast marine bioregion, although a selection process undertaken by the Marine Parks and Reserves Selection Working Group in 1994 (CALM Marine Parks and Reserves Selection Working Group, 1994) has identified nine areas which may be potentially realised as Marine Reserves under Western Australian legislation. The South Coast areas identified for Marine Reserves are presented in Table 1 showing their geographical location in relation to terrestrial reserves.

Table 1

Potential Marine Reserves in the South Coast Marine Bioregion

Potential Area	Geographical location in relation to terrestrial reserves
1. Walpole-Nornalup Estuarine System	Adjacent proposed Walpole Wilderness Area, Walpole-Nornalup National Park, Shire of Manjimup, Shire of Denmark
2. William Bay	Adjacent William Bay National Park/Shire of Denmark
3. West Cape Howe	Adjacent West Cape Howe National Park/City of Albany
4. King George Sound – Princess Royal Harbour	Adjacent Torndirrup National Park, Michaelmas Island Nature Reserve, Breaksea Island Nature Reserve/City of Albany
5. Cape Vancouver to Bald Island	Adjacent Two Peoples Bay Nature Reserve, Many Peaks Nature Reserve, Waychinicup National Park, Bald Island Nature Reserve, Arpenteur Nature Reserve/City of Albany
6. Fitzgerald Biosphere Reserve	Adjacent Fitzgerald River National Park, Doubtful Islands Nature Reserve/Shire of Jerramungup and Shire of Ravensthorpe
7. Stokes Inlet	Within Stokes National Park/Shire of Esperance
8. Recherche Archipelago	Adjacent Cape Le Grand National Park, Cape Arid National Park, Nuytsland Nature Reserve, /Woody Island Nature Reserve, Recherche Archipelago Nature Reserve/Shire of Esperance
9. Twilight Cove	Adjacent Nuytsland Nature Reserve/Shire of Dundas

(The potential marine reserves listed above do not appear in any order of priority, simply west to east geographically).

The Walpole-Nornalup Estuarine System is currently proposed for Marine Reserve status, with the public consultation process well progressed.

While the areas listed in Table 1 were identified as being potential marine protected areas within the South Coast marine bioregion in the early 1990's, an interest has developed over the past decade toward a more holistic bioregional approach. This could enable the full range of marine users and impacts to be identified, understood and managed on scales that are ecologically meaningful. Further work has been done on the identification of benthic habitats and marine biodiversity in Recherche Archipelago and in the region of Bremer Bay/Fitzgerald River National Park (G Kendrick pers comm., Harman et al 2003) to assist with prioritisation of areas along the South Coast for implementation of Marine Protected Areas.

In addition, the process of developing Fish Habitat Protection Areas (FHPA's) under the Fish Resources Management Act is being investigated by community groups at Williams Bay, Albany, Cape Riche and Bremer Bay. In the event that a marine protected area was gazetted over a FHPA, the FHPA would cease to exist.

Small Reef Protection Areas, also created through the Fish Resources Management Act, have been implemented in Esperance around the Sanko Harvest wreck and over the artificial reef at the end of the Old Tanker Jetty. A similar protective measure has also been placed over the HMAS Perth wreck in King George Sound, where fishing within a radius of 250m of the HMAS Perth is prohibited.

3.0 Overview of the Net Economic, Social and Environmental Effects of Marine-based Activity

The marine environment plays an important role in facilitating transport, fishing, tourism and recreation. The majority of the population living in the South Coast live within 10 kilometres of the sea and, as such, the Region can be described, in the most part, as populated by coastal people. The people who live at the farthest distance from the sea in the Region probably visit it on occasions to recreate and as such it is an important part of their lives.

The marine environment, therefore, has significant social value and contributes to the Regional identity of the south coast community to a high but largely unrecognised degree. Economically, the marine environment is pivotal to the success of extractive activities such as farming, tree cropping and fishing, simply because the sea is used as a transport conduit for produce as well as a resource base in the case of fishing.

3.1 Shipping

Shipping transport within the South Coast marine bioregion goes largely unnoticed except for those ships that call into the Port of Albany or Port of Esperance. The Ports are strategically placed within the Region to allow for the best transport of natural resources to national and international markets and are indispensable to Regional economic growth and social benefit. Shipping within Port waters is the responsibility of the recognised Port Authority, but outside of these waters shipping either becomes the responsibility of the State and/or Commonwealth governments.

The economic and social effects of shipping are relatively clear. Shipping is essential for the export of agricultural produce and the large-scale transport of goods. The use of ship transport reduces the number of heavy vehicles on roads and the need for regular road maintenance, and allows produce to be shipped directly to overseas markets. The Port of Albany has recently become an important exit point for wood chips produced from the Blue Gum Plantation Industry and provides an opportunity for the development of a new industry which has strong overseas markets. Similarly, the Port of Esperance provides the exit point for iron ore and nickel produced in the remote Goldfields region of the State.

However there are some environmental threats associated with shipping including:

- TBT build-up in sediment around wharves and anchorages.
- Destruction of benthos in anchoring areas.
- Increased risk of marine pest introduction through ballast water exchange and hull fouling.
- Increased risk of shipwreck and oil spill.
- Disposal of rubbish at sea.
- Expansion of port areas to accommodate increasing traffic and new port dependent industry.

This is an area of marine use where sustainable management of environmental effects will be difficult to achieve. Nevertheless, there are internationally agreed pollution prevention regulations, oil spill contingency plans and maritime safety regulations relating to shipping, all contributing to the protection of the marine environment, albeit in times of catastrophe or when a ship's safety is at risk.

In addition, the National Introduced Marine Pests Coordination Group (NIMPCG) has been established to oversee the coordinated development of nationally consistent arrangements and measures to prevent and manage marine pest incursions with the Australian Quarantine Inspection Service being the primary tool used to implement recommendations and strategies. Department of Fisheries (DoF) facilitate State involvement in managing the introduced pest issue. DoF has worked with the Commonwealth and other States to develop a national system for the prevention and management of invasions of marine pests. The South Coast has some of the most pristine marine waters of Australia, and the introduction of pest species is recognised as a very serious threat by DoF (see <http://www.fish.wa.gov.au/annualreport/ar2003/highlights/index.html>).

Both the Port of Albany and Port of Esperance, through the CSIRO's Centre for Research on Introduced Marine Pests, have undertaken some benthic surveys to look for introduced species. There are about 250 introduced marine species in Australian waters and already 92 of these can be found in Western Australia (Department of Fisheries, 2000a). To date, the most obvious marine pest in the South Coast marine bioregion has been the European Fan Worm (*Sabella spallanzanii*) which has been found in large numbers at Bandy Creek Boat Harbour in Esperance. DoF have produced a colour field guide that provides information to divers and fishers on 12 potential pests (Department of Fisheries, 2000).

3.2 Commercial Fishing

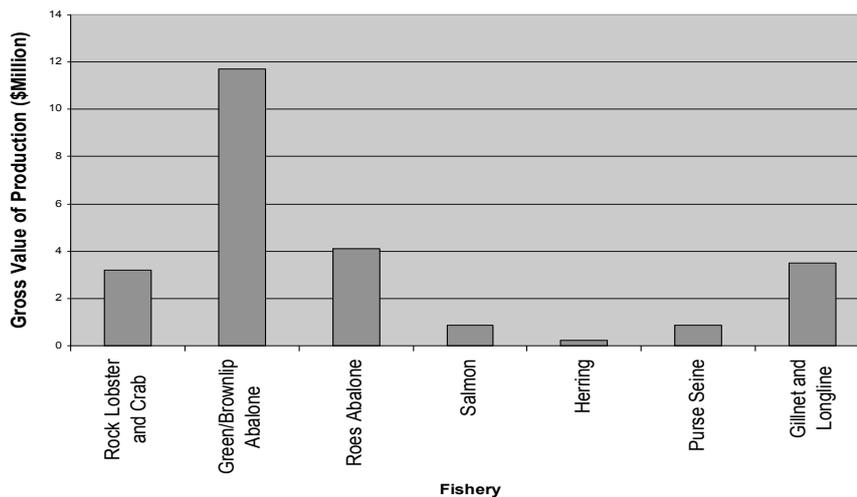
The oligotrophic waters of the South Coast are not highly productive in comparison to other areas of the country and similar marine environments of the world. However a small commercial fishing sector has developed over many years. The commercial fishing fleet within the south coast marine bioregion consists mainly of:

- South Coast Rock Lobster Fishery.
- Abalone Managed Fishery.
- Western Australian Salmon Fishery.
- Australian Herring Fishery.
- South Coast Purse Seine Fishery.

- Demersal Gillnet and Demersal Longline Fisheries (Temperate Shark Fisheries Management currently under review: Department of Fisheries, 2004a: Fisheries Management Paper no. 180).
- Marine Aquarium Fishery.

Commercial fishing for deep-sea crabs occurs within the Rock Lobster Fishery and a small fishery exists for scallops. Commercial fishing within 3 nautical miles takes place under State Legislation. Outside 3 nautical miles some fisheries are managed jointly by the Australian and State Governments; others are managed by the State under the Offshore Constitutional Settlement (OCS). The management of commercial fisheries is discussed in section 2.3 above. South coast fisheries have an estimated annual catch value of about \$24.5 million (Figure 1).

Figure 1. Gross Value of Production of some south coast commercial fisheries.



Direct social effects from the commercial fishing sector include the creation of work based around vessel maintenance, equipment sales and fitting, seafood processing, seafood transport, packaging of produce, regulation and monitoring, research and tourism. It is difficult to quantify the “down-the-line” economic and social effects of these activities but they could be regarded as adding significant value to the industry.

A small Marine Aquarium Fisheries (MAF) exists on the South Coast and is regulated by the Dept of Fisheries, according to a Marine Aquarium Fish Management Plan. The collection of marine aquarium fish for personal use is regulated through bag limits and minimum legal size rules. The Leafy Seadragon (*Phycodurus eques*) is totally protected under present MAF regulations.

3.3 Recreational Fishing

Recreational fishing participation for the South Coast of Western Australia, between Augusta and WA/SA border, is estimated at around 96,000 anglers per year, resulting in 330,000 fishing days. There are also 23 fishing charter licences and 4 ecotourism licences that have been issued for the South Coast marine bioregion. A review of recreational fishing on the South Coast commenced in 2002/03, and has resulted in the production of the draft 5-year strategy for management of recreational fishing on the South Coast (Department of Fisheries, 2004b: Fisheries Management Paper No. 182).

Important recreational target species include:

- Abalone, Crabs, Black Bream, Cobbler, King George Whiting, Swallowtail, Cod, Leatherjackets, Herring, Salmon, King Fish, Red Snapper, Pink Snapper, Samson Fish, Southern Blue Fin Tuna, Shark, Harlequin, Queen Snapper, Western Blue Groper, Hapuka, Trevally, Dhufish.

Bag and size limits are in place for all species named above and are currently under review in Fisheries Management Paper No. 182. Compulsory logbook record keeping has been introduced for the aquatic fishing charter tour industry. In addition to the proposed new bag and daily catch limits, to promote a greater level of compliance with bag limits and minimum fish sizes,

the Department of Fisheries has recently introduced new rules for recreational fishers that requires fishers to bring their catch back to shore before filleting.

Key management issues of the South Coast recreational fisheries include:

- Resource-sharing conflicts between the recreational fisheries and the commercial fisheries.
- Concerns about significant increases in recreational fishing effort and pressures with rapid population growth on the South Coast.

(Department of Fisheries, 2004b).

3.4 Recreational Boating

The relatively unpredictable nature of the Southern Ocean and the sparsity of safe ports of call limit the number of large (>15m) recreational boats found in the Region. Vessels travelling south and east from the west coast of Western Australia are virtually without a protected port after leaving Geographe Bay and may or may not find shelter in embayments along the way, depending on wind direction. Vessels travelling this route pass through the hazardous waters of Cape Leeuwin which is considered one of the most dangerous cape crossings in the world, along with Cape Horn (South America) and Cape of Good Hope (South Africa). Vessels travelling from eastern Australia face a similar trial crossing the remote areas of the Great Australian Bight and the dangerous island and shoal strewn Recherche Archipelago without any safe port of call before Esperance. As such, the largest recreational boating sector in the South Coast consists of small vessels, which can be towed on trailers and launched at boat ramps or off the beach when the weather allows.

3.5 Aquaculture

Licensed aquaculture of mussels occurs in Oyster Harbour and the waters of Wilson Inlet. Mussel and abalone aquaculture leases have been taken up in the southern parts of King George Sound, around Mistaken Island and Limestone Head. Abalone hatcheries and grow out facilities have also been established in Albany at the Albany Aquaculture Park and Bremer Bay. There is little information on the economic effect of this activity but it appears that Albany mussels are highly sought after because of the clean water in which they grow and abalone have a high market value. The Department of Fisheries has a Shellfish Quality Assurance Program, developed in conjunction with the Mussel industry, that monitors the quality of mussels produced from the aquaculture mussel industry. This ensures that the mussels produced and sold to consumers are of the highest quality.

The production of abalone from the aquaculture hatcheries established on the South Coast is undertaken within the inshore reef platform areas off the South Coast and within land based raceways. Therefore, it is essential to the viability of this industry that the surrounding marine environment is managed appropriately so that there are no detrimental affects to water quality.

Sea-cage tuna fish farming, similar to the established industry of Port Lincoln in South Australia, is currently being investigated by a commercial proponent for development in the Recherche Archipelago. Sea-cages are used as grow-out pens for Southern Bluefin Tuna commercially fished under an annual quota arrangement and, sometimes, Yellowtail Kingfish.

Most of the potential environmental issues with this industry relate to the potential for protected species interaction, damage/fouling to benthic habitats, the introduction of artificial feed to high order carnivores, potential for secondary impacts and the requirement for additional shore-based infrastructure requiring modification of the shoreline. Sites chosen for the siting of sea-cages can impact upon recreational and commercial fishing and recreational and charter diving. Aquaculture potential and planning recommendations for the Recherche Archipelago have been detailed in the Aquaculture Plan for the Recherche Archipelago (Department of Fisheries 2000b).

3.6 Marine-based Tourism

Tourism, in general, is an ever growing industry and has been described as the world's 'biggest' industry on the basis of its contribution to global economy (Christ et al, 2003). In the period 1990 to 2000, tourism in Australia is estimated to have grown 123% (Christ et al, 2003). Marine based tourism on the South Coast is growing, with new boat chartering, dive and fishing expedition operations opening in coastal centres. There are currently 23 fishing charter licences and 4 ecotourism licences that have been issued for the South Coast marine bioregion.

It is generally believed that when properly managed and directed, tourism can have a positive effect on biodiversity conservation and an increase in community wealth.

4. Marine NRM – Future Direction

4.1 Priority Areas

- Support for research of marine habitat diversity, biodiversity values and marine threats within the region to facilitate future sustainable management and planning.
- Promote public awareness of the diversity and uniqueness of the South Coast marine environment.
- Support for implementation of Ecologically Sustainable Development (ESD) and Integrated Fisheries Management (IFM) in South Coast fisheries.
- Support for stakeholder and community involvement in marine planning, conservation efforts and NRM.

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