

**FISHERIES ENVIRONMENTAL
MANAGEMENT PLAN
FOR THE GASCOYNE REGION**

- Draft Report

FISHERIES MANAGEMENT PAPER NO. 142



Department of
Fisheries



Fish for the future

Department of Fisheries
168-170 St Georges Terrace
Perth WA 6000

June 2002

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Compiled by Jenny Shaw

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WOULD YOU LIKE TO COMMENT?

The draft Fisheries Environmental Management Plan of the Gascoyne provides a brief outline of fisheries and fishing activities occurring in the Gascoyne Region as well as a summary of possible environmental effects of fishing. Proposals for further environmental management of the fisheries in the Gascoyne are outlined. The Department of Fisheries would like your comments on the management plan and the proposed recommendations.

WHY COMMENT?

The draft Fisheries Environmental Management Plan of the Gascoyne has been released in conjunction with the Fisheries Environmental Management Review (2000). The review is a status report of all fisheries and fishing activities in the Gascoyne. The document provides discussion on the environmental effects associated with each fishery as well as possible pressures and threats to these fisheries.

The information was resourced from Department of Fisheries reports and experienced staff. The draft management plan gives the wider community an opportunity to comment on the recommendations arising from the review. Individual or joint submissions are welcome.

Public submissions will be treated as public documents unless specifically marked confidential, and may be quoted in full or in part in any further reports or summary of submissions.

POINTS TO CONSIDER

To ensure your comments are as effective as possible:

- Clearly and briefly describe each subject or recommendation you want to discuss,
- Assist us by referring to the relevant sections or page numbers in the document,
- Clearly state your views and quote from other documents or sources of information where appropriate, and
- Where possible, suggest ways of resolving any of the issues you have raised.

Please remember to include your name, address, the date and whether you want your submission to be confidential.

RESPONSE TO SUBMISSIONS

The issues raised in all submissions will be summarised and considered when final recommendations and priorities are determined.

WHERE AND WHEN TO SEND YOUR SUBMISSION

The closing date for submissions is 7 October 2002. Please send your submission before this date, along with your full name, address and association details (if applicable) to:

The Executive Director
Attention: Fish and Fish Habitat Protection Program Manager
Department of Fisheries
Locked Bag 39
Cloisters Square Post Office
PERTH WA 6850

For extra copies of this draft management plan and the related review:

For copies of this document and the related Fisheries Environmental Management Review (2000), please visit the web site: www.wa.gov.au/westfish or contact:
Department of Fisheries
Community Relations Branch
Phone (08) 9482 7333

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FOREWORD

The Department of Fisheries is undertaking a series of Fisheries Environmental Management Reviews (FEMRs) and Plans. The reviews aim to examine the environmental management of the Western Australian coastline from a broad fisheries perspective, and to make an initial and qualitative assessment of the environmental effects of fishing on a regional basis.

The plans, which are separate documents, complement the reviews and contain recommendations relating to Department of Fisheries environmental management.

Fisheries Environmental Management Reviews (FEMRs) and Plans will be produced for the following regions:

- Northern (NT/WA border to Rocky Point);
- Gascoyne (Rocky Point to Kalbarri);
- South West (Kalbarri to Augusta);
- South Coast (Augusta to WA/SA border); and
- Inland waters.

This draft document for the Gascoyne Region is the first in the series of Environmental Management Plans. . It complements the recently released Fisheries Environmental Management Review of the Gascoyne Region (2000).

The draft plan is available for public comment for a three-month period and I urge you to read it and provide your comments to the Department of Fisheries. Comments received will be carefully considered in preparation of a final plan. I am confident that once finalised, the plan will provide a clearer understanding of the role Fisheries has in managing fisheries in an environmentally sustainable manner.

Peter Rogers
EXECUTIVE DIRECTOR
DEPARTMENT OF FISHERIES

SECTION 1 THE MARINE ENVIRONMENT OF THE GASCOYNE

1.1 Physical and Biological Environment

The Gascoyne Region is characterised as a transition zone between the tropic and temperate regions of WA. This transition in climatic conditions and ocean currents and the wide range of coastal landforms and variety in coastal morphology combine to provide the requirements for varied and complex marine habitats and associated flora and fauna.

This management plan will cover a section of coast called the Gascoyne Region for the purposes of this report. The region extends along the coast from Rocky Point (21° 44' 09" S, 114° 51' 24" E), about 30km south of Onslow, to Kalbarri (27° 42' 07" S, 114° 09' 11" E) and includes approximately 1,200 km of mainland coastline. The area within the study area is approximately 291,330 km² (Figure 1).

The limits of this zone approximate those chosen for other fisheries and environmental purposes (see *1997 Environment Western Australia: State of the Environment Report*) and also take into account major habitat transitions (see *A Representative Marine Reserve System for Western Australia 1994*). The zones include the major ecosystem-based classifications adopted on a national level by Environment Australia. These national biogeographical regions are a key element in *Australia's Oceans Policy* (see *Interim Marine and Coastal Regionalisation for Australia 1998*).

The Department of Fisheries has responsibility for fisheries operating in State and Commonwealth waters out to the Australian Fishing Zone (AFZ). Consequently, the environments considered in the Gascoyne FEMR and this Plan are limited to those marine and estuarine environments within a boundary delineated by the 200nm AFZ boundary and the coastline described above (Figure 1).

The marine environment of the Gascoyne has been divided into coastal, offshore and oceanic ecosystems.

1.2 Coastal and Inshore ecosystems

The coastal and inshore ecosystems are classified as those that occur at depths of less than 40m, which is the approximate limit of organisms reliant on photosynthesis, and include -

Coral reefs: Ningaloo Reef, in the north of the region, is the only major coral reef on the Gascoyne coast. It is the largest continuous reef area in Western Australia and is considered one of Australia's most significant coral reef systems. Coral reefs support the most abundant and diverse fish populations of all these habitats.

Mangroves: The eastern coast of Exmouth Gulf supports one of the largest mangals in the region. These mangals and flats are thought to be a significant source of nutrients that contribute to the valuable prawn fishery in Exmouth Gulf, and provide a nursery area for juvenile prawns and other commercial and non-commercial species.

Seagrasses: The central Gascoyne coast and Shark Bay support major seagrass communities, which may be one of the most important ecosystems in the region, playing an important role in sedimentary processes, food chains and nutrient cycling. Smaller seagrass species occur in eastern and southern Exmouth Gulf and provide nursery areas for tiger prawns.

Sand Banks: Extensive sand areas support seagrasses and also provide a substrate for microphytobenthos (microalgae) in all areas, particularly Ningaloo Reef where their productivity is equal to corals (*zooxanthellae*) on a square metre basis (R. Masini, pers comm.). In both Exmouth Gulf and Shark Bay, the shallow sand banks provide productive habitat and nursery areas for the prawn and finfish (whiting and mullet) stocks in the area.

Other ecosystems include algal communities, rocky shore communities, hard-bottom benthic communities; soft-bottom benthic communities, and pelagic mid-water communities (CALM, 1994).

1.3 Offshore and Oceanic Ecosystems

Offshore ecosystems are described as those with water depths ranging from approximately 40-200 m, or as those occurring from the outer boundary of inshore ecosystems to the edge of the continental shelf. This offshore zone is one where coastal and oceanic influences mix.

Waters deeper than the continental shelf are described as oceanic. In both offshore and oceanic zones, there are hard-bottom benthic communities, soft-bottom benthic communities and pelagic communities. There is little detailed information on these environments.

1.4 Marine Fauna

The Gascoyne coast supports an abundant and diverse fish fauna, and is noted for the high quality of its commercial and recreational fishing. Despite having a prolific fish fauna, there is little information available on the fish communities of large sections of the Gascoyne Region. A particular lack of information exists for fish in deeper areas of the continental shelf and on the continental slope.

Approximately 1,400 species of fishes could be expected to inhabit this region of transition. This includes tropical species common to most of the Indo-Pacific region, some of which range from the shores of eastern Africa to the islands of Micronesia.

The Leeuwin Current flows southward over the continental shelf from Rowley Shoals and may transport pelagic fish larvae. The narrowness of the shelf in the vicinity of the Ningaloo Reef means that the reef is bathed by the southward flowing current. Ningaloo Reef itself provides a stepping-stone for the transport of fish larvae to more southern reefs.

The molluscs and crustaceans in the Gascoyne Region follow similar habitation patterns to the region's fish populations, with temperate and tropical species overlapping and more tropical species occurring in the northern half than in the southern.

Other marine fauna in the Gascoyne area with scientific and tourism significance are sea snakes, but little information is available about their distribution. Turtles, which are abundant in the area, especially in Shark Bay, Exmouth Gulf and Ningaloo Reef, inhabit tropical coasts and nest on sandy beaches in the area. Dugongs are found in internationally significant numbers in Shark Bay and also occur at Ningaloo Reef and in Exmouth Gulf.

Humpback whales travel through the Gascoyne Region, on their northward migration to Kimberley breeding and calving grounds in the winter and southward migration to Antarctic feeding grounds during August to October. On their return journey south, large numbers of whales, including mothers with calves, use Exmouth Gulf and Shark Bay as a resting ground (Jenner and Jenner, pers. comm.). A number of other species of cetaceans may be found in the Gascoyne, of which the bottlenose dolphin is the most common.

1.5 Stakeholders

1.5.1 Fishing

Commercial Fishing (State)

The variety of marine habitats in the Gascoyne supports a wide range of fisheries. Commercial fishing is economically the most important industry with an approximate catch value of \$80 million (1998/99). Six of these commercial fisheries have licence areas that fall entirely within the Gascoyne Region generating direct expenditure and employment for the local communities. There are a number of other commercial fisheries, both State and Commonwealth, that fish the waters of the Gascoyne and also contribute to the local economy.

In an economic survey, McLeod and McGinley (1994) estimated that the main Gascoyne fisheries accounted for 33 per cent of the total output of Western Australia's fisheries. Using associated multipliers it can be assumed from the above survey that the value of the commercial fishery in the Gascoyne is somewhere between \$78 million and \$254 million. These figures do not include the economic contribution of fish processing that occurs in the region.

Recreational Fishing

Recreational fishing is a popular activity along the Gascoyne coast. There is a relatively small resident fishing population in the Gascoyne, but this is seasonally boosted by an influx of tourists many of whom go fishing (estimated 50,000). It is estimated that their contribution in direct expenditure for the region is around \$50 million (Sumner and Steckis, 1999).

Aquatic Tourism Industry

The fishing tourism industry is more closely aligned with the recreational sector than the commercial sector because of the species targeted, fishing gear used and motivation for fishing. It is now managed as part of the recreational fishing sector and although applications are still to be finalised, there have been 32 applications for Fishing Tourism Operator Licences and six for Aquatic Eco-tourism Operator Licences for the Gascoyne Region.

Aquaculture

A variety of aquaculture activities take place in the inshore waters of the Gascoyne. Most of the activity is based on silver lipped pearl oyster (*Pinctada maxima*), which occurs in Exmouth Gulf.

Around Carnarvon and Shark Bay, there has also been significant investment in the culture of non *P. maxima* pearl oyster species and all other aquaculture activities are in early stages of development. The Gascoyne's potential for aquaculture is believed to be considerable because land availability is high and natural water resources that include hypersaline, marine, brackish, fresh and artesian water are available. In addition, the region supports many fish and shellfish species that are high value and considered good prospects for aquaculture development.

Traditional Fishing

Fishing is a popular activity among the large Aboriginal communities in the Gascoyne, particularly in the Shire of Carnarvon.. People of Aboriginal descent do not require recreational fishing licences if fishing traditionally for themselves or their family. However, they are expected to fish within the recreational fishing rules, unless operating a Commercial Fishing Licence or a special Aboriginal Community Licence.

Commercial Fishing (Commonwealth)

Commonwealth Fisheries in the Gascoyne Region occur in the deeper offshore and oceanic waters and are managed by the Australian Fisheries Management Authority (AFMA). The legal licence area for three Commonwealth fisheries extends into Gascoyne waters with the most activity coming from the Western Tuna and Billfish Fishery and the Western Deepwater Trawl Fishery.

1.5.2 Post-Harvest Fishing Interests

There are a number of fish processors in Carnarvon, Exmouth and Denham. Processors sell to the local market, or box and freight the fish to Perth for both the export and local markets. The economic value of the post-harvest fishing interests in the Gascoyne is unknown, but thought to be significant (McLeod P., pers comm.).

1.5.3 Tourism and Recreation

The Gascoyne Region supports substantial tourism resources with some of the State's most popular marine and coastal attractions situated on this stretch of coastline. Apart from its scenic beauty, the main attraction of the coastline for tourists is the quality of marine life. Opportunities for interaction with marine life include passive observation (e.g. dolphins at Monkey Mia and whale sharks at Ningaloo Reef), with eco-tourism generating significant revenue for the region.

Extractive activities, such as fishing and spearfishing, continue to bring large numbers of visitors to the region. It is estimated that in 2000, visitors spending more than one night in the Gascoyne Region spent approximately \$57 million (WA Tourism Commission).

1.5.4 Mining and Petroleum Industry

A number of active mining leases operate in the region of which the most valuable are the salt fields at Lake Macleod (Carnarvon) and Useless Loop (Shark Bay), worth approximately \$45 million annually.

The Shark Bay Salt lease located in Useless Loop has a substantial connection with the marine environment. The salt field relies on the ingress of marine water to its primary concentration ponds via large gates, to supply saline water for evaporation and salt production. There is a shell mine adjacent to L'haridon Bight. The Shire of Shark Bay and a private company operate leases to extract the shells of the *Coquina* bivalve mollusc.

Several State and Commonwealth petroleum exploration leases are held within the region. The area has been subject to moderate exploration activity. Issues associated with petroleum industry impacts within the Shark Bay World Heritage Property have been examined for the Environment Protection Authority and Environment Australia (URS, 2000).

1.5.5 Ports and Shipping

The offshore waters of the Gascoyne Region provide passage for numerous vessels transiting between coastal ports and internationally. There are three deep-water port facilities currently operating: Useless Loop and Cape Cuvier (both private facilities servicing salt fields) and Point Murat, a naval port facility at Exmouth.

The majority of shipping movements involve coastal cargo vessels, shipping associated with the two saltfields in the region, and fishing vessels operating out of the numerous small ports along the coast. There are also an increasing number of charter vessels and recreational vessels in the area.

1.5.6 Agriculture

Agricultural interests in the Gascoyne include a significant horticultural industry at Carnarvon and extensive pastoral acreage along much of the coastal rangelands. It is difficult to estimate the value of this industry along the coastal perimeter, but it is significant for the Shires that make up the greater Gascoyne Region.

1.5.7 Conservation and Conservation Areas

Because of the unique values in many areas of the Gascoyne, a number of areas have been set aside for conservation purposes. There are extensive areas designated as World Heritage Property in Shark Bay, two Marine Parks (Ningaloo and Shark Bay), a National Park (Cape Range), a Marine Nature Reserve (Hamelin Pool) and numerous Department of Fisheries closures.

In the document 'A Representative Marine Reserve System for Western Australia' (CALM 1994) other areas were also considered representative as marine reserves and included the eastern side of Exmouth Gulf, Red Bluff to Point Quobba, the Western shores of Shark Bay outer Islands and the Zuytdorp Cliffs.

1.5.8 Research

Parts of the region have been the subject of research conducted by a wide range of agencies, including the Department of Fisheries, Commonwealth Scientific and Industrial Research Organisation (CSIRO), WA Museum, Department of Conservation and Land Management (CALM), Department of Environmental Protection (DEP), the University of Western Australia and Murdoch University. The region is biogeographically complex and characterised by a wide diversity of marine environments, which attracts a high level of scientific interest.

By far the greatest research effort in the region has been concentrated in the Shark Bay area. This is largely due to the unique nature of the area, its world-recognised

conservation significance and its extensive commercial and recreationally exploited fish stocks.

Large inshore areas of the Gascoyne Region remain virtually unstudied - for example the Zuytdorp Cliffs area; the western coast of the Shark Bay outer islands; and the high-energy coastline north of Carnarvon.

The offshore and oceanic areas of the Gascoyne Region have attracted virtually no research interest and little is known of these ecosystems.

SECTION 2 FISHERIES AND FISHING ACTIVITIES IN THE GASCOYNE

There are 20 commercial fisheries and fishing activities as well as the recreational, aquaculture and fishing tourism sectors that operate in the waters of the Gascoyne region.

Most of these groups operate in the inshore areas rather than the deeper offshore and oceanic ecosystems.

2.1 Current Management of the Fisheries of the Gascoyne

There is a complex range of management measures for each of the fishing sectors. In most cases each measure is designed to protect some aspect of the resource or associated habitat. The limits put in place are complex (Bunting, 2001) and in some fisheries can also be adjusted seasonally.

It is important to remember that other components of the ecosystem, not directly targeted by a particular fishing practice, also receive protection from the measures or limitations put in place by the Department of Fisheries to protect the resource or habitat.

The Fisheries Environmental Management Review (Shaw, 2000) gives a brief outline of current Environmental Management for each fishery and fishing activity in the Gascoyne, as well as potential environmental effects of fishing (Table 1).

With The Department of Fisheries currently assessing the ecological sustainability of fisheries, a greater emphasis on management measures designed to specifically alleviate potential environmental effects is likely.

2.1.1 Commercial

In the commercial sector, management is largely based on controlling the level of effort put into the fishery (input controls). This includes limitations on the number of licences available, the size of boats, number of crew, type and amount of fishing gear used, as well as limitations on when and where fishing can take place.

Fisheries management, which also limits the amount of fish caught or landed (output controls), occurs in the Shark Bay Snapper Managed Fishery by quota restrictions and in the Pearl Oyster Fishery with a Total Allowable Catch (TAC) of wild shell.

The most valuable commercial fisheries in the Gascoyne are the crustacean and mollusc fisheries, Shark Bay and Exmouth Gulf prawn, Shark Bay scallop and west coast rock lobster. These fisheries were some of the earliest in WA to come under

managed fishery arrangements and as a result have extensive data sets and rigorous management that is considered world best practice.

Information to manage the fisheries, including catch data and the level of effort expended, is collected from commercial fisher catch returns as well as independent research data.

While catch data in many fisheries is extensive, some of the minor fisheries in the Gascoyne Region have limited or no stock assessment analysis (Shaw, 2000) - for example the Marine Aquarium Fish Managed Fishery. These small fisheries are managed by assessment of risk of the fishery on the fish stocks and the environment. The fishers only record data on other aspects of the ecosystem opportunistically.

Some of the multispecies fisheries, such as the Shark Bay and Exmouth Gulf beach seine fisheries provide an excellent long-term index of the status of fish stocks for the commercial as well as the recreational fishery. This is because the data they provide is both long term and consistent.

2.1.2 Recreational

Recreational fisheries management relies more on (output) controls that limit the quantity of fish that can be taken. There are also some restrictions on the type of fishing that can occur in a specific area, particularly in the marine parks of the Gascoyne region.

Recreational fishing in the Gascoyne is currently under review. A discussion paper (Fisheries Management Paper 124) has been released for comment and as a result, public submissions and a recreational fishing management strategy are being finalised for consideration by the Minister for Fisheries.

In general the implementation of regional recreational fishing management strategies will:

- (i) Provide a framework for future management of recreational fishing in the region,
- (ii) Ensure that effective controls are in place on recreational fishing, and
- (iii) Position recreational fishing so it can be incorporated in an integrated management framework.

2.1.3 Fishing Tourism Operators

The fishing tourism industry is more closely aligned with the recreational fishing sector than the commercial sector because of the species targeted, fishing gear used and motivation for fishing.

This sector is now managed under the recreational fishing sector. Licences have yet to be finalised, however in the Gascoyne Region there have been 32 applications for Fishing Tourism Operator Licences and six for Aquatic Eco-tourism Operator Licences.

2.1.4 Pearling and Aquaculture

Environmental considerations apply to the pearling licence and aquaculture lease applications. This includes referral of the proposal to relevant decision-making authorities, including the Department of Environmental Protection and other interested groups.

When assessing the proposals, possible impacts on fish and the aquatic environment, recreational and commercial fishing as well as other activities are considered.

2.2 Fisheries Environmental Management Issues for the Gascoyne

In the Gascoyne, a large proportion of the inshore habitats comprise areas of extremely high ecological importance with some (e.g. Shark Bay) recognised as ecologically significant on a global scale. It is the shallow inshore ecosystem that has the greater productivity when compared with the deeper offshore and oceanic zones and the inshore ecosystem resources that are most easily exploited. The inshore ecosystem is under greatest pressure by fishers and other stakeholders in the Gascoyne region.

Following is a general discussion of the effects of fishing in the inshore, offshore and oceanic ecosystem zones of the Gascoyne region. For the purposes of this document, 'inshore' and coastal ecosystems refer to those areas less than approximately 40m deep. 'Offshore' are the ecosystems occurring roughly between 40 and 200m and the 'oceanic' ecosystems, are the marine waters greater than about 200 metres.

A brief discussion of the major pressures and threats to the fisheries operating in these areas follows. Table 1 provides a qualitative summary of effects and potential effects of fishing in the Gascoyne, and possible measures to mitigate these effects.

2.2.1 Inshore Ecosystems

Impacts of Fishing: Commercial Fishing

The demersal trawl fisheries in the Gascoyne have the greatest potential for habitat and ecosystem effects because of the particular method of harvesting and the bycatch associated with trawling.

The Department of Fisheries has managed these fisheries for over 30 years using controls designed to minimise these effects. These controls include limiting the

amount of fishing, the locations being fished, the effort put into each fishery as well as large permanent nursery area closures.

No documented evidence is available to demonstrate significant habitat alteration as a result of demersal trawling in the Gascoyne Region. However, as the trawl fisheries started operations in the region in the 1960s, it is likely that if habitat changes have occurred, these have taken place early in the life of the fisheries.

Although the trawl licence areas can be extensive (e.g. Figure 2), the area fished is often relatively small. For example, within the Shark Bay trawl Licensed Fishing Area it is estimated that the fleet operates on less than 10 per cent of the area, with large areas set aside as permanent and temporal closures (Figure 3). Despite this, there is a perception that trawling is extensive and could extend to areas outside existing managed fishery areas. Extending trawl managed fishery boundaries to the north and the south, and then closing all areas where fishing does not occur, could lessen this concern.

As the bycatch volume remains high in the trawl fisheries it can be argued that management measures put in place to protect the resource (prawns) and the habitat have also been successful in sustaining the bycatch. It may also be that the relative abundance of species making up the bycatch has changed over time, with the more robust, productive species now dominating.

The lack of data regarding charismatic megafauna (e.g. turtles, dugongs and dolphins) may leave the trawl fisheries vulnerable to public concern. However, anecdotal evidence suggests that dugongs and dolphins are not adversely affected by trawling, in fact, the population of dolphins in Shark Bay may be greater as a result of feeding on discarded bycatch. While some turtles are caught by trawlers, the short duration of trawls decreases the likelihood of turtles drowning, as the turtles' ability to breath-hold is greater than the average duration of a trawl shot.

In June 1999, the Government adopted the Implementation Plan for the Western Australian Policy on Fisheries Bycatch. As a result of this, Bycatch Action Plans are being developed for all trawl fisheries in WA. These plans will incorporate public comment on the trawl fisheries and contain recommendations to reduce any environmental effects.

The Department of Fisheries and trawl fisheries licensees in the Gascoyne are actively working towards reducing the volume of bycatch in the fisheries and eliminating any incidental turtle and large fish captures. Trials are currently being conducted in Shark Bay and Exmouth Gulf with Bycatch Reduction Devices (BRDs), including grids (to exclude large animals) and fish escape sections inserted into the trawl nets.

The major fisheries in the Gascoyne region have also been part of an extensive environmental reporting process that focuses on the impact of the fishing on both retained and non-retained species and other environmental aspects, including the impact of fishing on the trophic structure and damage to habitat. The reports for the Gascoyne fisheries will be published in 2002.

The commercial fisheries operating in the coastal habitats of the Gascoyne Region are managed to ensure that the resources are exploited at sustainable levels. Although there is a paucity of comprehensive ecosystem data, these fisheries are thought to have a low impact on the marine ecosystems of the region. The statistics of their activities also provide an important, cost effective, but under-utilised means of monitoring the health of the marine environment of the region.

2.2.1.1 Impacts of Fishing: Recreational Fishing

The impact of recreational fishing is generally concentrated on the coastal zone around popular resorts, ports and boat ramps. In the Gascoyne Region this is also true, however there are large relatively remote areas (all off southern Shark Bay) that are accessible and extensively visited by recreational fishers.

There are increasing numbers of fishers in the region and while it is difficult to consistently monitor recreational fisher levels of catch and effort, the Gascoyne Region has been a priority area for recreational fishing research. Results of an extensive catch survey will be available in 2002.

The depletion of pink snapper in the eastern and western gulfs of Shark Bay has shown the level of impact recreational fishers can have on fish stocks. A management strategy for recreational fishing in the Gascoyne Region, recently released for public comment, addressed these and other issues and provided recommendations for a more regional approach to recreational fisheries management.

Inshore ecosystems can also be affected when boat ramps and access points are provided or improved in an area. Pristine areas can be damaged and high value fishing areas may be more heavily impacted. There may also be long-term ecosystem effects if older, large resident fish are quickly removed.

The cost of education and compliance in recreational fisheries in remote areas, such as the Gascoyne is an issue and needs to be considered. This is pertinent in view of proposed marine parks and coastal development in the region.

2.2.1.2 Impacts of Fishing: Aquaculture

The Gascoyne Region has been identified as an area in which the development of aquaculture should be encouraged. Internationally and around Australia, some aquaculture developments have altered coastal habitats through physical modification, increased nutrient input and subsequent eutrophication.

In WA, there has been limited aquaculture production, however as there is some community concern regarding possible environmental effects from aquaculture, all aquaculture and pearling applications are assessed on a case-by-case basis, and relevant conditions are applied depending on the species.

2.2.1.3 Impacts of Fishing: Vessel Impacts

In the Gascoyne Region, the impacts from vessels tend to be concentrated around ports and favoured anchorage areas. Impacts result mainly from inexperienced boat operators driving small boats, damaging coral and losing fuel. Anchorage points for both commercial and recreational vessels can also cause habitat damage, particularly if located near coral, rocky outcrops or seagrass.

The potential for exotic pests being imported in ballast water and discharged in an area like Shark Bay is of concern for all stakeholders in the region, particularly commercial and recreational fishers and aquaculturalists.

2.2.1.4 Pressure on Fisheries: Mining, Agriculture and Development

In the coastal and inshore areas of the Gascoyne Region, urban development is relatively minimal. Most industrial development is small scale. Mining in the area is confined to salt production (Lake MacLeod and Useless Loop), gas gathering and limestone excavation (North West Cape) and shell mining (Shark Bay).

Eutrophication, due to agricultural run-off, is currently not recognised as a significant issue for the Gascoyne.

There are a number of small ports in the region, where vessel pollutants and oil and cargo spills have the potential for significant localised environmental effects.

2.2.1.5 Pressure on Fisheries: Human Use

The coastal scenery, good fishing and mild winter weather bring large numbers of visitors to the region, many of whom are equipped with four-wheel drive vehicles and boats. This additional activity may place a significant level of pressure on coastal and inshore environments.

2.2.1.6 Pressure on Fisheries: Coastal Development

The existing coastal development in the study area includes the towns of Carnarvon, Exmouth and Denham and the settlement of Coral Bay. Other smaller coastal developments and tourist nodes include Monkey Mia, Gnarraloo, Quobba, Red Bluff, Steep Point, Carrarang and the community of Useless Loop at the base of Useless Inlet.

If approved, a proposed marina development at Maude's Landing (north of Coral Bay) is expected to cater for 2,500 people in the peak season.

These developments all have an impact on the marine environment. Any increase in populations and improved boat facilities tend to increase pressure on fish stocks and marine habitats.

2.2.1.7 *Pressure on Fisheries: Fishing*

The coastal and inshore areas of the Gascoyne Region are subject to high levels of commercial and recreational fishing activity that may be unsustainable if not managed correctly. Over exploitation of one species can affect the whole ecosystem, with negative consequences for other species and fisheries.

2.2.1.8 *Pressure on Fisheries: Treaties and Obligations*

Commonwealth legislation as well as international treaties and obligations have the potential to impact on all fisheries, particularly those exporting product. For example, *Australia's Oceans Policy* (1998) contains two proposals that may affect commercial fishing. The first is the removal of the blanket exemption of marine animals (including pearls) from wildlife exports controls unless industry demonstrates that it is operating in an ecologically sustainable manner. The criteria for ecologically sustainable fishing are still to be defined.

The second is the proposal for regional marine plans for all Australian waters. This is considered the core of *Australia's Oceans Policy* and could have implications for fisheries management, particularly under the Offshore Constitutional Settlement.

2.2.2 *Offshore and Oceanic Ecosystems*

In the offshore and oceanic ecosystems, probably the key area of concern in terms of environmental management at this stage is the absence of information on environmental conditions. A good knowledge of habitat types, environmental quality and processes is necessary to make assessments of potential environmental effects and develop appropriate environmental management strategies.

2.2.2.1 *Impacts of Fishing: Commercial Fishing*

The level of fishing activity in the offshore and oceanic ecosystems in the Gascoyne Region is low. As a result of this, management of environmental effects associated with operational aspects of deepwater fishing is not considered significant.

There are very few State commercial fisheries operating in this environment. The largest fishery in the offshore area, the pink snapper fishery, is thought to have minimal environmental impact.

There are two Commonwealth fisheries operating in the deeper offshore and oceanic regions of the Gascoyne - the Western Deepwater Trawl Fishery and the Western Tuna and Billfish Fishery. Both fisheries are considered developmental with limited fishing effort. However, in the last two years there appears to be increased fishing interest in them, particularly in the Western Tuna and Billfish Fishery. There is the potential for activity to increase in both fisheries, but their effect on the environment is unknown, because of a lack of information about them and their associated oceanic habitats.

2.2.2.2 *Impacts of Fishing: Recreational Fishing*

Recreational fishing is probably of relatively minor importance in the deeper offshore and oceanic environment, as there is currently only light fishing pressure.

2.2.2.3 *Pressures on Fisheries: Mining, Agriculture and Development*

In the Gascoyne offshore and oceanic environment, there appear few existing threats to the fisheries. While there are offshore petroleum exploration tenements in the region, exploration activity is limited and no oil and gas production takes place.

There is little information on the effects on fish and fisheries of exploration activities associated with the petroleum industry in WA. The environmental effects associated with routine exploration activities generally appear benign, particularly with the current use of low toxicity drilling fluids.

Of greater concern for the marine environment is the potential effect of large spills of hydrocarbon liquids – if they occur – from petroleum industry activities. Requirements are in place to reduce the risks of routine and non-routine discharges associated with petroleum industry activities.

Table 1 (Potential Environmental Effects of Fishing in the Gascoyne Region and Possible Management Options) follows on the next eight pages

NOTE: The acronyms used in Table 1 are:

ADC	Aquaculture Development Council
AFMA	Australian Fisheries Management
AMSA	Australian Maritime Safety Authority
AQIS	Australian Quarantine Inspection and Services
BRS	Bureau of Rural Sciences
CALM	Department of Conservation and Land Management
DGDLL	Demersal Gillnet and Demersal Longline Fishery
DOLA	Department of Minerals and Energy
DME	formerly Department of Minerals and Energy, now Department of Minerals and Petroleum Resources
DOF	Department of Fisheries
DOT	Department of Transport
EA	Environment Australia
EPA	Environmental Protection Authority
KABC	Keep Australia Beautiful Council
MARPOL	International convention for the prevention of pollution from ships
MFP	Ministry for Planning
PPA	Pearl Producers Association
WAFIC	Western Australian Fishing Industry Council
WRC	Waters and Rivers Commission

The table below is a brief summary of the known, perceived and potential environmental effects of fishing in the Gascoyne Region. It provides a qualitative and subjective assessment of the level of environmental effects in the region (if any), as well as considering if the regional fishing activity and its related environmental effects (if any) are a possible threat to the ecological sustainability of the region. Management actions currently in place that may mitigate any environmental effects of fishing are given, as are further management actions that could be considered. The table includes agencies other than Fisheries WA who may have responsibility for a particular area of the environment in the Gascoyne Region.

Table 1 Potential Environmental Effects of Fishing in the Gascoyne Region and Possible Management Options.

NOTE: The approximate ecosystem zones (i.e. inshore, offshore and oceanic) where the fishing occurs have been listed. **IN** = inshore, **OF** = offshore, **OC** = oceanic, **DOF**= Dept of Fisheries

COMMERCIAL FISHING

ZONE	ACTIVITY	POTENTIAL ENVIRONMENTAL EFFECT	LEVEL OF EFFECT IN REGION	THREAT TO REGIONAL ECOLOGICAL SUSTAINABILITY	CURRENT MANAGEMENT ACTIONS WHICH MITIGATE EFFECT	POSSIBLE MANAGEMENT ACTIONS IF REQUIRED (RESPONSIBLE AGENCIES)
IN OC	Trawling	Reduction of target species: Overfishing	<i>Inshore:</i> Exmouth Gulf tiger prawn stocks reduced to below optimum, Shark Bay prawn stocks adequate. <i>Oceanic:</i> Unknown.	<i>Low.</i> Management arrangements adjusted so that stocks are maintained at sustainable levels.	Restrictions on the level of effort (licences, vessels, gear, closed seasons, times). Permanent and temporal closures. Catch and effort monitoring.	<i>Inshore:</i> Assessment of the ecological sustainability of the fishing practice (DOF, EPA), including: Assessment of effects of removal of target stocks (DOF). Vessel Monitoring System (DOF). Amendments to Fisheries Management Plans (DOF). <i>Oceanic:</i> Commonwealth jurisdiction (AFMA, BRS, EA).
IN OC	Trawling	Habitat modification.	<i>Inshore:</i> Unknown. Some anecdotal evidence that habitat modification has occurred. Changes thought to be initially high in some areas, subsequently reduced effect with repeated trawling. Dependant on bottom type, gear used, trawling frequency. <i>Oceanic:</i> Unknown.	<i>Low.</i> Relatively small areas of seabed subject to habitat modification as a result of trawling activity.	Area closures. Time restrictions. Seasonal closures. Gear restrictions. Effort limitations (licensing).	<i>Inshore:</i> Identification of habitat type/distribution (DOF, CALM). Determination of trawling density, spatial and temporal (DOF). Significance of trawling over identified habitats (DOF). Research into amelioration and mitigation strategies (DOF). Vessel Monitoring System (DOF). Long-term marine planning (MFP, DOF, CALM). Environmental Impact Assessment for new fisheries (DOF, EPA, EA). <i>Oceanic:</i> Commonwealth jurisdiction (AFMA, BRS, EA).

COMMERCIAL FISHING (continued)

ZONE	ACTIVITY	POTENTIAL ENVIRONMENTAL EFFECT	LEVEL OF EFFECT IN REGION	THREAT TO REGIONAL ECOLOGICAL SUSTAINABILITY	CURRENT MANAGEMENT ACTIONS WHICH MITIGATE EFFECT	POSSIBLE MANAGEMENT ACTIONS IF REQUIRED (RESPONSIBLE AGENCIES)
IN OC	Trawling	Bycatch: Alteration of species abundance. Including direct mortality by fishing (e.g. discards) and secondary effects.	<p><i>Inshore:</i> Varies depending on location: Exmouth Gulf lower volume of bycatch than Shark Bay. Bycatch may have changed from more vulnerable, resident species to the more robust species. Possible increase in dolphins, seabirds and crab populations from increased food availability from discarded bycatch.</p> <p><i>Oceanic:</i> Unknown.</p>	<p><i>Low.</i> Possible change to the abundance of some species.</p>	<p>Area closures. Time restrictions Seasonal closures. Gear restrictions. Effort limitations (licensing).</p>	<p><i>Inshore:</i> Develop Bycatch Action Plans for all trawl fisheries (DOF), including: Assessment of bycatch (DOF). Assessment of bycatch removal on ecosystem (DOF). Development/deployment of bycatch reduction devices (DOF, Industry). Assessment of species abundance within & outside trawl areas (DOF). Further area/seasonal closures (DOF). Education and enforcement to ensure compliance (DOF, WAFIC). Code of practice and trawling guidelines (DOF, WAFIC).</p> <p><i>Oceanic:</i> Commonwealth jurisdiction (AFMA, BRS, EA).</p>
IN OC	Trawling	Bycatch: Capture of high profile or protected species (turtles, dugongs, dolphins, sea snakes).	<p><i>Inshore:</i> Thought to be negligible for dugongs and dolphins. Low for turtles and sea snakes in Shark Bay and thought even lower in Exmouth Gulf. Mortalities thought negligible to low.</p> <p><i>Oceanic:</i> Unknown.</p>	<p><i>Negligible to Low.</i></p>	<p>Area closures. Gear restrictions. Effort limitations (licensing). Protected species legislation.</p>	<p><i>Inshore:</i> Develop Bycatch Action Plans for all trawl fisheries (DOF), including: Assessment of level of effect (DOF, CALM). Research on distribution of relevant biota (DOF, CALM). Development and deployment of bycatch reduction devices (DOF). Education and enforcement to ensure compliance (DOF, WAFIC). Code of practice and trawling guidelines (DOF, WAFIC, CALM).</p> <p><i>Oceanic:</i> Commonwealth jurisdiction (AFMA, BRS, EA).</p>

COMMERCIAL FISHING (continued)

ZONE	ACTIVITY	POTENTIAL ENVIRONMENTAL EFFECT	LEVEL OF EFFECT IN REGION	THREAT TO REGIONAL ECOLOGICAL SUSTAINABILITY	CURRENT MANAGEMENT ACTIONS WHICH MITIGATE EFFECT	POSSIBLE MANAGEMENT ACTIONS IF REQUIRED (RESPONSIBLE AGENCIES)
IN OC	Trawling	Habitat modification: Increase in turbidity from re-suspension of sediments.	<i>Inshore:</i> Unknown. Natural processes (tides, flooding) also influence turbidity. <i>Oceanic:</i> Unknown.	<i>Negligible.</i>	Seasonal closures. Effort limitations. Gear specification.	<i>Inshore:</i> Assessment of level of effect (DOF). Identification of habitat type/distribution (DOF, CALM). <i>Oceanic:</i> Commonwealth jurisdiction (AFMA, BRS, EA).
IN OF	Potting - rock lobster, crabs	Habitat modification: Destruction of seabed features.	Unknown. Thought low for deeper water rock lobster fishery. Low for inshore crab fishery as too few operators.	<i>Negligible to Low.</i>	Effort limitations (number of pots). Seasonal closures. Closed areas.	Assessment of the ecological sustainability of the fishing practice (DOF, EPA). Assessment of level of effect (DOF, EPA). Identification of habitat type/distribution (DOF, CALM). Code of practice and guidelines (DOF, WAFIC). Environmental management planning (DOF). Amendments to Fisheries Management Plans (DOF).
IN OF	Potting - rock lobster, crabs	Bycatch: Capture of non-target species.	Unknown. Thought to be low. Rock lobster pots considered selective. Inshore crab has few operators in the region.	<i>Negligible to Low.</i>	Escape gap requirements. Effort limitations (number of pots). Seasonal closures. Closed areas.	Develop Bycatch Action Plan (DOF). Assessment of level of effect (DOF, EPA). Code of practice and guidelines (DOF, WAFIC).
IN OF OC	Line fishing	Reduction of target species, particularly those resident species.	Most Shark Bay snapper stocks fully exploited. Western gulf Shark Bay over exploited (fished mainly by recreational fishers). Spanish mackerel stocks of concern. Other species appear stable. <i>Oceanic:</i> Unknown.	<i>Low to Moderate.</i>	Closed areas. Effort limitations (licensing). Gear restrictions. Minimum & maximum sizes.	<i>Inshore and offshore:</i> Assessment of the ecological sustainability of the fishing practice (DOF, EPA). Assessment of level of effect for species other than snapper (DOF). Additional closed areas and limited seasons (DOF). Wider use of minimum and maximum sizes (DOF). Prepare Management Plan for Spanish Mackerel. <i>Oceanic:</i> Commonwealth jurisdiction for tuna fisheries (AFMA, BRS, EA).

COMMERCIAL FISHING (continued)

ZONE	ACTIVITY	POTENTIAL ENVIRONMENTAL EFFECT	LEVEL OF EFFECT IN REGION	THREAT TO REGIONAL ECOLOGICAL SUSTAINABILITY	CURRENT MANAGEMENT ACTIONS WHICH MITIGATE EFFECT	POSSIBLE MANAGEMENT ACTIONS IF REQUIRED (RESPONSIBLE AGENCIES)
IN OF OC	Line fishing	Bycatch: Reduction of non-target species.	Unknown. Could be an issue for pink snapper accidentally taken by wetline fishers within Shark Bay Snapper Managed Fishery. However, there are very few wetline operators in Shark Bay. <i>Oceanic:</i> Unknown. Some concerns regarding shark bycatch from western tuna fishery.	<i>Low.</i>	Closed areas. Effort limitations (licensing). Gear restrictions. Minimum & maximum sizes.	<i>Inshore and offshore:</i> Develop Bycatch Action Plan (DOF). Assessment of level of effect (DOF). <i>Oceanic:</i> Commonwealth jurisdiction for tuna fisheries (AFMA, BRS, EA). Shark bycatch part of DOF jurisdiction (DOF). Develop Bycatch Action Plan (DOF, AFMA).
IN OF	Net fishing	Bycatch: Reduction of non-target species.	Low for beach seine and haul net fisheries. Low in Demersal Gillnet.	<i>Low.</i>	Mesh net restrictions. Effort limitations (licences, gear length, boat size). Area closures for DGDLL fishery. Shark Bay closed to all set netting.	Develop Bycatch Action Plans (DOF). Monitoring of effect (DOF). Assessment of the ecological sustainability of the fishing practice (DOF, EPA).
IN OF	Net fishing	Bycatch: Capture of high profile or protected species (turtles, dugongs, dolphins, sea snakes, seabirds).	Thought low. Most of netting in shallow water, enabling easy release. Demersal gill netting in deep water and on bottom.	<i>Low.</i>	Mesh net restrictions. Effort limitations (licences, gear length, boat size). Area closures for DGDLL fishery. Shark Bay closed to all set netting.	Develop Bycatch Action Plan (DOF). Monitoring of effect (DOF, CALM). Code of practice and guidelines (DOF, CALM). Assist in the preparation of Bycatch Action Plans to protect endangered species (DOF, EA).
IN OF	Net fishing	Habitat modification.	Negligible – low for beach seine and haul net fisheries. Low in demersal gillnet – set nets just above the bottom.	<i>Negligible to Low.</i>	Effort limitations (licences, gear length). Restricted areas.	Monitoring of effect (DOF, EPA). Regional fisheries environmental management plans (DOF).

COMMERCIAL FISHING (continued)

ZONE	ACTIVITY	POTENTIAL ENVIRONMENTAL EFFECT	LEVEL OF EFFECT IN REGION	THREAT TO REGIONAL ECOLOGICAL SUSTAINABILITY	CURRENT MANAGEMENT ACTIONS WHICH MITIGATE EFFECT	POSSIBLE MANAGEMENT ACTIONS IF REQUIRED (RESPONSIBLE AGENCIES)
IN OF	Net fishing	Reduction of target species: Ghost fishing.	Negligible for beach seine and mesh net fisheries. Low for demersal gillnet and wetline fisheries. Few operators.	<i>Negligible to Low.</i>	Education and awareness programs to encourage industry to minimise gear loss.	Assessment of effect (DOF, EPA). Education, code of practice and guidelines for recovery of gear (DOF, WAFIC). Identification of habitat type/distribution (DOF, CALM).
IN OF	Net fishing	Reduction of target species.	Some shark species of concern in DGDLL fishery. Beach seine – unlikely, very few operators. Wetline – Spanish mackerel stocks of concern. Marine Aquarium Fish – unlikely, very few operators.	<i>Low to Moderate.</i>	Effort limitations (licences, gear length, mesh sizes). Extensive area closures (commercial & recreational). Threatened species protection for great white sharks.	Increased protection for threatened species (DOF, EA). Stock assessment for species of concern (DOF).
IN	Diving – marine aquarium fish	Reduction of target species: Localised.	Unknown – assumed low, very few operators.	<i>Negligible.</i>	Effort limitations (licences, gear types).	Assessment of the ecological sustainability of the fishing practice (DOF, EPA, EA). More detailed management plan (DOF). More refined analysis of fisher log book data (DOF).
IN	Diving – abalone, pearl oyster, tropical rock lobster	Reduction of target species: Localised.	Unknown. Abalone low, very few operators. Pearl oysters, Exmouth – some concern with stocks. Tropical rock lobster very few operators. Isolation & inhospitable weather may also contribute to stock protection.	<i>Negligible to Low.</i> Negligible for all methods except pearl oyster fishing.	Effort limitations (licences and conditions, area closures, seasonal closures, TACS). Minimum sizes.	Abalone – stock assessment for areas with high fishing pressure (DOF). Pearling – greater restrictions via the fisheries management planning process (DOF). Amendments to Fisheries Management Plans (DOF).
IN	Collecting – specimen shells, edible oysters, beche de mer	Reduction of target species: Localised.	Unknown. Specimen shells moderate-high in some areas, e.g. trawl grounds. May be low/negligible effect for other groups in some areas.	<i>Negligible to Low.</i>	Effort limitations (licence conditions, area closures, seasonal closures).	Assessment of the ecological sustainability of the fishing practice (DOF, EPA). More restrictions via Fisheries management planning process (DOF).

RECREATIONAL FISHING

ZONE	ACTIVITY	POTENTIAL ENVIRONMENTAL EFFECT	LEVEL OF EFFECT IN REGION	THREAT TO REGIONAL ECOLOGICAL SUSTAINABILITY	CURRENT MANAGEMENT ACTIONS WHICH MITIGATE EFFECT	POSSIBLE MANAGEMENT ACTIONS IF REQUIRED (RESPONSIBLE AGENCIES)
IN	Shore based angling	Reduction of target species: Overfishing.	Low. Some stocks also protected because of limited fishing access.	<i>Negligible to Low.</i>	Bag and size limits. Possession limits.	Regional recreational fisheries management plans (DOF). Closed areas (DOF). Education (DOF). Stricter bag, size and possession limits (DOF).
IN	Shore based angling	Bycatch: Capture of unwanted species and return of under size fish.	Thought low. Some stocks also protected because of limited fishing access.	<i>Negligible to Low.</i>	Education and awareness.	Develop Bycatch Action Plan (DOF). Increased education and awareness (DOF).
IN OF	Boat based angling	Reduction of target species. Overfishing.	Very high in some areas for some popular target species.	<i>Moderate to High.</i>	Bag and size limits. Possession limits.	Regional recreational fisheries management plans (DOF). Stricter bag, size and possession limits (DOF). Increased area closures (DOF).
IN	Boat based angling	Habitat modification: Coral destruction from anchors and motors.	Moderate to high in some areas. Mostly restricted, localised damage.	<i>Low.</i>	Moorings in some areas.	Appropriate moorings (DOT, DOF, CALM). Community education (FWA, CALM, DOT). Identification of habitat type/distribution (DOF, CALM)
IN OF	Boat based angling	Bycatch: Capture of unwanted species and return of under size fish.	Unknown. May be significant for snapper in areas closed to snapper fishing (Shark Bay). Deep water and under size species damaged when returned to water, including tag and release fishing. Bag limits may exacerbate situation if limits are obtained by discarding less favourable and smaller fish.	<i>Low.</i>	Education and awareness to heighten fishing experience, not just quantity of catch.	Develop Bycatch Action Plan (DOF). Increased education and awareness (DOF).
IN	Netting	Reduction of target species: Overfishing.	Not considered high. Limited net fishing in the region.	<i>Negligible.</i>	Restrictions on use, time, areas fished, gear type, mesh size, time set, attendance. Bag and size limits.	Regional recreational fisheries management plans (DOF). Increased areas closed to netting (DOF).

RECREATIONAL FISHING (continued)

ZONE	ACTIVITY	POTENTIAL ENVIRONMENTAL EFFECT	LEVEL OF EFFECT IN REGION	THREAT TO REGIONAL ECOLOGICAL SUSTAINABILITY	CURRENT MANAGEMENT ACTIONS WHICH MITIGATE EFFECT	POSSIBLE MANAGEMENT ACTIONS IF REQUIRED (RESPONSIBLE AGENCIES)
IN	Netting	Bycatch: Capture of unwanted species.	Could be significant although limited net fishing in the region.	<i>Negligible.</i>	Area closures. Restrictions on use, gear type, mesh size, time set, attendance.	Develop Bycatch Action Plan (DOF). Increased areas closed to netting (DOF).
IN	Netting	Reduction of target species: Ghost fishing.	Unknown. Considered not significant due to low numbers of fishers and small amounts of net.	<i>No.</i>	Regulated gear length, attendance of net at all times.	Better net identification (DOF).
IN	Collecting – display molluscs and aquarium fish	Reduction of target species: Overfishing.	Thought some localised depletion. Concern for some mollusc species on Ningaloo reef. Number of shell collectors appears to be declining.	<i>Low.</i>	Marine Park Zoning. Bag limits.	Regional recreational fisheries management plans (DOF). Lower bag limits (DOF). Increased enforcement (DOF). Education and awareness (DOF). Protected species (DOF, EA).
IN	Collecting – edible molluscs and crustaceans	Reduction of target species: Overfishing.	Localised depletion of some species could be occurring. Isolation and inaccessibility may also help protect stocks.	<i>Negligible.</i>	Bag and size limits.	Regional recreational fisheries management plans (DOF). Increased enforcement (DOF).
IN	Collecting – edible molluscs	Habitat modification: Physical disturbance of the reef (trampling and overturning of rocks).	Low. Few collectors. Isolation and inaccessibility may also help protect stocks.	<i>Negligible.</i>	Community education.	Education and awareness (DOF).
IN	Diving – spear fishing	Reduction of target species: Overfishing.	Localised. Loss of 'prize' species, particularly reef fish. Limited fisher numbers and inaccessibility of many areas help protect stocks.	<i>Low.</i>	Marine Park zoning. Bag limits, size limits. Protected species status.	Regional recreational fisheries management plans (DOF). Closed areas (DOF). Higher level of restrictions (DOF).

RECREATIONAL FISHING (continued)

ZONE	ACTIVITY	POTENTIAL ENVIRONMENTAL EFFECT	LEVEL OF EFFECT IN REGION	THREAT TO REGIONAL ECOLOGICAL SUSTAINABILITY	CURRENT MANAGEMENT ACTIONS WHICH MITIGATE EFFECT	POSSIBLE MANAGEMENT ACTIONS IF REQUIRED (RESPONSIBLE AGENCIES)
IN	Diving – spear fishing	Habitat modification: Coral destruction (from fin damage and trampling).	Unknown. Thought to be very low. Limited numbers and inaccessibility of many areas help protect stocks.	<i>Negligible.</i>	Marine Park Zoning.	Community awareness (DOF, CALM).
IN	Beach access – controlled	Reduction of target species: Increased pressure as a result of increased access.	Thought high in some areas. Could have regional protection of some stocks because of isolation and seasonal nature of visiting fishers.	<i>Low.</i>	<i>Fish Resources Management Act 1994.</i> Recreational fishing regulations.	Marine and coastal planning (MFP, DOT, DOF). Increased compliance (DOF).
IN	Beach access – uncontrolled	Habitat modification: Erosion of coastal dunes and loss of vegetation.	High in areas of high usage. May result in changes to dunal vegetation i.e. introduction of weeds, blow-outs.	<i>Low.</i>	<i>Control of vehicles (off road areas) Act 1978.</i> Marine Park zoning. Coastal management. Fences and barriers. Limited entry through pastoral leases.	Continuing education on coastal management (Local Government, MFP, CALM). Enforce regulations (DOT, Local Government). Wider use of <i>Control of vehicles (off road areas) Act. (DOT).</i> Greater access restrictions (Local government, pastoralists, indigenous land owners, CALM).
IN	Littering	Pollution: Visual.	High in areas of concentrated activity by recreational fishers, e.g. Steep Point. Areas of concern now under stricter management. Total area relatively small. Low level by charter operators.	<i>Negligible to Low.</i>	Enforce <i>Litter Act 1979</i> requirements. Education programs. Pastoralist management.	Tighter <i>Litter Act</i> requirements (KABC). Education programs (DOF, CALM). Greater input from pastoralists/indigenous land owners in planning and management.
IN	Littering	Pollution: Ingestion and entanglement by marine animals and seabirds.	Thought low, although difficult to monitor. Relative isolation and small number of fishers reduces potential effect.	<i>Negligible.</i>	Enforce <i>Litter Act 1979</i> requirements. Education programs.	Tighter <i>Litter Act</i> requirements (KABC). Education programs (DOF, CALM).

2.3 Fish Protection Measures

The objectives of the *Fish Resources Management Act 1994* require the Department of Fisheries to “protect fish and conserve their environment”. In addition, the Commonwealth has taken a number of initiatives, which have also seen a shift of fisheries management arrangements from a stock basis to an ecosystem management approach.

This means fisheries research and management must consider the impact of fishing on the broader environment and the impact of a range of other human activities upon fish and their habitats.

The Department of Fisheries has access to a number of administrative and legislative instruments to assist it in protecting marine ecosystems. It may:

- Provide advice and input to the State and Commonwealth Environmental Protection and mining industry approval processes, and the WA State Planning Commission decision-making process.
- Regulate fishing activity to minimise its impact upon the environment. These arrangements are described in detail in a separate publication titled “Fish Protection Measures to Ensure Fish for the Future” (Fisheries Management Paper No. 141, 2001).
- Influence the marine park planning process in a manner that results in the protection of fish habitats.
- Establish Fish Habitat Protection Areas where there is a need to control the impact human (both fishing and other) activities have on an area considered appropriate for protection.

Fish Habitat Protection Areas (FHPAs) can be set aside to protect fish, fish habitats, and the aquatic environment. Inshore ecosystems, which are important to many marine species and particularly susceptible to human impacts, are the areas of greatest concern.

Under Section 115 (2) of the *Fish Resources Management Act 1994* an area may be set aside as a FHPA for the following purposes:

- The conservation and protection of fish, fish breeding areas, fish fossils or the aquatic eco-system; and/or
- The culture and propagation of fish and experimental purposes related to that culture or propagation; and/or
- The management of fish and activities relating to the appreciation or observation of fish.

The table below (Table 2) expands on these purposes in order to develop a clear and concise suite of selection criteria on which to judge proposed FHPAs.

Note that reference to ‘fish’ in the following criteria can mean an aquatic organism of any species, excepting mammals, reptiles, amphibians or birds.

Table 2 Selection Criteria for Fish Habitat Protection Areas

Purpose of FHPA		Selection Criteria
1	Fish protection	An area that provides for the protection, conservation, or maintenance of protected, endangered, or threatened species of fish or other aquatic organisms.
	Habitat protection	Areas of significant value for breeding, spawning, feeding, sheltering, or which serve as nursery areas or migration routes for fish and other aquatic organisms
	Resource protection	Areas of scientific interest or of importance for the economic or biological sustainability of particular aquatic organisms.
	Rehabilitation	Areas of importance for fish and fish habitat, which have been degraded through human impacts, but which have the potential to be rehabilitated.
2	Aquaculture & research	Areas that may be of special value for the culturing and breeding of fish (i.e. a significant source for broodstock) or for conducting aquatic research.
3	Human use & resource sharing	Areas used by commercial and recreational users, where their activities may impact adversely on the aquatic environment or lead to resource-sharing problems.
	Observation & education	Areas of value for public education on various aspects of fish and interpretation of issues associated with fish and their habitats, or of value for the observation or appreciation of fish.

The Department of Fisheries has developed a five-stage process for the development of a proposal for a FHPA (see Guidelines for the Establishment of a Fish Habitat Protection Area, Fisheries Management Paper No. 152, 2001). The step-by-step process is designed to encourage discussion between the Department of Fisheries and the proponent at an early stage of development of the proposal; ensure the proponent has a sound proposal prior to developing a detailed submission; and ensure consistency between applications.

Setting aside a FHPA requires management planning and public involvement. This enables interested groups and individuals to have a direct say in how an area should be managed to protect fisheries values.

Fish Habitat Protection Areas and Marine Parks cannot exist over the same area. If a Marine Park already exists, a FHPA cannot be created. If a FHPA is already in place when a Marine Park is established over the same area, the FHPA will be cancelled when the Marine Park Plan comes into effect.

At present there are no FHPAs in the Gascoyne region. Given the need for broader and more integrated marine planning, the following proposed FHPAs are recommendations only.

- Eastern shore of Exmouth Gulf.
- An area or areas between Gnarraloo Bay and Point Quobba.
- Northern waters of Shark Bay (within the World Heritage Property and outside the Marine Park and proposed Marine Park extension).
- Miaboolya Beach - Carnarvon.

2.3.1 Eastern shore of Exmouth Gulf

Exmouth Gulf is one of the largest embayments on the WA coast and the eastern side of the gulf is the site of one of the largest mangals in the State. This area is crossed by transverse tidal creeks, backed by wide supratidal salt flats and fronted by intertidal mudflats (A Representative Marine Reserve System for Western Australia, CALM, 1994).

These habitats are the source of much of the nutrients that support the valuable prawn fishery in the gulf and function as a nursery area for prawns, commercial and recreational fish species as well as other marine fauna. It is an area of substantial importance for nature conservation and for sustaining local fisheries.

The waters to be recommended as a FHPA are those waters closed to trawling under the Exmouth Gulf Prawn Management Plan (Figure 5). This permanent nursery area closure has been in operation since 1983. The creation of a FHPA would provide the area and its important conservation values with a much higher public profile and afford it greater protection and management.

Conservation measures would be put in place that would extend beyond those already in place to protect the prawn species.

2.3.1.1 Location

The area extends from Tubridgi Point southwest to Point Lefroy along the existing nursery area closure for the Exmouth Gulf Prawn Managed Fishery. The closure includes Giralia Bay and Gales Bay. Inshore islands along the sector are vacant Crown land.

2.3.1.2 Values

- High value prawn nursery area. The proposed FHPA serves as a habitat for many of the juvenile prawn species captured in the adjacent trawl fishery. The value of the annual catch of prawns is around \$19 million.
- Important nursery area for commercial and recreational fish species. Many of the species targeted by commercial and recreational fishers utilise the eastern gulf as a nursery area. Larger species are likely to move on and off the shallow banks to feed.
- Significant fishing area for commercial and recreational fishers. Fishers in the Exmouth Gulf Beach Seine Fishery catch mullet and whiting in the southern part of the gulf. Part of the proposed area (particularly around the islands) is used by recreational anglers fishing from boats.
- Valuable pearl oyster habitat. Wild stocks of the oyster *Pinctada maxima* are collected on the eastern side of the gulf for the culture of pearls. This wild stock has an average annual value of about \$1 million.
- Importance to aquaculture and pearling leases. There are pearling farm lease areas, holding sites and an aquaculture licence area in the proposed FHPA.
- Minimal impact. Fishing and development impact in the area has been minimal. The proposed FHPA has been permanently closed to trawling since 1978 and the number of fishers in the area has been minimal because of access difficulties and distance. With the recent opening of the marina at Exmouth, access has improved greatly for recreational fishers and fishing effort is thought to have increased. Development is also increasing but is currently limited to aquaculture licence and pearling lease areas.
- High value mangal habitat, sand habitat and coastal marine flora and fauna generally. The mangal is one of the largest in the State and includes a range of mangrove assemblages. Mangroves have a high ecological value and contribute to the significant nutrient value of the gulf (CALM, 1994). In a Guidance Statement (EPA, 2001) the mangroves on the eastern shore have been categorised as high conservation value and designated 'regionally significant'. In addition to the mangal habitat there are significant mudflats and sand flats with their associated epibenthic and burrowing faunas. These communities represent the most westerly of their type. (CALM, 1994).
- Important habitat for species other than fish. The area supports turtles and the eastern part of the gulf also supports an important dugong population. There are significant seabird nesting sites in the area and the mud and sand flats are important feeding areas for a variety of migratory wading birds (CALM, 1994).

2.3.1.3 Selection Criteria Applicable to the Eastern Side of Exmouth Gulf

The values of the proposed FHPA fit in the following criteria.

1. Fish Protection. Dugongs and turtles are protected under the *Wildlife Conservation Act 1950*, however protection of this area under the FRMA would give these species further incidental protection with increased management of

the area. [The Department of Fisheries has used its legislation previously to regulate fishing activities specifically for the protection of dugongs and turtles in Shark Bay].

Fish species including juvenile prawns are protected from trawling in this area by an existing and permanent trawl closure.

2. **Habitat Protection.** The area has significant value as a nursery area for prawns, as well as other crustaceans, finfish and marine fauna and flora species.
3. **Resource Protection.** The proposed FHPA is the main nursery area for the Exmouth Gulf Prawn Managed Fishery (estimated catch value \$19m). It is also an important nursery area for many of the species targeted by the Exmouth Gulf Beach Seine Fishery and the recreational fishery. The habitat also supports the wild stock pearl oyster resource.
4. **Aquaculture and Research.** Research into tiger prawn stock enhancement in the proposed FHPA (south of Whalebone Island) is progressing. Particular habitats may be found to be significant and require added protection.
5. **Human Use and Resource Sharing.** Although not considered a current problem, the potential exists for a large number of operators, including aquaculture licensees, recreational fishers and other commercial ventures to increase their presence in this area and degrade the current values of the area.

A Representative Marine Reserve System for Western Australia (CALM, 1994) recommended a similar area for consideration as a Marine Reserve. If a Marine Park or Reserve was established in the area, any Fish Habitat Protection Area would cease to exist. The Department of Fisheries would continue to manage the fish resources in these waters.

2.3.2 An area or areas between Gnarraloo Bay and Point Quobba

Ningaloo Reef Marine Park extends south to Amherst Point, and there is a proposal to extend the Marine Park further south to Gnarraloo Bay. The area comprises a range of distinct coastal types. In the proposed extension, there is a barrier-fringing coral reef. Further south the coastline is rocky and exposed to open ocean swells. Between Red Bluff and Cape Cuvier there are quite high limestone cliffs. These cliffs are lower further south to Point Quobba and rock platforms, created from the weathering of the limestone, change from a narrow platform of a few metres width in the north to platforms and tidal pools more than 50 metres wide in areas south of Cape Cuvier (*A Representative Marine Reserve System for Western Australia*, CALM, 1994).

There is very little habitat or species information available for much of this coastline. Much of the area has had relatively low visitation rates because of difficulties with access. The road extending from Gnarraloo to Waroora has been closed for many years, providing a barrier to movement along this section of the coast.

Protection of this area would preserve a marine community that has been largely unexploited because of limited access points. As access to this prize fishing spot is now available, expedient protection is required for preservation of the area. In areas where access is available, particularly close to Point Quobba, there has been public concern over the illegal removal of aquatic organisms, including corals.

2.3.2.1 Location

The area south of the proposed southern extension to Ningaloo Marine Park to Point Quobba (Figure 5). Point Quobba is presently gazetted as closed waters under the Fisheries Act.

2.3.2.2 Values

- Important recreational and commercial fishing areas. Nationally recognised areas for shore-based game fishing.
- Baitfish aggregations of high ecological and tourist value.
- High habitat value for fish and crustacean species.
- Largely pristine environment. Access to part of the area has been closed and there has been limited vehicular through traffic. There are few access points to the coast in this area.

2.3.2.3 Selection Criteria Applicable to the Area between Gnarraloo Bay and Point Quobba

The values of the proposed FHPA fit in the following criteria.

1. Fish Protection. There has been limited recreational fishing and as a consequence the area is likely to contain good numbers of large, older fish, similar to those present in 'virgin' stocks. It is likely that with increased access, and a subsequent increase in fishing pressure, these vulnerable stocks will be exploited.
2. Habitat Protection. The area is likely to have distinct and significant habitat, however research is needed to determine exactly what the habitats comprise.
3. Resource Protection. The area supports part of the valuable commercial wetline mackerel fishery. Recreational fishing has been limited and as a consequence the area has a unique value in the provision of future 'wilderness' type recreational fishing experiences with the availability of large 'trophy' size fish (Ian Curnow, pers. comm.).
4. Observation and Education. The inshore area adjacent the cliffs north of Point Cuvier regularly provides a marine spectacle of international magnitude with aggregations of baitfish congregating along the cliffs.

A Representative Marine Reserve System for Western Australia (1994) recommended that an area from Red Bluff to Point Quobba be considered as a Marine Reserve. If a Marine Park or Reserve was established within the area, any Fish Habitat Protection Area would cease to exist. The Department of Fisheries would continue to manage the fish resources in these waters.

2.3.3 *Miaboolya Beach - Carnarvon*

This small area north of Carnarvon has recently been found to be a productive nursery area for juvenile fishes and the only tailor nursery area found north of Kalbarri (R. Lenanton, pers. comm.). This low-energy surf beach is adjacent to a sand dune system, which in turn has an extensive mangal community running alongside a creek. The creek periodically discharges into the ocean.

The local high school, in conjunction with the research section of the Department of Fisheries, has been instrumental in establishing the value of this area as an important fish habitat and juvenile nursery area. There is strong community support for the area to become a FHPA.

The area is a favourite recreational fishing spot for both locals and tourists. The high level of human usage has degraded access points and an integrated management strategy for protection of the area is required.

2.3.3.1 Location

Miaboolya Beach is approximately 16km north of Carnarvon. The FHPA is proposed to include the waters north of Point Whitmore and south of South Bejaling Hill as well as the adjacent mangals and inland waters (Figure 5).

2.3.3.2 Values

- Nursery area for important recreational and commercial fish species (tailor, whiting, mulloway, northern threadfin salmon, dart, mud crabs and blue manna crabs).
- Unique habitat in Carnarvon area.
- Important recreational fishing area.

2.3.3.3 Selection Criteria Applicable to Miaboolya Beach

The values of the proposed FHPA fit in the following criteria.

1. Fish Protection. The area was found to be an important nursery area for a variety of commercial and recreational fish species.

2. **Habitat Protection.** The mangal system that feeds into Miaboolya Beach is degraded and appears under further threat from the use of inappropriate (and illegal) methods for recreational mud crab fishing.

There is limited information on the marine inshore habitat. Unpublished data collected by students from Carnarvon High School indicated a deep gutter offshore and unremarkable bottom in terms of seagrass in the areas surveyed.

3. **Resource Protection.** The recreational fishery is one of the major tourist attractions for the Carnarvon area (Tourism Industry Development Division, 1997). Miaboolya Beach is now recognised as an important nursery area that contributes to the recreational and commercial fish stocks of the region.
4. **Rehabilitation.** It may be possible to rehabilitate the mangal system with more appropriate access, community ownership and support of a protected area, greater fisheries compliance, and better understanding of the hydrological requirements of the inland waters surrounding the mangrove community.
5. **Observation and Education.** Miaboolya Beach provides a high value educational experience for Marine Biology, Biology and Geography students of the Carnarvon High School. The students undertake regular field trips for the collection of fish, mud crabs and environmental data. They analyse biological information on the species caught and compare results with other sites in the area. Miaboolya Beach provides an excellent opportunity for students to study the complexities of an ecosystem, given that it is a highly productive nursery area.

2.3.4 Shark Bay

The World Heritage Property was proclaimed in 1991 and the Shark Bay Marine Park, which includes waters within the Property, was proclaimed in 1990. During the initial planning process for the Shark Bay World Heritage Property, the Department of Fisheries prepared the Shark Bay Management Paper for Fish Resources (1996). The goals of the paper were to:

- utilise the Property's recreational, commercial and aquaculture fisheries within ecologically sustainable limits,
- ensure that all fishing activities are undertaken with minimal impact on the World Heritage values of the Property,
- encourage interpretation and education programs on the importance and relevance of fish resource management, and
- encourage continued research and monitoring of fish and their habitats.

The plan also indicated that the water of the World Heritage Property outside the Marine Reserves would be set aside as a FHPA pursuant to Section 115 of the *FRMA 1994*.

Since then, there has been a proposed extension to the Marine Park that includes the waters surrounding Bernier and Dorre Islands and additional waters between Dorre and Dirk Hartog Islands.

2.3.4.1 *Location*

All waters within the World Heritage Property and outside the existing and proposed Marine Reserves and the small area off Nanga (Figure 5).

2.3.4.2 *Values*

- High value prawn fishing area. Much of the catch for the Shark Bay Prawn Managed Fishery is taken from this area (estimated catch value for entire fishery \$34m).
- High value scallop fishing area. Much of the catch for the Shark Bay Scallop Managed Fishery is taken from this area (estimated catch value for entire fishery \$7.4m).
- Part of a World Heritage Property. The Department of Fisheries has an obligation to afford this area special management and protection under the World Heritage Property charter.

2.3.4.3 *Selection Criteria Applicable to the Northern Waters of the Shark Bay World Heritage Property*

The values of the proposed FHPA fit in the following criteria.

1. Fish Protection. Dugongs and turtles are protected under the *Wildlife Conservation Act* 1950, however protection of this area under the FRMA would give these species further incidental protection with increased management of the area. The Department of Fisheries has previously used its legislation to regulate fishing activities specifically for the protection of dugongs and turtles in Shark Bay.

Additional protective management of the area would focus on a reduction of bycatch species from the trawl fisheries.

2. Resource Protection. This area contributes to the most valuable commercial fisheries in the region. The Shark Bay prawn and scallop fisheries have a combined catch value of approximately \$41 million and provide a significant flow-on effect for the region.
3. Human Use and Resource Sharing. This area is an area of high use by commercial fishers and, increasingly, charter boat operators. The high value of the area requires prudent management to sustain both the fishing resources and the ecological integrity of the area.

SECTION 3 PROPOSALS FOR FURTHER ENVIRONMENTAL MANAGEMENT OF THE GASCOYNE

3.1 Recommendations arising from the FEMR, specific to the Gascoyne Region:

3.1.1 *Formally Incorporate Environmental Management Measures Into Each Commercial And Recreational Fishery*

3.1.1.1 *Develop a plan of management for all commercial and recreational fisheries*

Develop a Plan of Management that provides an assessment of the level of environmental impact from both commercial and recreational fisheries. Objectives would be set for each fishery with the purpose of mitigating any environmental effects or potential environmental effects.

The Plan of Management would describe the regulations in the existing Fisheries Management Plan and outline management measures to alleviate potential environmental effects.

3.1.1.2 *Include appropriate devices to reduce the capture of non-target species in commercial trawl fisheries*

Bycatch Action Plans are proceeding for all fisheries in WA. Priority fisheries are the commercial trawl fisheries, and it is expected that devices to reduce bycatch will be incorporated into these fisheries.

Currently trials of bycatch reduction devices are underway in the Shark Bay and Exmouth Gulf prawn trawl fisheries. The use of these devices will become compulsory in all trawl fisheries.

3.1.1.3 *Instigate a more refined analysis of fisher catch data and include other indicators of ecosystem health within catch returns*

The information from the commercial fisher catch returns is often the best available data to manage fish stocks. While it is a legal obligation for all commercial fishers to complete the fisheries catch and effort returns, some of the minor fisheries have limited or no stock assessment analysis (e.g. Marine Aquarium Fish Managed Fishery). These small fisheries are managed by the assessment of risk of the fishery on the fish stocks and the environment.

While the cost of data collection and analysis is an issue, the data provided in the catch returns can be a good general measure of ecosystem health. Some of the multi-species fisheries (e.g. Shark Bay and Exmouth Gulf beach seine fisheries) provide an excellent long-term index of the status of fish stocks for the commercial and recreational fishery as the provision of data and expended effort is both long term and consistent.

Commercial fisher catch returns could be modified to enable more information to be gathered on the health of the marine ecosystem.

3.1.2 Increase The Protection Of Marine Habitats By Re-Defining Trawl Licence Areas And The Level Of Sanction

3.1.2.1 Close areas of the managed trawl fishery not essential to the fishery

Many trawl fisheries (e.g. the Shark Bay prawn and scallop trawl fisheries) have extensive licence areas, however the area fished is relatively small (Figures 2 and 3).

It is recommended that areas in the Shark Bay Prawn and Scallop Managed Fishery Licence Area that are not currently utilised be closed to trawling. The closed area would include those waters west of Bernier and Dorre Islands.

An exploratory fishing policy for affected fisheries could be introduced to allow for the possibility of future trawling if the proposal was recognised as ecologically sustainable and in appropriate habitat.

3.1.2.2 Increase the level of sanction for trawling in areas outside the managed trawl fisheries

Currently the level of penalty for (illegally) trawling outside the boundary of a trawl fishery licence area is less than that for illegally trawling within the boundary of a trawl fishery licence area.

It is recommended that the level of sanction for trawling in areas not currently under a trawl management plan (ie those areas outside a current management area) be increased to at least the equivalent penalty.

3.1.3 Quantify The Socio-Economic Value Of Fishing In The Gascoyne Region

Early work (McLeod and McGinley 1994) indicated that the main fisheries in the Gascoyne Region accounted for almost 33per cent of the total output of WA fisheries. Using economic multipliers the total value of the commercial fishery to the economy in the Gascoyne is estimated at approximately \$254.3 million.

These figures are based on production value and do not take into account other interests that contribute to the socio-economic value of fishing in the Gascoyne, such as fish processing operations. In the Gascoyne, the figures are likely to be significant and may be important when making an assessment on the ecological sustainability of the regional fisheries.

It is recommended that the socio-economic value of all fishing sectors in the Gascoyne region be quantified.

3.1.4 *Rationalise Recreational Fishing Rules In The Region*

There are currently four sets of recreational fishing rules in the Gascoyne.

Following community discussion and submissions on a draft recreational fishing management strategy, a five-year management strategy for recreational fishing in the Gascoyne Region of WA (Fisheries Management Paper No. 154, 2001) has recently been released. The Minister for Fisheries has called for final public comments.

Specifically the Gascoyne strategy will define the objectives of recreational fisheries management in the region, provide guiding principles and priorities for management and provide for a uniform set of controls across the region.

3.1.5 *Increase The Education And Compliance Awareness For Recreational Fishers In The More Isolated Areas Of The Gascoyne*

The number of recreational fishers visiting the region is significant and appears to be increasing. With the number of Marine Parks in the region and the proposed extensions, the cost of compliance within Marine Parks and in remote areas needs to be addressed.

3.1.6 *Establish Fish Habitat Protection Areas*

At present, there are no Fish Habitat Protection Areas (FHPAs) in the Gascoyne region. Given the need for broader and more integrated marine planning, the following proposed FHPAs are recommendations only.

The following areas are seen as an initial step towards identifying and protecting important coastal environments, including the:

- Eastern shore of Exmouth Gulf,
- An area or areas between Gnarraloo Bay and Point Quobba,
- Northern waters of Shark Bay (within the World Heritage Property and outside the Marine Park and proposed Marine Park extension), and
- Miaboolya Beach - Carnarvon.

With the agreement of the Minister, community groups can nominate Fish Habitat Protection Areas for consideration and the Minister for Fisheries may vest the management of a FHPA in a community group that is a body corporate. Refer to Section 2.3 of this document.

3.2 Broader Department of Fisheries initiatives relevant to the Gascoyne Region:

3.2.1 Develop A Whole Of Government Approach To Marine Management

There is increasing recognition that Australia (see *Australia's Oceans Policy*) and Western Australia would benefit from the development of a more integrated approach to marine planning and management.

The Gascoyne Region with its high value commercial and recreational fisheries, significant and expanding tourism industry and valuable salt fields, highlights the need for an integrated planning approach.

An integrated approach to marine planning across all relevant State and Commonwealth Agencies would also facilitate the transition to a more ecosystem based approach to fisheries management and a greater understanding of the ecosystem linkages and potential environmental effects.

As the lead planning agency in WA, it would be appropriate for the WA Planning Commission (WAPC) to lead this planning process. As the WAPC has limited marine interest, other relevant agencies include the Environmental Protection Authority and Departments of Fisheries; Mineral and Petroleum Resources; Planning and Infrastructure; Environment, Water, and Catchment Protection; Conservation and Land Management; the Marine Parks and Reserves Authority and Environment Australia.

3.2.2 Adopt Management Tools for Ecologically Sustainable Fisheries

A flow diagram of the Department of Fisheries' Environmental Policy and Reporting Process (Figure 6) is given in Section 6 of this document.

3.2.2.1 Adopt a framework to report on all fisheries in an ecologically sustainable manner

Nationwide, fisheries agencies are developing a framework for reporting on a fishery in terms of its contribution to Ecologically Sustainable Development. This framework is being developed through the Standing Committee on Fisheries and Aquaculture (SCFA) - a committee on which the Executive Directors of all State and

Commonwealth fishing agencies sit, tasked with addressing national level policy issues. The Department of Fisheries is taking a lead role in this process.

Discussion on the ESD reporting framework was initiated by SCFA in 1993/4, however its progress has been accelerated by the development of new Commonwealth environmental legislation.

The Department of Fisheries will work within the framework being developed by the Standing Committee on Fisheries and Aquaculture, as well as with local stakeholders, to develop a framework for managing and reporting on fisheries in accordance with the principles of ESD.

In line with the Commonwealth legislative changes, the Department of Fisheries is committed to ensuring that the major eight) West Australian export fisheries meet the guidelines by the end of 2002 and all fisheries meet the guidelines before the end of 2003.

Most of the major WA export fisheries occur in the Gascoyne Region and include the Shark Bay prawn fishery, the Shark Bay scallop fishery, the Exmouth Gulf prawn fishery, the Shark Bay snapper fishery, the rock lobster fishery, the pearl oyster fishery and the aquarium and ornamental fish fishery.

3.2.2.2 Refine the existing annual assessment of fisheries in WA while progressing an independent audit accreditation

The Department of Fisheries has been reporting the state of the WA fisheries to Parliament annually since 1968 in a document entitled 'State of the Fisheries'. This process has continually developed and since 1994/95 has reported on indicators relating to the sustainability of fisheries.

The Department of Fisheries will continue to refine this reporting process in line with ESD principles and objectives resulting from the SCFA framework developed in (i) above.

As part of this development, the Department of Fisheries, in close consultation with the Office of the Auditor General and the Department of Environment, Water and Catchment Protection, aims to further develop an expert biological audit system based on ESD objectives. When developed, it is envisaged that the Environmental Protection Authority would manage the biological audit system.

The Department of Fisheries report on the sustainability of fisheries will be included in the WA Government's State of the Environment Report. This report provides an overview of the key environmental issues facing WA.

The next State of the Environment Report is due for release in 2002.

3.2.2.3 Continue to develop the Integrated Fisheries Management Initiative

Development of the 'Protecting and Sharing of Western Australia's Coastal Fish Resources' initiative (2000) is one of the most important tools in the management of the State's fisheries using an ecosystems approach.

It is intended that this process will facilitate a fair and equitable allocation of the fish resource to all major users, and the best way to do this could well be to integrate management of the State's coastal fish stocks within one agreed framework. It would be central to such a strategy to establish target catch shares for the commercial and recreational fishing sectors, and integrate the management of all interest groups.

The discussion paper 'Protecting and Sharing of Western Australia's Coastal Fish Resources' (2000) looks at commercial and recreational fishing in terms of their growth and contribution to the State's economy, and puts in perspective their increasing value and importance as well as their impact on fish stocks. The paper also looks at issues, such as the effects of population growth, the impact of fishing technology, marine planning and the expansion of marine reserves, fish stocks at risk, and important new marine activities, such as aquaculture and charter fishing. The document has been available for public comment and submissions are presently being compiled.

It is expected that the process to developing integrated management of the State's coastal and estuarine fish stocks will be long, however it will provide an effective basis for fisheries management into the future.

3.2.2.4 Refine the Fisheries Environmental Management Plans

The Department of Fisheries is developing a series of Fisheries Environmental Management Reviews and complementary Management Plans for the marine regions of the State as well as the inland fisheries. The first review was for the Gascoyne Region.

The review documents will cover all fisheries and fishing activities in WA out to the 200 nm Exclusive Economic boundary. The reviews take a 'first look' at the possible effects of WA fisheries on the aquatic environment as well as noting any potential external pressures to each fishery and the habitats that support them.

The present Environmental Management Plan is limited by the available data and policy development. However, subsequent Plans will evolve to reflect the progress of the Agency in their capacity to report on ESD objectives. The Plans will also be refined to reflect a greater regional perspective in terms of ESD.

3.2.2.5 Ensure fisheries and aquaculture operations proposed for the region are ecologically sustainable

The Standing Committee on Fisheries and Aquaculture is in the process of developing a framework for reporting on ecologically sustainable development of Australian

fisheries (see i). The principles of this reporting system should be used to assess the potential impacts of new fisheries and aquaculture operations in the Gascoyne region.

Ideally this would result in the formulation of guidelines for environmental impact assessments of such proposed activities in the region. This should be incorporated in the Developing New Fisheries in Western Australia Management Paper (Fisheries Management Paper 130) and the existing process for the assessment of aquaculture operations as outlined in Ministerial Policy Guideline No. 8.

3.2.3 Map Ecosystem Types

WA marine environments are poorly documented, which impedes the development of effective ecosystem management. There is a need to map the ecosystem types in terms of the physical and biological resources to identify areas of particular importance in the Gascoyne Region as well as those areas impacted by fisheries. This is valuable in the overall planning of an area, especially in terms of development assessments, and aspects of marine resource sharing.

Large areas of seagrass in Shark Bay have been mapped, as well as habitats in Exmouth Gulf and part of Ningaloo Reef. There is only limited information available in other inshore areas of the Gascoyne. In the offshore and oceanic regions of the Gascoyne there is little or no habitat or ecosystems information.

SECTION 4 IMPLEMENTATION STRATEGY

In the final Fisheries Environmental Management Plan for the Gascoyne Region, public submissions will have been reviewed and an implementation Strategy developed which outlines:

- Recommendation priorities;
- Cost estimates associated with each recommendation; and
- Estimated time lines for development of the recommendation.

SECTION 5 REFERENCES

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SECTION 6 FIGURES

Figure 1 Boundary Area and Location; Gascoyne Region

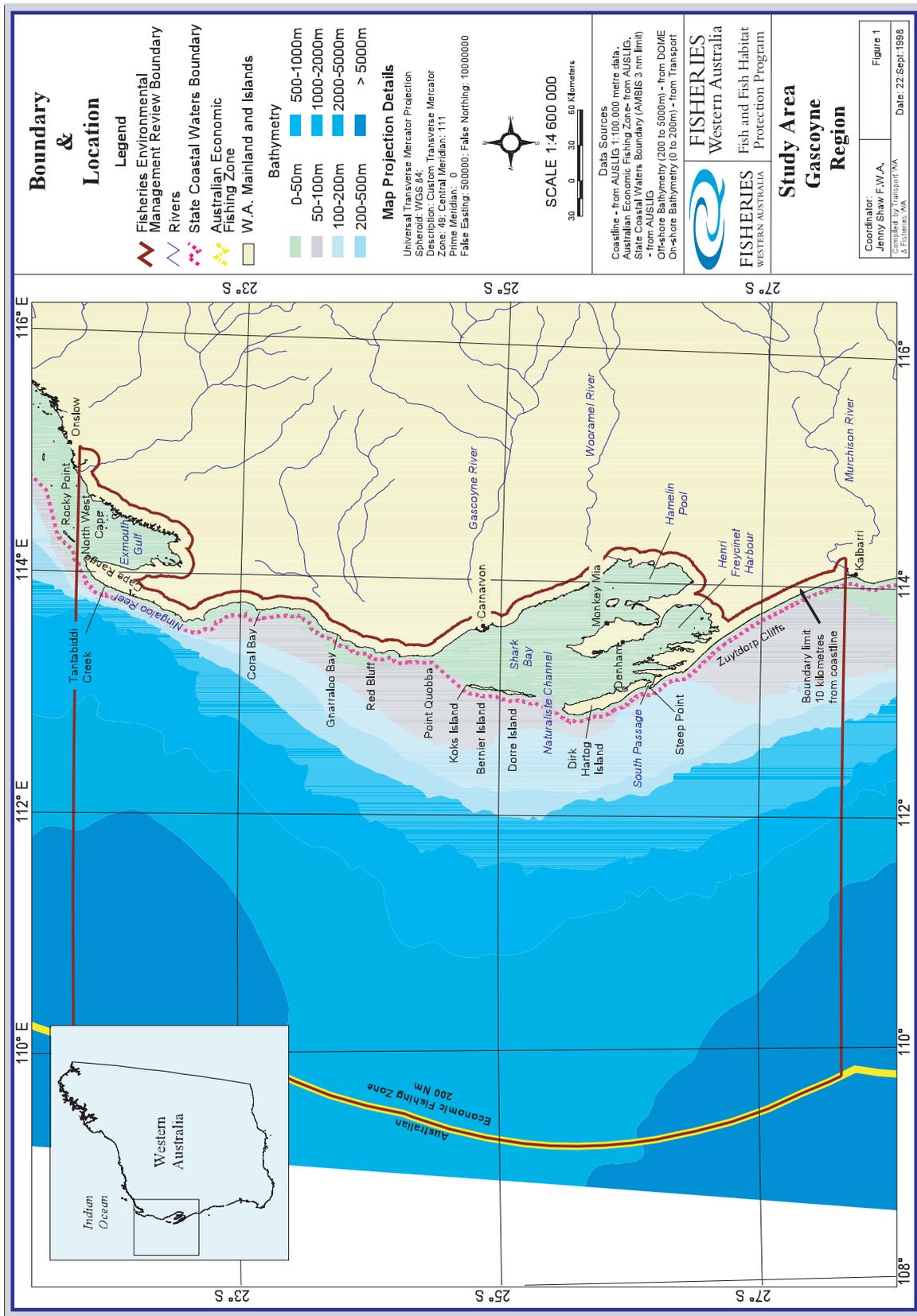


Figure 2 WA Commercial Fisheries Licence Areas; Shark Bay Prawn Managed Fishery

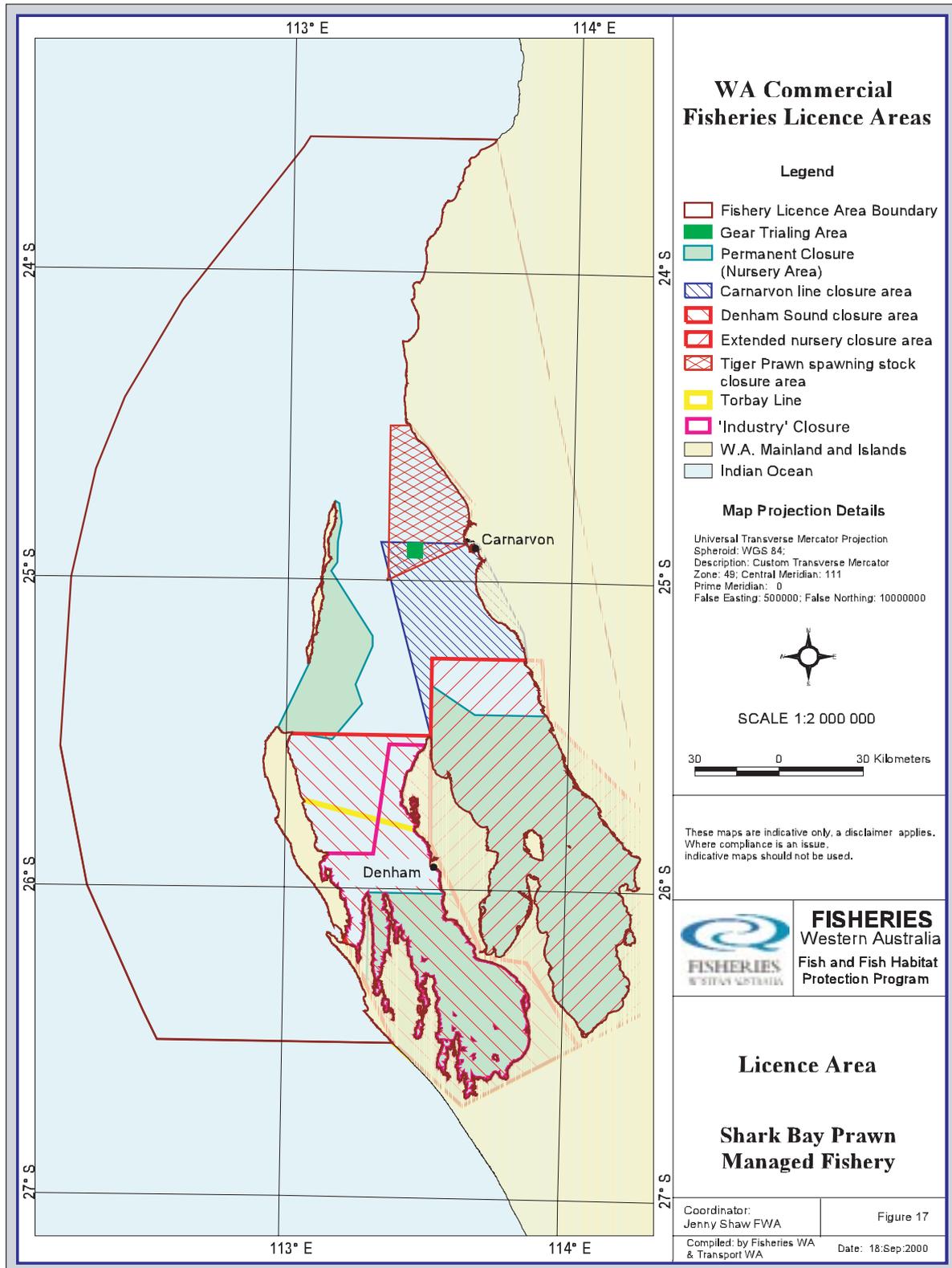


Figure 3 Principal Commercial Fishing Areas; Shark Bay Prawn Managed Fishery

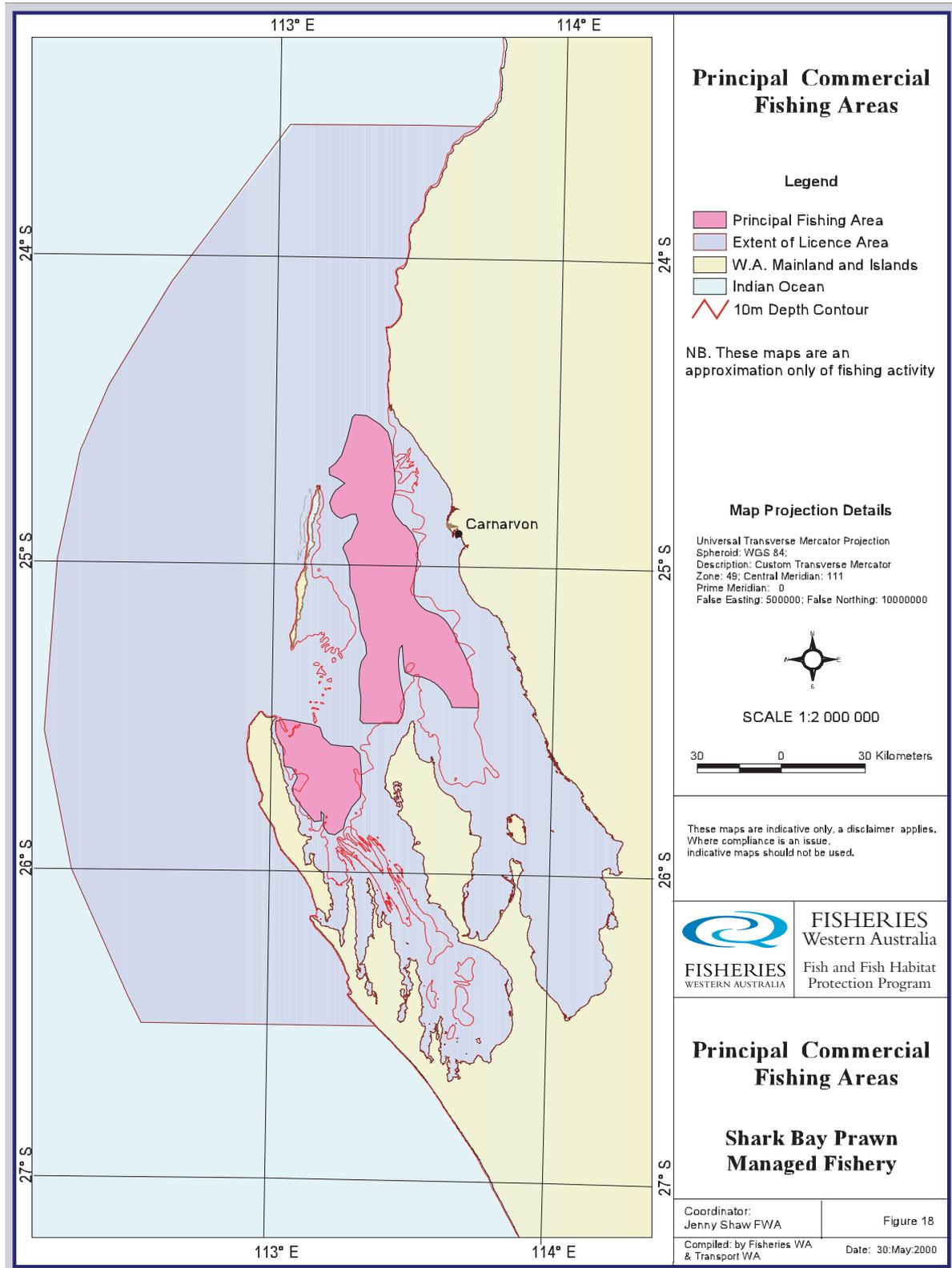


Figure 4 Conservation Areas; Gascoyne Region

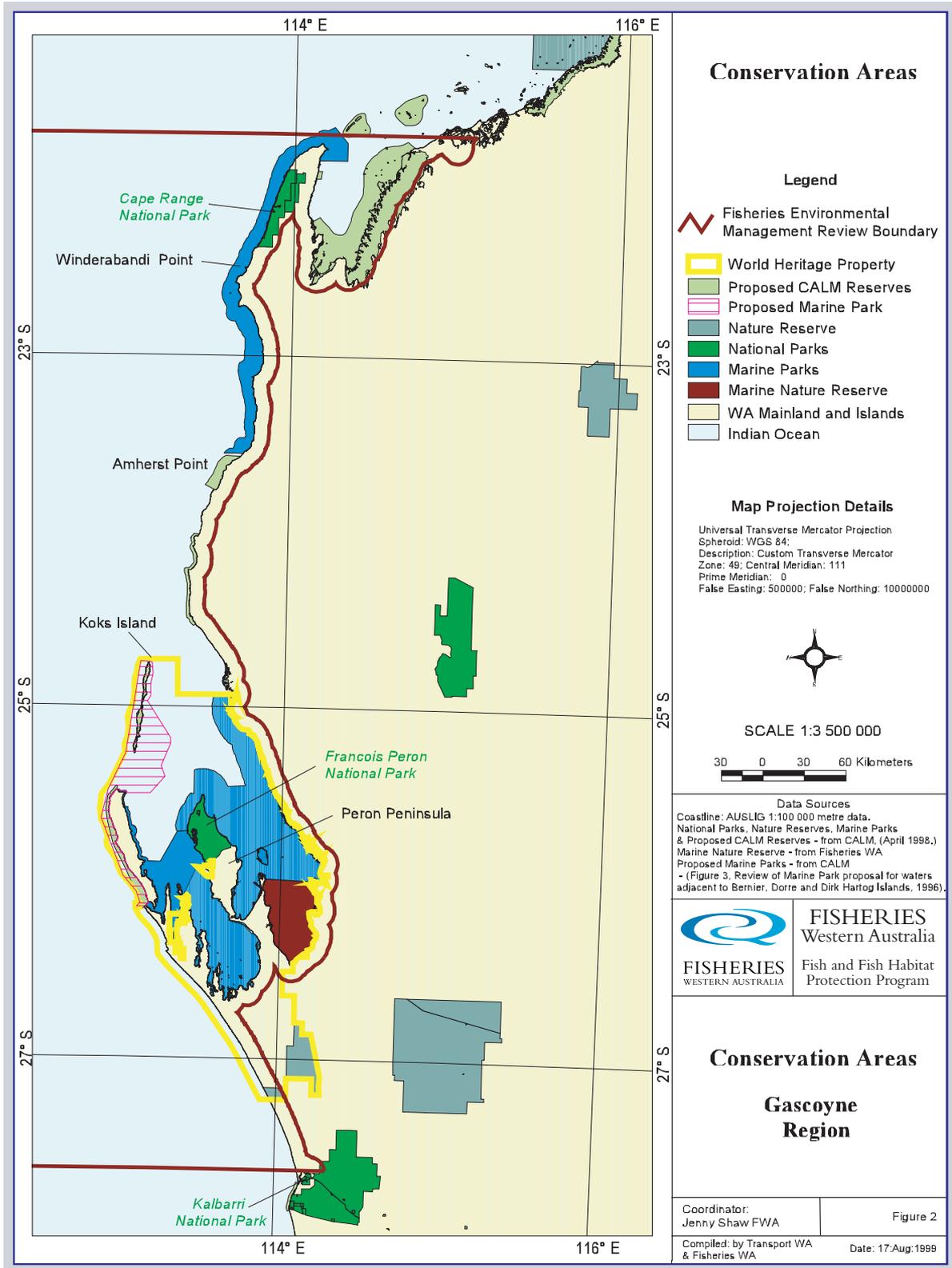


Figure 5 Proposed Fish Habitat Protection Areas; Gascoyne Region

Figure 6 Components of the Environmental Policy and Reporting Process

SECTION 7 FISHERIES MANAGEMENT PAPERS

- No. 1** The Report of the Southern Western Australian Shark Working Group. Chairman P. Millington (1986)
- No. 2** The report of the Fish Farming Legislative Review Committee. Chairman P. Rogers (1986)
- No. 3** Management Measures for the Shark Bay Snapper 1987 Season. P. Millington (1986)
- No. 4** The Esperance Rock Lobster Working Group. Chairman A. Pallot (1986)
- No. 5** The Windy Harbour - Augusta Rock Lobster Working Group. Interim Report by the Chairman A. Pallot (1986)
- No. 6** The King George Sound Purse Seine Fishery Working Group. Chairman R. Brown (1986)
- No. 7** Management Measures for the Cockburn Sound Mussel Fishery. H. Brayford (1986)
- No. 8** Report of the Rock Lobster Industry Advisory meeting of 27 January 1987. Chairman B. Bowen (1987)
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