GASCOYNE COMMERCIAL COMPLIANCE TABLE 1

Summary of compliance and educative contacts and infringement types in commercial fisheries within the Gascoyne coast bioregion during the 2001/02 financial year.

CONTACT WITH THE COMMERCIAL FISHING COMMUNITY	NUMBER
Hours delivered in bioregion	7,593
Fisher field contacts by Fisheries Officers	508
District Office contacts by Fisheries Officers	1,217
Fishwatch reports *	26
OFFENCES DETECTED	
Infringement warnings	8
Infringement notices	21
Prosecutions	18

* This represents the total number of Fishwatch reports, both commercial and recreational, since the service provider reporting mechanism cannot currently differentiate between sectors.

The region's major fisheries continued to be the focus of the majority of investigations resulting in prosecution action during the year. In particular, the Shark Bay Prawn and Scallop Managed Fisheries generated a number of VMS-related offences requiring investigation and in some cases prosecution.

However, a number of other commercial fisheries, including the Exmouth Gulf Prawn and Shark Bay Snapper Managed Fisheries and the wetline fishery, also required varying levels of investigation. The wetline compliance problems were generally restricted to a small number of fishers using unlicensed personnel as crew and/or incorporating the catches of recreational fishers in their consignments. The Shark Bay Snapper Managed Fishery, following stricter and more comprehensive management arrangements introduced in late 2000, generated several offences relating mainly to non-compliance with quotas or failure to complete correct catch and disposal records. A number of fishers were also investigated for authorisation-related offences.

Initiatives in 2002/03

2002/03 saw the Gascoyne bioregion's management staff working together with participants in the Exmouth Gulf Prawn Managed Fishery to complete a series of risk assessment workshops and meetings. The meetings allowed those involved to work through issues associated with levels of compliance funding and servicing for the fishery and resulted in both the Department and industry gaining a better understanding of one another's priorities, obligations and expectations, with a view to ensuring effective formulation and delivery of appropriate compliance projects.

The introduction of VMS into the Exmouth Gulf Prawn Fishery management arrangements during the 2002 season necessitated extra training in VMS-related matters for staff working at the Exmouth District Office. This training was able to build on experience gained over the past three years since the Shark Bay prawn and scallop trawl fisheries began using VMS. Additionally, the Department has been working to review the most appropriate strategy to deal with VMS-related offences. This has included the development of new protocols and processes incorporating staff from the Gascoyne bioregion, the Perth-based VMS centre and the Prosecutions Section, and is already producing benefits for those handling these matters.

REGIONAL RESEARCH OVERVIEW OF WETLINE FISHING

The CAES database indicates that around 12% of the State's wetline catch was reported from the Gascoyne coast bioregion during 2001/02. The top ten species comprised goldband snapper (*Pristipomoides multidens*) 69 t, Spanish mackerel (*Scomberomorus commerson*) 49 t, pink snapper (*Pagrus auratus*) caught outside of the Shark Bay Snapper Managed Fishery 43 t, sea mullet (*Mugil cephalus*) 19 t, rosy jobfish (*Pristipomoides filamentosus*) 17 t, red emperor (*Lutjanus sebae*) 12 t, northern bluefin tuna (*Thunnus tonggol*) 10 t, grey mackerel (*Scomberomerus semifasciatus*) 6 t, nor-west snapper (Lethrinidae) 6 t and spangled emperor (*Lethrinus nebulosus*) 6 t.

An interim management plan for the troll fishery for mackerel, details of which are reported under the north coast bioregion (pp. 97–102), will commence in 2004. Most of the other demersal species are taken by vessels targeting pink snapper in the region's oceanic managed fishery for that species (see pp. 64–67). The majority of the mullet catches were reported from the area between the northern boundary of the beach seine fishery and Carnarvon.

Shark Bay Prawn Managed Fishery

Management Summary

The Shark Bay Prawn Managed Fishery targets western king prawns (*Penaeus latisulcatus*), brown tiger prawns (*Penaeus esculentus*) and a variety of smaller prawn species including coral prawns (various species) and endeavour prawns (*Metapenaeus* spp.). King prawns are the dominant species, comprising about 70% of the catch. Tiger prawns make up most of the remaining 30%. The fleet also catches between 20% and 30% of the annual scallop catch in Shark Bay.

Most large king and tiger prawns are exported whole or headless to Asia (Japan) and Europe, while the Australian markets take most of the smaller king and coral prawns. The fishery has an annual value of around $25–30 million, although the value of the catch fluctuates according to catch levels, the prices of prawns on world markets, and exchange rates.

Management of the fishery is based on limited entry, crew limitations, gear controls, season and area openings and closures, moon phase closures and daily fishing time controls.

A Ministerial exemption was again granted to licensees prior to the start of the 2003 season, exempting operators from the 375 boat unit rule currently provided for under the Shark Bay

Prawn Management Plan 1993. Management responses to the longer-term removal of the 375 boat unit rule are being discussed with industry. An exemption was also granted to allow licensees to trial 'bison' otterboards (as opposed to standard flat wooden otterboards) during the 2003 season.

Bycatch reduction devices (specifically grids) continue to be fully implemented during the 2003 season. Vessels operating in the fishery are required by way of a condition on the managed fishery licence to fish with a grid in each net. Trials of secondary bycatch reduction devices or fish escapement devices (FEDs) (for example, square mesh panels) are also occurring during the 2003 season. It was necessary to provide an exemption to provide for such trials given that the meshes associated with the FEDs are greater than provided for in the legislation.

The 2003 fishing season commenced on 6 March and is scheduled to close on 1 November. The timing of the opening of the season allows the harvest of large residual prawns which were not caught in the previous year's season. Within the main fishing period, there are various subsidiary openings and closures which are aimed at catching prawns at appropriate sizes and protecting the stock from recruitment over-fishing.

Since the 1999 season, moon closures have been made more variable, changing from a standard three-day period to between three and seven days over the full moon. This change is aimed at increasing economic efficiency by shifting fishing effort away from the period where catch rates are reduced and a greater proportion of the catch is soft-shelled and therefore less marketable. Permanent nursery area closures within the fishery prevent the fishing of small prawns while two spatio-temporal closures serve to protect tiger prawn breeding stocks. The Vessel Monitoring System continues to be an integral part of the fishery's management strategy and provides the mechanism to give effect to the various closures in the fishery.

The Shark Bay Prawn Management Advisory Committee has been replaced by the Joint Trawl Management Advisory Committee (JTMAC), which covers the Shark Bay Prawn, Shark Bay Scallop, and Exmouth Gulf Prawn managed fisheries. Given the overlap between the three Gascoyne trawl fisheries it was considered more efficient to merge the previously separate MACs. The JTMAC, which provides high-level advice to the Minister on the management of these fisheries, held its inaugural meeting in February 2003. The JTMAC process provides for management arrangements to be better tailored to maintaining the sustainability of the fishery, ensuring cost-effective management and achieving the maximum economic return from the prawn resource. Detailed fishery management matters (e.g. opening/closing dates, spatial and temporal closures) are now dealt with directly between the Department and licensees.

Environment Australia has declared the fishery as being managed in an ecologically sustainable manner under the provisions of the *Environment Protection and Biodiversity Conservation Act 1999*. While subject to a variety of recommendations, this approval allows product from the fishery to be exported for a five-year period.

Governing Legislation/Fishing Authority
Shark Bay Prawn Management Plan 1993
Shark Bay Prawn Managed Fishery Licence

Consultation Process
Joint Trawl Management Advisory Committee
Department–industry meetings

Research Summary

Research activities continued to focus on stock assessment and monitoring the status of the prawn stocks, particularly tiger prawns. All boats completed detailed research logbooks, which together with pre-season and spawning stock surveys, made up the database for monitoring the fishery.

A collaborative project with industry to review the impact of trawling on non-target species has been evaluating gear modifications to reduce bycatch and improve product quality. A further FRDC-funded project is examining the biodiversity of bycatch in trawled and untrawled areas of Shark Bay.

The following status report summarises the research findings for this fishery.

Shark Bay Prawn Managed Fishery Status Report

Prepared by E. Sporer and M. Kangas

FISHERY DESCRIPTION

Boundaries and access

The boundaries of this managed fishery are the waters of the Indian Ocean between latitudes 23°34′ S and 26°30′ S and adjacent to Western Australia on the landward side of the 200 m isobath (Shark Bay Prawn Figure 1).

Twenty-seven boats are licensed to engage in prawn trawling in this fishery and all licences were active in the 2002 season, which opened on 6 March and closed on 21 October.

Recruitment surveys in March and April within the closed area south and east of the Carnarvon/Peron Line and the extended nursery area (ENA) were used to determine the extent of this area to be opened. The Carnarvon/Peron area was opened on 11 April. Owing to small prawn size the ENA remained closed to fishing until 6 May. The ENA closed to fishing on 1 August to protect juvenile king prawns.

Denham Sound opened on 6 March, with trawling restricted to the area north of the Torbay Line, and closed from 1 May. The Sound, including the Torbay Line, reopened on 1 August and remained open until the end of the season (21 October).

Main fishing method

Otter trawl.

RETAINED SPECIES

Commercial production (season 2002): 2,075 tonnes

Landings

The total landings of major penaeids for the 2002 season were 2,075 t, comprising 1,554 t of king prawns, 510 t of tiger prawns and 11 t of endeavour prawns. There were also 102 t of minor penaeids (coral prawns) landed.

The 2002 landings represent a substantial increase compared to 2001, with the catch of king, tiger and endeavour prawns within the acceptable catch range. King prawn landings for 2002 were close to the five-year average (1,516 t) (Shark Bay Prawn Figure 2) whilst the tiger prawn landings were slightly lower than the five-year average (561 t).

Variable quantities of minor penaeids (predominantly coral prawns) are retained, depending on the catch of the target species. Owing to the small size of these species, it is likely that the majority of the stock is able to pass through the mesh, suggesting that the overall exploitation is low.

Scallop landings by the prawn fleet in 2002 totalled 371 t whole weight. All Shark Bay Prawn Managed Fishery boats have Shark Bay Scallop Managed Fishery Class B licences.

By-product landings included 155 t of blue swimmer crab (*Portunus pelagicus*), 29 t of squid, 19 t of cuttlefish, 21 t of tuna (wetlining), 8 t of mulloway (*Argyrosomus hololepidotus*) and a small quantity of other miscellaneous finfish species.

Fishing effort

Effort recorded in the 2002 daily logbooks for the fleet showed nominal effort as 49,494 hours, which was a reduction of 4,818 hours when compared with the last five years' average effort (54,312 hours). Fishing effort is being monitored with the aim of reducing ineffective trawl hours whilst maintaining high catch rate levels, thus reducing overall effort to improve economic efficiency within the prawn trawl fleet. There were seven moon closure periods consisting of three, five and seven days providing a total of 192 nights' fishing. Following consultation with the Research Division and industry, the August and September moon closure periods were extended from seven to ten days, and together with the voluntary early closure, only a total of 182 nights were actually fished. Although the number of fishing days (and thus trawl hours) has been reduced during the 2002 season, effective effort is high. The catch and effort in this fishery requires vigilant monitoring of both king and tiger prawn stocks to maintain effective effort at current levels.

Catch rate

A catch rate of 31.4 kg/hr for king prawns was observed, which was the highest catch rate since 1964. This, in part, reflects the reduction in fishing during periods of low catch rate aimed at increasing economic efficiency.

The 2002 tiger prawn catch rate of 10.3 kg/hr was higher than the 2001 season (7.4 kg/hr) and comparable to that of the years 1991–2000 (mean 10.4 kg/hr). The 2002 season catch rates have also been affected by extended full moon closures which are designed to reduce periods of ineffective effort whilst maintaining sustainability of the species in this fishery.

Recreational component: Nil

Stock assessment completed: Yes

The king and tiger prawn stocks are fully exploited. For tiger prawns, this assessment is supported by the position of recent indices of recruitment and spawning stock with respect to the accepted spawning stock–recruitment relationship (SRR). Environmental factors, in particular the variation in the strength of the Leeuwin Current (see below), are being examined to improve the understanding of variations in the SRR for the king prawn stock. We continue to examine catch trends to enhance our evaluations and longer-term predictions. Indications are that at current effort levels, catches of king and tiger prawns are likely to remain in the vicinity of 1,500 and 500 t respectively.

Exploitation status: Fully exploited

Breeding stock levels: Adequate

The multi-species nature of this fishery requires the levels of exploitation for both king and tiger prawn stocks to be carefully monitored to simultaneously achieve the maximum sustainable catches. Current stock and recruitment studies indicate that the king prawn stock remains at a point where recruitment is not affected by spawning stock levels. Thus, at the current level of exploitation, most fluctuations in the annual king prawn harvest are likely to have resulted from varying effort levels and environmental effects on recruitment, not from the abundance of the spawning stock.

In contrast, the recruitment levels of tiger prawns during the 1980s were demonstrably affected by reduced spawning stock biomass. Management practices have subsequently been employed to increase the level of these spawning stocks. The spatial extent of the Tiger Prawn Spawning Area (TPSA) was re-examined and divided into two areas, southern and northern, during the 2001 season (Shark Bay Prawn Figure 1). The southern area is regarded as the prime area for spawning tiger prawns. Furthermore it was agreed, in consultation with industry, to close the spawning areas using a catch rate threshold level of 10 kg/hr instead of an arbitrary date, which had been the practice prior to 2001.

Two standardised research surveys (to confirm commercial catch rates derived from logbook information) were carried out on 4 and 18 June 2002 to obtain the catch rate of tiger prawns, which provided the basis for closure of the southern spawning area on 23 June. The average catch rate of tiger prawns for the surveys in 2002 was 15.5 kg/hr compared to 10.2 kg/hr in 2001. In 2001, because the TPSA was closed on 19 June, the threshold catch rate was maintained throughout July and August in the TPSA. In 2002, however, fishing was allowed in the TPSA during the period 18–23 June, and a subsequent survey on 30 July indicated the catch rate had declined to only 3.6 kg/hr in the TPSA (which is still above the SRR trigger level of 2 kg/hr). In future, therefore, the TPSA will close immediately after survey confirmation of the threshold catch rates (10 kg/hr) being reached. This regime of

surveys and closure will continue for a minimum of three years (2001–2003 inclusive) to allow an analysis of its usefulness in protection of spawning stock.

The northern spawning area, which is aligned with the northern portion of the original 1996 TPSA, was not closed during the 2002 season because a survey could not be completed in the area and it was anticipated that low fishing activity would occur there. The season average commercial catch rate (10.3 kg/hr) and the total catch for tiger prawns was within expectations. Furthermore, the fishing arrangements provided larger sizes and good quality prawns during the season.

Changes in the efficiency of the fishing fleet must still be monitored carefully to ensure that tiger prawn spawning stocks are not reduced below optimal levels. This is particularly the case during high rainfall events, when the vulnerability of stocks appears to be increased by the stock moving on to the fishing grounds from inshore areas early, thereby allowing the fishery to deplete the spawning stock well before the prime spawning period starts in August.

NON-RETAINED SPECIES

Bycatch species impact: **Moderate**

Bycatch composition is dominated by dead wire weed, which breaks off the extensive shallow Wooramel seagrass bank annually over summer, and small fish species mostly not exploited by other sectors. Small blue swimmer crabs and other crustacean species are also taken in significant quantities but are generally released alive. Overall bycatch loads are medium relative to other subtropical trawl fisheries at about 4–8 times the prawn catch. A study on the bycatch of trawled and untrawled areas of Shark Bay is under way and will further document bycatch abundance and composition during 2002/03. Trialling and implementation of fish escapement devices (square mesh panels in cod-ends) should further reduce the quantity of small fish retained in trawls.

Protected species interaction: **Low**

Although protected species including whales, dolphins, dugongs, turtles and sea snakes are particularly abundant in Shark Bay generally, only sea snakes are seen regularly in the trawl catches in certain areas, and these are generally returned to the sea alive. The full implementation of bycatch reduction devices (grids) into the fishery during 2002 has eliminated the occasional capture of turtles in trawl nets. However, there is a short period of time in a specific area that is grid-exempt. This area generally has low occurrence of turtles, minimising captures during this time, and the short trawl duration (approximately 60 minutes) required in Shark Bay to accommodate the high prawn catch rates and the clogging effects of dead wire weed means that any turtles caught can be returned to the sea alive.

ECOSYSTEM EFFECTS

Food chain effects: **Low**

Although the exploitation rates of the retained target species are high, such species have very high natural mortality rates and make up a relatively low proportion of the 'fish' biomass on the trawl grounds. Thus, most prawn predators are opportunistic due to these natural variations in prawn populations. Consequently, it is not likely that the commercial take of prawns impacts significantly on the upper trophic levels within the Shark Bay ecosystem.

Habitat effects: **Moderate**

As a result of the extensive permanent and temporary closures first introduced via the management plan in the 1960s and 1970s respectively (Shark Bay Prawn Figure 1), the fleet operates in only 5% of the overall licensed area of the fishery. Inside Shark Bay, trawl fishing is focused in the deeper areas of the central bay, north of Cape Peron and in the northern area of Denham Sound. In 2002, the total area trawled within Shark Bay was approximately 885 square nautical miles which represents less than 20% of inner Shark Bay. This, combined with the fact that the majority of these trawl grounds are on hard sand habitats which characteristically have very low levels of benthic fauna, means that the typical impact of the trawls is minimal.

SOCIAL EFFECTS

The estimated employment for the year 2002 was 135 skippers and crew. There are also prawn processing and support staff employed at Carnarvon and Fremantle. This industry, in conjunction with the other trawl fisheries for prawns and scallops in the Gascoyne bioregion, is a major contributor to regional employment.

ECONOMIC EFFECTS

Estimated annual value (to fishers) for year (2002): **$30 million**

Wholesale prices for prawns vary depending on the type of product and the market forces operating at any one time. Generally, the price of prawns was lower than in 2001 except for tiger prawns, and average ex-boat prices were as follows:

King prawns	$13.10/kg
Tiger prawns	$18.25/kg
Endeavour prawns	$9.00/kg
Coral prawns	$2.00/kg

FISHERY GOVERNANCE

Acceptable catch range: **1,501–2,330 tonnes**

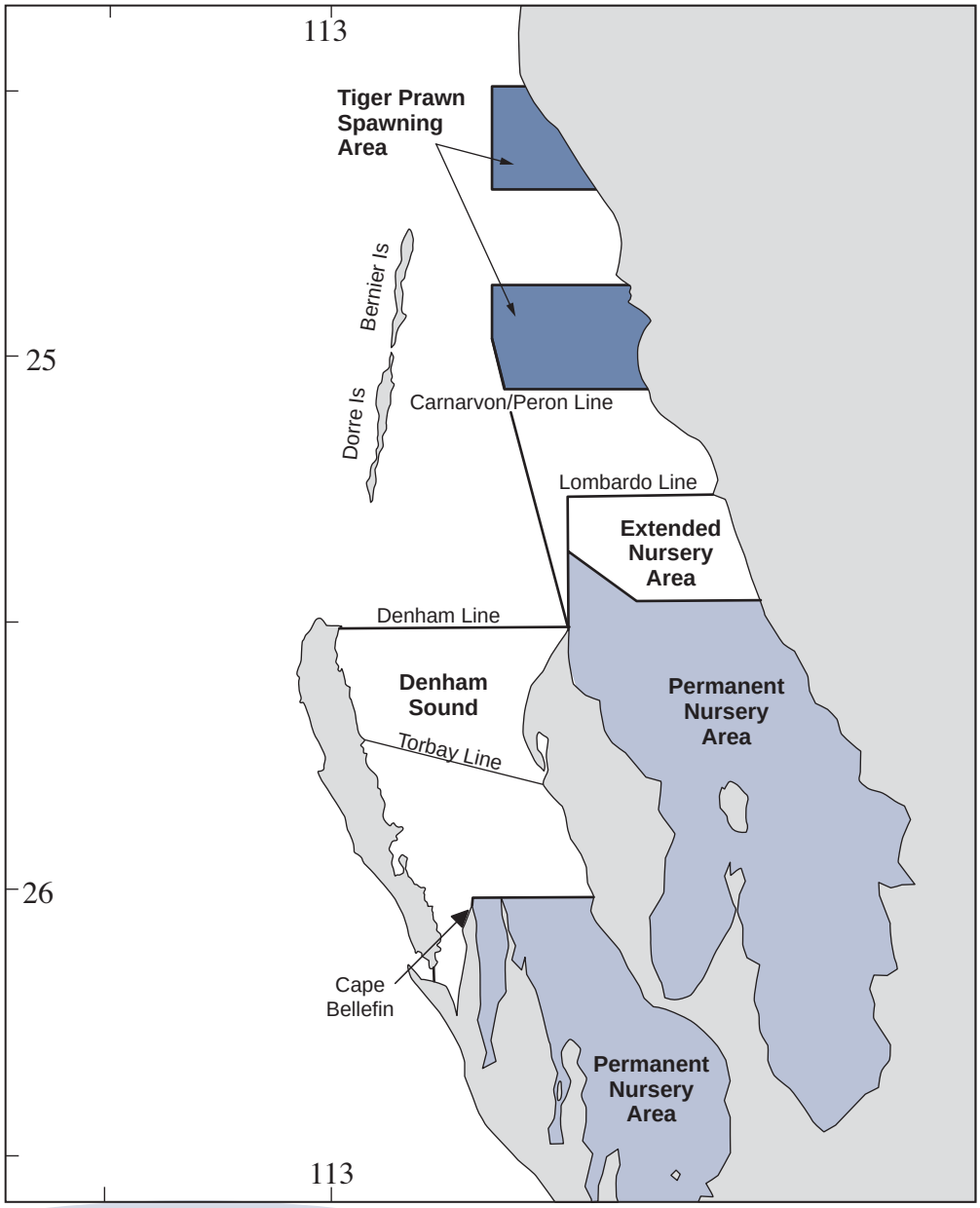
Under current effort levels and normal environmental conditions, and based on the 10-year range of catches following the restructuring of the fishery to 27 licences (1990), the acceptable catch range for major penaeids is 1,501–2,330 t. Acceptable catch ranges for individual species are king prawns 1,100–1,600 t, tiger prawns 400–700 t and endeavour prawns 1–30 t. The total prawn catch and the catch of the three individual species during 2002 were within the acceptable ranges set. Monitoring of the tiger prawn stock will still be regarded as a high priority in this fishery and the collaborative initiative with industry to refine the TPSA closure system will continue.

EXTERNAL FACTORS

The catches of prawns in Shark Bay are relatively stable compared with other penaeid fisheries. The major environmental factor influencing these stocks appears to be the flow of the Leeuwin Current along the outside of the embayment. A relationship between current strength (as measured by Fremantle sea level) and king prawn catches has been identified and may be used to indicate broad catch trends.

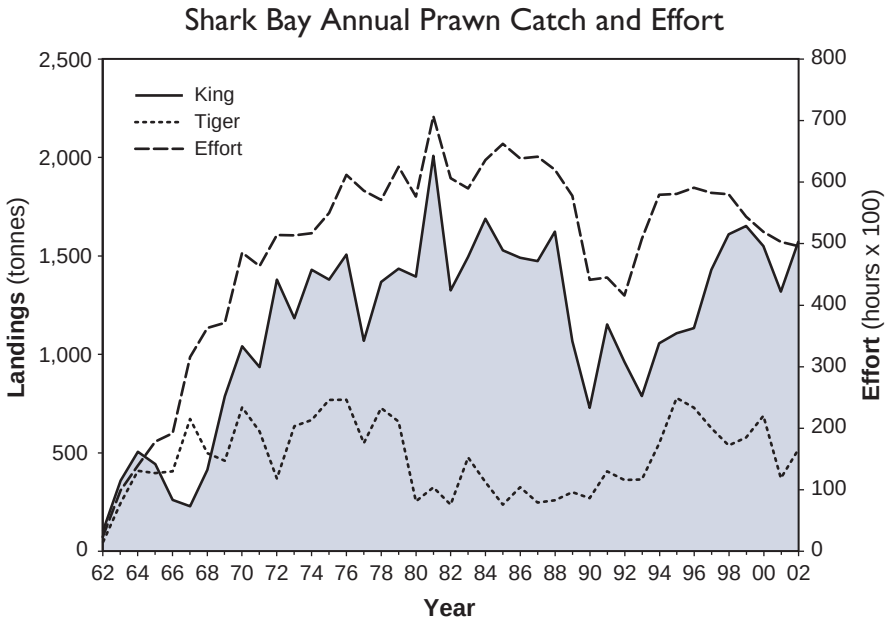
The Leeuwin Current also appears to affect scallop recruitment, which can cause a redirection in effort away from prawn areas and artificially lower prawn catches when scallops are very abundant.

Cyclone effects including high rainfall events may also influence prawn catches as strong river flows (Gascoyne and Wooramel Rivers) can flush prawns (particularly brown tiger prawns) from inshore seagrass areas out on to trawl grounds. At these times more wire weed is also encountered on the trawl grounds, which influences fishing patterns.



SHARK BAY PRAWN FIGURE 1

Boundaries of the Shark Bay Prawn Managed Fishery.



SHARK BAY PRAWN FIGURE 2

Shark Bay Prawn Managed Fishery annual prawn catch and effort, 1962–2002.

Exmouth Gulf Prawn Managed Fishery

Management Summary

The Exmouth Gulf Prawn Managed Fishery targets western king prawns (*Penaeus latisulcatus*), brown tiger prawns (*Penaeus esculentus*), endeavour prawns (*Metapenaeus* spp.) and banana prawns (*Penaeus merguiensis*).

The 2003 fishing season commenced on 1 April and is scheduled to close on 15 November. The more flexible fishing arrangements trialled in the 2002 season are continuing during the 2003 season. This provides industry with the flexibility to maximise tiger prawn size (and hence market value) while maintaining the existing monitoring and tiger prawn breeding stocks catch threshold protocols. The Memorandum of Understanding between industry and the Department continues to ensure accountability.

Management controls also include limited entry and gear restrictions as well as controls on vessel size and power. Licensees in the fishery have again been granted an exemption to continue trialling quad gear (four smaller nets). It is likely that the Exmouth Gulf Prawn Management Plan 1989 will be amended during the 2003 season to allow for more flexible gear configurations (through unitisation without altering the total headrope in the fishery). The Vessel Monitoring System continues to be an integral part of the fishery's management strategy.

Bycatch reduction devices (specifically grids) continue to be fully implemented during the 2003 season by way of a condition on the managed fishery licence. It is expected that secondary bycatch reduction devices or fish escapement devices (for example, square mesh panels) will be trialled later in the 2003 season.

The Department, in association with industry, is also in the process of preparing an application to the Commonwealth's Department of Agriculture, Forestry and Fisheries Australia in order to gain certification from the US Department of State that the fishery is BRD-compliant in terms of potential turtle captures. This will allow licensees to export product to the US market. Industry has also installed additional 'hopper' sorting systems on vessels, which improves the survival of some bycatch species. There are now seven vessels which have hopper systems.

The Exmouth Gulf Prawn Management Advisory Committee has been replaced by the Joint Trawl Management Advisory Committee, which covers the Exmouth Gulf Prawn, Shark Bay Prawn and Shark Bay Scallop Managed Fisheries. Given the overlap between the three Gascoyne trawl fisheries it was considered more efficient to merge the previously separate MACs. The JTMAC, which provides high-level advice to the Minister on the management of these fisheries, held its inaugural meeting early in 2003. The JTMAC process provides for management arrangements to be better tailored to maintaining the sustainability of the fishery, ensuring cost-effective management and achieving the maximum economic return from the prawn resource. Detailed fishery management matters (e.g. opening/closing dates, spatial and temporal