Australian Government

Department of the Environment and Heritage

Assessment of the
Broome Prawn Managed Fishery

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Disclaimer

This document is an assessment carried out by the Department of the Environment and Heritage of a commercial fishery against the Australian Government *Guidelines for the Ecologically Sustainable Management of Fisheries*. It forms part of the advice provided to the Minister for the Environment and Heritage on the fishery in relation to decisions under Parts 13 and 13A of the *Environment Protection and Biodiversity Conservation Act 1999*. The views expressed do not necessarily reflect those of the Minister for the Environment and Heritage or the Australian Government.

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Assessment of the ecological sustainability of management arrangements for the Broome Prawn Managed Fishery

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EXECUTIVE SUMMARY

Background
The Department of Fisheries Western Australia (DFWA) has submitted a document for assessment under Parts 13 and 13A of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act). The draft document *Application to Australian Government Department of the Environment and Heritage on the Broome Prawn Managed Fishery* (the submission) was received by the Department of the Environment and Heritage (DEH) in December 2003. The submission was released for a forty-three day public comment period that expired on 30 January 2004. One public comment was received. DFWA provided a response to the issues raised. A number of changes were made to the submission as a result of public comment and discussions with DEH.

The submission reports on the Broome Prawn Managed Fishery (BPMF) against the Australian Government *Guidelines for the Ecologically Sustainable Management of Fisheries*. The DEH assessment considers the submission, associated documents, public comments and DFWA's response to the comments.

Table 1: Summary of the Broome Prawn Managed Fishery

Area	Waters off the north-west coast of Western Australia, north-west of Roebuck Bay.
Fishery status	Under-exploited
Target Species	Western king prawns (*Penaeus latisulcatus*) Coral prawns (most commonly *Parapenaeopsis cornuta* and *Metapenaeopsis crassissima*)
By-product Species	Not limited. Small amounts of bugs, cuttlefish, octopus, squid and saucer scallop retained.
Gear	Demersal otter trawl nets, quad gear. BRDs currently in use, FEDs required in 04/05.
Season	Up to nine weeks during Northern Prawn Fishery closure period, usually between 1 June and mid-August.
Commercial harvest 2002	209 t
Value of commercial harvest 2002	$1.9 million
Recreational harvest	Negligible
Commercial licences issued	5 licences
Management arrangements	Input controlled through: • Limited entry (5 vessels allowed in the fishery); • Seasonal closure • Permanent spatial closures • Gear restrictions • Compulsory BRDs (and FEDs in 04/05)
Export	Marketed both overseas and on the domestic market.
Bycatch	Unknown. Ratios are thought to be similar to that seen in Shark Bay Prawn Fishery of 5-10:1.
Interaction with Threatened Species	Unknown. Assumed to be low, based on surveys of similar fisheries.

The area of the BPMF, as defined in the *Broome Prawn Management Plan 1999*, includes all waters of the Indian Ocean off the north-west coast of Western Australia (WA) east of 120º east longitude and west of 123º45' east longitude, on the landward side of the 200 m isobath. Within the fishery,

trawling is only permitted within a small area. In 2002, 54% of the permitted trawling area was fished, representing less than 1% of the total BPMF area.

The fishery targets western king prawns (*Penaeus latisulcatus*) and coral prawns (most commonly *Parapenaeopsis cornuta* and *Metapenaeopsis crassissima*). There is no limit to the quantity or species that may be taken as byproduct in the fishery, however in 2002 less than a tonne of byproduct was taken in total. Species currently retained as byproduct in the fishery include bugs, cuttlefish, octopus, squid and saucer scallop.

Western king prawn (*P. latisulcatus*) and the coral prawn (*P. cornuta*) are found through the Indo-West Pacific region and warmer Australian waters. The western king prawn is the dominant prawn species taken in Western Australian (WA) and South Australian (SA) prawn fisheries, comprising 65% and 100% of prawn harvest respectively. The species is generally found in hypersaline marine embayments and studies have found genetic differences between populations in SA, WA and the Northern Territory (NT). The BPMF western king prawn stock is therefore considered functionally separate from other fished areas.

Western king prawns are found over both hard and soft bottoms down to a depth of around 200 m. Juvenile western king prawns inhabit inshore nursery areas until they are physically mature, at which time they migrate offshore into the trawl fishing grounds. King prawns feed primarily on meiofauna and detritus and are prey to a range of fish and molluscs.

The coral prawn *M. crassissima* is found in Australian waters from SA around the west coast to Darwin, NT. Coral prawns are smaller than the western king prawn, and little is known about their life history, behaviour or population structure. Coral prawns can occur down to 200 m, however most species occur shallower than 50 m over both soft and hard substrate (Jones & Morgan 1994).

The BPMF consists of five WA-based Northern Prawn Fishery (NPF) vessels operating during the NPF mid-year closure period. The season lasts for up to 9 weeks and has an annual average value of around $0.6 to 2.6 million depending on catch levels, market price and exchange rates. In 2002 the BPMF had a total catch of 209 t, worth $1.9 million, and employed around 20 skippers and crew. The product is marketed both overseas and on the domestic market.

Operators in the BPMF have been harvesting prawns in the area since 1991. Fishers have provided catch and effort information since 1997, and effort has been controlled since inception of the management plan in 1999.

The fishery harvests western king and coral prawns by night trawling with four demersal otter trawl nets (quad gear). Shots are usually 50-70 minutes in duration and trawling is generally in waters between 30 and 60 m deep, however can occur down to 100 m. Vessels in the fishery are at sea for up to 10 days and product is snap frozen at sea. Fishery management arrangements include spatial and temporal closures, limited entry and gear restrictions. Vessel Monitoring System (VMS) has been used in the fishery since the 2000/01 season, Bycatch Reduction Devices (BRDs) in each net have been required since 2003 and Finfish Exclusion Devices (FEDs) are required in 2004/05.

Information on bycatch in the fishery is limited, but DFWA believes that bycatch ratios in the fishery would be similar to that found in the Shark Bay Prawn Fishery with a very rough estimate of 5-10:1. Information on interactions with protected species in the fishery is also lacking. Interactions with turtles and seasnakes are known to occur in the fishery. Evidence from other fisheries suggests that many of those specimens caught are returned to the water alive. DFWA states that due to the low number of operators, short fishing season, the use of BRDs and FEDs and the large amount of adjacent area in which other bycatch species are likely to live, the fishery is likely to have a low

impact on bycatch and protected species. These interactions are assessed under Principle Two of this report.

Take of coral and western king prawns by the indigenous and recreational sectors in the region is not significant. There is also minimal likelihood that a significant level of illegal capture of prawns occurs within the fishery. Both prawn groups are taken by other prawn fisheries in WA and form a significant component of prawn fisheries across Australia.

A number of other fisheries operate within the boundaries of the BPMF, including the WA Northern Demersal Scalefish Managed Fishery, the WA Pearl Oyster Fishery and the WA North Coast Shark Fishery. Prawns are not targeted by these fisheries. Each of the fisheries listed will be individually assessed against the *Guidelines for the Ecologically Sustainable Management of Fisheries* and are therefore not considered in this report.

The fishery is managed under the *Broome Prawn Management Plan 1999*, which obtains its authority from the WA *Fish Resources Management Act 1994* (FRMA). Management of the fishery is further supported by the Ecologically Sustainable Development (ESD) Report for the BPMF, which once completed will be made publicly available.

Overall assessment

The material submitted by DFWA indicates that the BPMF operates in accordance with the Australian Government *Guidelines for the ecologically sustainable management of fisheries*. DEH considers that the BPMF is a well managed fishery that is unlikely to have an unacceptable or unsustainable impact on the environment in the short to mid term. Recommendations have been developed to ensure that the risk of impact is minimised in the longer term. Overall, the sophisticated management regime of limited entry, season and fishable area, and the strategic performance measures and indicators in place, suggests that the fishery is being managed in an ecologically sustainable way.

In making its assessment, DEH considers that the information collection system, risk assessments, and management arrangements are sufficient to ensure the fishery is conducted in a manner that does not lead to over-fishing and that stocks are not currently overfished. Considering the reliable fishery-dependent information collection, the commitments made by DFWA and the significant spatial and temporal closures in the fishery, DEH considers that fishing operations are managed to minimise their impact on the structure, productivity, function and biological diversity of the ecosystem. Management of this fishery has a history of precautionary management of threats to sustainability and DEH is confident that DFWA will continue to provide this high quality management.

The assessment finds that the fishery is managed in an ecologically sustainable way and its operation is consistent with the objects of Part 13A of the EPBC Act. DEH recommends that the export of species taken in the fishery should be exempt from the export requirements of Part 13A of the EPBC Act, with that exemption to be reviewed in 5 years. DEH considers that the fishery, as managed in accordance with the management plan is not likely to cause serious or irreversible ecological damage over this period.

As the official fishery area encompasses Commonwealth as well as State waters, consideration under Part 13 of the EPBC Act is required regarding the impact of the fishery on listed threatened species, listed migratory species, cetaceans and listed marine species.

Protected species occurring in the fishery area include marine turtles, sawfish, syngnathids and seasnakes. To date the fishery has no recorded interactions with these species groups. The actual and potential impact on Part 13 species under the management arrangements is considered low and measures to further minimise the risk are being implemented. There are no listed threatened ecological communities in the fishery area.

DEH recommends that the *Broome Prawn Management Plan 1999* be declared an accredited management plan under Sections 208A, 222A, 245 and 265 of the EPBC Act. In making this judgement, DEH considers that the fishery to which the Management Plan relates does not, or is not likely to, adversely affect the survival in nature of listed threatened species or population of that species, or the conservation status of a listed migratory species, cetacean species or listed marine species or a population of any of those species. DEH also considers that the Management Plan requires that all reasonable steps are taken to avoid the killing or injuring of protected species, and the level of interaction under current fishing operations is low. On this basis, DEH considers that an action taken by an individual fisher, acting in accordance with the Management Plan, would not be expected to have a significant impact on a listed threatened species or listed migratory species protected by the EPBC Act.

To further strengthen the effectiveness of the management arrangements for the BPMF, and to contain the environmental risks in the medium to long term, DEH has developed a series of recommendations. During the assessment of the BPMF, DFWA committed to implementing a number of new measures in the fishery's management regime. These changes are detailed in the updated submission and associated ESD report, "*Application to Australian Government Department of the Environment and Heritage on the Broome Prawn Managed Fishery – June 2004*". The implementation of recommendations and other commitments made by DFWA in the submission and ESD report will be monitored and reviewed as part of the next DEH review of the fishery in 5 years time.

Recommendations

1. DFWA to advise of any material change to the fishery's legislated management plan that could affect the criteria on which EPBC decision are based, within 3 months of the change being made.
2. DFWA to ensure, where appropriate, that any relevant community, research, indigenous, conservation and recreational interests in the fishery are considered through consultative mechanisms.
3. The ESD report, including all performance measures, responses and information requirements, to be formally incorporated into the management regime and decision making process.
4. DFWA, in its Annual State of the Fisheries Report, to report on the performance of the fishery against performance measures that relate to the sustainability of the fishery.
5. DFWA to incorporate into the management regime, an objective to minimise protected/listed species interactions, to minimise or maintain at sustainable levels the take of other non-retained species and to minimise impacts on the marine environment.
6. DFWA to provide a mechanism, which allows fishers to record interactions with protected/listed species. DFWA to implement an education program to ensure that industry has the capacity to make these reports at an appropriate level of accuracy.

PART I - MANAGEMENT ARRANGEMENTS

The Broome Prawn Managed Fishery (BPMF) is managed by the Department of Fisheries, Western Australia (DFWA).

The management regime is described in the following documents, all of which are, or will be publicly available:

- *Broome Prawn Management Plan 1999;*
- *Fish Resources Management Act 1994* (FRMA).*;*
- *Fisheries Resources Management Regulations 1995*;
- The BPMF Ecologically Sustainable Development (ESD) report; and
- Relevant Gazetted notices and licence conditions.

A number of other documents, including research reports, scientific literature and discussion papers are relevant to the management of the fishery.

Further information on the fishery and its management can be found in the following reports:

- The State of the Fisheries Report (annual);
- The Annual report to the Auditor General; and
- Other irregular reports, including the submission to DEH.

The Department of Fisheries is developing Ministerial Policy Guidelines which will provide the policy framework for the management for each fishery. This document will reflect the management objectives and philosophy and guidance for decision making including the legislated management plan, the ESD report, and as relevant, reference to other documents.

DEH considers it important that management arrangements remain flexible to ensure timely and appropriate managerial decisions. Due to the importance of the management plan to DEH's assessment of the fishery, DEH should be informed of any amendments as they could change the outcomes of the assessment and the decisions stemming from it.

Recommendation 1: *DFWA to advise of any material change to the fishery's legislated management plan that could affect the criteria on which EPBC decisions are based, within 3 months of the change being made.*

Management arrangements in the BPMF are developed through consultation with industry, including an annual meeting with permit holders. Although the fishery does not have a Management Advisory Committee (MAC), DFWA states that management decisions made in the Shark Bay Prawn (SBP), Shark Bay Scallop and Exmouth Gulf Prawn (EGP) Joint Trawl MAC are carried over to the BPMF. The joint MAC involves a community sector and conservation sector member, in addition to industry members and groups.

Workshops, including representatives from industry, non-government environmental organisations, DEH, scientific researchers and other state government agencies, were held to seek outside involvement in the development of ESD reports for the SBP and EGP fisheries. No such workshop was held for the development of the BPMF ESD report, however the submission states that issues identified in the SBP and EGP workshops are very similar to those affecting the BPMF.

Public comment raised concern about the lack of consultation in the BPMF with resource owners or those affected by the activity, in particular representatives of the region in which the fishery operates. DEH is concerned that the consultation on management of the BPMF is limited to industry

members and DFWA officers, and recommends that DFWA provide opportunity for other parties to be involved in management of the fishery. DEH encourages DFWA to consider expansion of the next review of the BPMF ESD report to a workshop involving greater consultation with stakeholders.

Recommendation 2: *DFWA to ensure, where appropriate, that any relevant community, research, indigenous, conservation and recreational interests in the fishery are considered through consultative mechanisms.*

The ESD report is yet to be finalised and is not currently a formal component of the legislative arrangements for the fishery. Nevertheless, the submission indicates that these rules and requirements will be implemented in the fishery to ensure that the fishery management regime remains strategic and capable of detecting and addressing unacceptable impacts of fishing activity. DEH recommends that the contents of this report be formally incorporated into the management regime and decision making process.

Recommendation 3: *The ESD report, including all performance measures, responses and information requirements, to be formally incorporated into the management regime and decision making process.*

The fishery is managed according to the policy regime described in the *Broome Prawn Management Plan 1999*. Objectives, indicators, performance measures and management actions are specified in the ESD report for the fishery. An assessment of the effectiveness of these measures is included in Part Two of this report.

Management of the fishery is based on a number of input controls, including:

- Limited entry, with 5 current licences;
- A restricted season of up to 9 weeks;
- Gear restrictions; and
- Spatial closures.

Compliance and enforcement tools utilised in the fishery include VMS which was implemented in the 2000/01 season and random sea patrols and radar watches. The ability to conduct at sea compliance patrol on the Kimberley coast is limited due to the remoteness of the area, and limited size and availability of the patrol boats. From 2000 to 2003 there were no recorded offences in the BPMF. Due to the small number of operators, the value of the licences and their involvement in managerial decisions, it is likely that licence holders feel an ownership of the management arrangements and are therefore more likely to comply with them.

DFWA has committed to conduct a compliance risk assessment (CRA) for the BPMF in the future, which will enable the Department to better direct resources to increase the effectiveness of the limited compliance activities. The CRA for the BPMF will commence after CRAs have been completed for a number of high priority fisheries.

DEH considers that these compliance measures contain the means of enforcing critical aspects of the management arrangements for the fishery.

The performance of the major aspects of the BPMF is reviewed annually in the *State of the Fisheries* report. This report includes periodic review by the WA Office of the Auditor General. In addition, the ESD report will be reviewed every 5 years including an examination of the appropriateness of the objectives and performance measures. There is also a longer-term plan to have the entire system of management audited by the WA Environmental Protection Agency.

DEH considers that a five year review of the entire fishery is suitable as long as critical aspects, such as the performance of the fishery against performance measures, are reviewed annually. In addition, the outcomes of these reviews should be publicly available in the annual review of major aspects of the BPMF.

Recommendation 4: *DFWA, in its Annual State of the Fisheries Report, to report on the performance of the fishery against performance measures that relate to the sustainability of the fishery.*

The performance of the fishery over the previous season and the appropriateness of the management regime is discussed in an annual workshop held by DFWA with licence holders. DEH encourages DFWA to extend this workshop to incorporate a robust annual assessment of the performance of the fishery against performance measures, and invite participation from other sectors as appropriate. The outcomes of these meetings would be beneficial to the implementation of Recommendation 4.

Fishery-dependent data relating to the target species is collected on a regular basis in the fishery. Information collection includes Catch and Effort Statistics System (CAESS) returns, Vessel Monitoring System (VMS) data and voluntary daily logbooks, which have been completed by 100% of the fishers since 1997. Discussion of the information collection system can be found in Part Two of this report.

An analysis of the fishery's capacity for assessing, monitoring and avoiding, remedying or mitigating any adverse impacts on the wider marine ecosystem in which the target species lives and the fishery operates is contained under Principle Two of this report.

DFWA is further informed through participation in the Northern Australian Fisheries Management Workshop (NAFMW), which includes State, Territory and Commonwealth Fishery managers, researchers, and compliance staff, as well as representatives from Indonesia and East Timor.

DEH considers that the current management arrangements comply with all relevant threat abatement plans, recovery plans, the National Policy on Fisheries Bycatch, and bycatch action strategies developed under that policy. DFWA have committed to complying with any future plans or policies.

No regional or international management regimes, to which Australia is a party, are of direct relevance to the fishery. The prime international regime affecting the fishery is the United Nations Convention on the Law of the Sea (UNCLOS). The management regime essentially complies with this. Other international regimes are applicable to fisheries management but do not explicitly involve this fishery, for example the 1992 Convention on Biological Diversity and in particular the 1995 Jakarta Mandate requiring that, in relation to the sustainable use of marine and coastal biological diversity, the precautionary principle should apply in efforts to address threats to biodiversity. While these agreements are not specifically addressed in the submission, the fishery's compliance with their requirements can be assessed by examination of Part Two of this report. The application of the International Convention for the Prevention of Pollution from Ships (MARPOL) to vessels operating in the fishery is explicitly discussed under Principle 2, Objective 3.

DEH considers it is incumbent on all authorities to develop a thorough understanding of the framework of national, regional and international agreements and their applicability to export-based fisheries for which they are responsible.

Conclusion

DEH considers that the BPMF management regime is documented, publicly available and transparent, and is developed through a consultative process. The management arrangements are adaptable and underpinned by appropriate objectives and performance criteria by which the effectiveness of the management arrangements can be measured, enforced and reviewed.

The management arrangements are capable of controlling the harvest through a combination of input controls appropriate to the size of the fishery. Periodic review of the fishery is provided for, as are the means of enforcing critical aspects of the management arrangements.

The management regime takes into account arrangements in other jurisdictions, and adheres to arrangements established under Australian laws and international agreements.

DEH considers that there is scope to further refine the management arrangements and has provided a number of recommendations for improvements in the longer term.

PART II – GUIDELINES FOR THE ECOLOGICALLY SUSTAINABLE MANAGEMENT OF FISHERIES

Stock Status and Recovery

Principle 1: *'A fishery must be conducted in a manner that does not lead to over-fishing, or for those stocks that are over-fished, the fishery must be conducted such that there is a high degree of probability the stock(s) will recover'*

Maintain ecologically viable stocks

Objective 1: *'The fishery shall be conducted at catch levels that maintain ecologically viable stock levels at an agreed point or range, with acceptable levels of probability'*

Information requirements
Fishery dependent data is obtained through CAESS returns, VMS and voluntary daily logbooks completed by 100% of boats. The logbooks are filled in on a shot by shot basis with estimated catch values which are validated using processor unload records (actual quantity unloaded). Data on byproduct, area fished, gear used and species targeted is also collected through the logbooks. Regular feedback and consultation with industry occurs to ensure they have an understanding of the need and value of accurate catch and effort information.

CAESS returns provide data on catch of all species landed and effort (days fished) on a monthly basis. VMS collects information on the location and speed of vessels, enabling monitoring of compliance with closures in the BPMF. DEH believes that data reliability for target species is reasonable and that compliance and enforcement activities have the capacity to ensure the ongoing reliability of data in the fishery.

Processor unload records of the actual quantity of product unloaded are used to validate daily logbooks, however no other validation of fishery data is conducted. DFWA states that due to the low number of fishers, short season and small fishery area, the fishery poses a low risk to the stocks and therefore the collection of additional fishery independent information is not a priority.

DFWA has committed to implementing a research level observer program in the BPMF over the next 5 years. Although the primary objective of this program is to verify bycatch data and composition, this program is likely to also provide valuable information on catch and effort in the fishery.

Fishery-independent data collection in the BPMF is limited. DFWA conducted dive surveys and research trawls in the area during late 1987, to determine the suitability of trawling in the area and ensure that no pearl oyster habitats were included in the trawl area. This survey collected information on catch of commercial prawns and volumes of bycatch. Since this time, no fishery independent data has been collected. DFWA use projects and surveys conducted in other prawn trawl fisheries, such as SBP and EGP, to inform management of the BPMF.

Data collection in the BPMF is reliant on fishery dependent information. As a result of the small size of the fishery, DFWA states that there is a lack of resources available to commit to data collection in the fishery. Taking into account the 100% completion of daily logbooks, the validation of this data and the commitment to implement an observer program, DEH considers that there is a reliable information collection system in place appropriate to the scale of the fishery. DEH encourages DFWA to continue the collection of dependent data, and to endeavour to collect

relevant fishery independent data to verify the dependent data collected and further inform future management of the fishery.

Assessment
A Delury depletion analysis is conducted annually to determine the proportion of western king prawn stocks remaining at the end of a season. Analysis of the exploitation rate for 2003 indicates an exploitation of 33%, while in 2002, 40% was estimated to have been exploited. The analysis has a relatively high level of robustness, due to the reliable data available for input.

The outcomes of an annual review of the fishery's performance by management and industry are reported in the *State of the Fisheries* report. The review includes analysis of the total catch by the fishery, the level of effort to take the catch, the distribution of effort, both spatially and temporally across the season, and the calculated catch rates. DEH encourages DFWA to expand this annual review to include analysis of the performance of the fishery against the performance measures for the BPMF (see Recommendation 4) and to invite participation from other sectors (see Recommendation 2).

The western king prawn is taken in a number of prawn fisheries through WA and other parts of northern Australia. As a result, the distribution of the species is well documented. The species occurs in SA, WA, NT, Queensland (Qld) and northern NSW, however studies have suggested that populations are genetically different. DFWA considers the BPMF stocks to be functionally separate from other regions where fishing occurs.

Coral prawns are found throughout Australian waters, with most species occurring from Shark Bay in WA around the north coast of Australia to southern Qld. As they are a minor component of most commercial prawn trawl fisheries, less is known about the distribution and spatial structure of stocks. Coral prawns have been recorded in all areas where king prawns are caught.

There is no significant take of prawns by the recreational and indigenous sector in the BPMF, and therefore commercial take is considered the only removal. The fishery dependent data collection provides validated estimates of the commercial harvest. DEH considers the ongoing collection of fishery dependent data important in maintaining reliable estimates of removals from the fishery.

Management response
The BPMF is managed through a number of input controls including limited entry, gear restrictions, and spatial and temporal closures. In addition BRDs, in the form of a large animal exclusion grids, have been required in each net since 2003, and FEDs are to be introduced in 2004/2005.

Only half of the gazetted area open to fishing is actually fished each year, which amounts to approximately 1% of the entire BPMF area. The permanently closed areas include the Roebuck Bay sand flats, which form the major nursery habitat for the western king prawn in the region. Western king prawns only enter the gazetted fishing area once they have reached maturity and moved offshore from the nursery grounds.

The ESD report contains performance indicators, performance measures, and management responses for the two target prawn species. These measures will be reviewed as part of the ESD report review every 5 years. The performance measure for king prawns has been amended by DFWA to respond to the results of the annual delury depletion analysis, to ensure that the exploitation rate of king prawns does not exceed 60% in any one year. DEH considers this a precautionary level considering that management of prawns fisheries generally considers 80% exploitation a sustainable level. The closure of the fishery for 9-10 months each year also allows a reasonable period in which the stock can recover while trawling is not occurring in the area.

Analysis of the 2002 and 2003 seasons have shown an exploitation of 40% and 33% of the stock respectively. The submission states that the exploitation rates in the BPMF have been well below the trigger level of 60% for the last ten years.

The performance measure for coral prawns is an acceptable catch range based on fishing catch over the last 7 years of 20-90 t. The catch of coral prawns has been within the acceptable range for the last ten years.

Public comment raised concerns that coral prawns were not being managed in a precautionary way considering the lack of available information on their life history. DFWA state that only a small proportion of the coral prawn stocks are vulnerable to fishing, due to the wide distribution of coral prawns and the assumption that many of them pass through the cod-end mesh as a result of their small size. Therefore by maintaining a sustainable exploitation rate for the main target species (western king prawns) the exploitation rate of coral prawns would be expected to remain at a sustainable level. DEH encourages DFWA to continue to increase their understanding of coral prawn stock and biology, with a view to moving toward a more biologically based performance measure over the next 5 years.

DFWA intends reporting any breach in a performance measure will be reported in the State of the Fisheries report. If a breach materially affects the sustainability of the target species or negatively impacts on by-product, by-catch, protected species or the ecosystem, the breach will be reported to the Minister for Fisheries within 3 months for subsequent management review and action with timeframes for implementation.

CAESS records indicate that low levels of byproduct are taken in the fishery, with less than a tonne taken in 2002. The main species include bugs, cuttlefish, octopus, squid and saucer scallop. Management policy was put in place in 1997 to prohibit all fish species being retained due to the Northern Demersal Scalefish Managed Fishery targeting these species within the fishery area. The ESD report concluded that the impact on byproduct species from the operations of the fishery is negligible.

Although the current harvest of byproduct species in the BPMF is not significant, levels should continue to be monitored in order to detect changes, including market shifts to new species. The ESD report for the BPMF has been amended to trigger the re-examination of the risk assessment and a review of the fishery if byproduct exceeds 10 tonnes in any one year. DEH considers that this is a sufficiently precautionary measure that will allow management to determine if there has been a switch in targeting practices.

Ideally, management arrangements affecting a single stock should be under a single jurisdiction, or at least complementary across jurisdictions. DEH considers that the majority of species retained in this fishery are fundamentally independent within WA waters. Concerns were raised at the Northern Fisheries Managers meeting in September 2002 that increasing fishing pressure and opportunistic targeting of squid in fisheries around the coast could significantly affect the status of this shared stock. DEH acknowledges that only a small quantity of squid is taken in the BPMF, therefore there is no specific recommendation regarding squid for this fishery. However, DEH encourages DFWA to monitor the harvest of squid in the BPMF, and if the level of harvest increases, DFWA should participate in any cross-jurisdictional activities regarding squid.

Conclusion

DEH considers that the management regime in the BPMF is appropriately precautionary and provides for the fishery to be conducted in a manner that does not lead to over-fishing. DEH

considers that the information collection system and stock assessment and management arrangements generally are sufficient to ensure that the fishery is conducted at catch levels that maintain ecologically viable stocks within acceptable levels of probability.

Promote recovery to ecologically viable stock levels

Objective 2: *'Where the fished stock(s) are below a defined reference point, the fishery will be managed to promote recovery to ecologically viable stock levels within nominated timeframes'*

This objective is not applicable to the fishery at present as the target species are within defined reference limits. DEH considers that the stock is not currently over fished and management measures will ensure that the stocks will remain so in the short to mid term.

Conclusion

DEH considers that the BPMF prawn stocks are not below defined reference points but should that occur in the future, the fishery is conducted such that there is a high degree of probability the stocks would recover to ecologically viable levels within nominated timeframes.

Ecosystem impacts

Principle 2: *'Fishing operations should be managed to minimise their impact on the structure, productivity, function and biological diversity of the ecosystem'*

Bycatch protection

Objective 1: *'The fishery is conducted in a manner that does not threaten bycatch species'*

Information requirements

Data available from the 1987 survey of the BPMF trawl grounds, indicate species taken as bycatch may include flathead, grinners, flounder, whiting, goatfish, trumpeters, dollarfish and a small number of elasmobranches. DFWA states that due to the low number of operators, the short season and the large unfished area in which bycatch species are likely to inhabit, bycatch poses a low risk to the ecosystem.

Bycatch information has not been collected in the BPMF since the 1987 survey. Due to the limited information available, current management is based on data collected from surveys and studies undertaken in the SBP and EGP fisheries.

DEH has concerns regarding the extrapolation of bycatch data from SBP and EGP fisheries for management purposes as these fisheries are significantly larger, operate in different regions to the BPMF, have full moon closures, harvest functionally separate stocks and have in place more strategic management arrangements. It is therefore likely that the bycatch is significantly different (both in terms of composition and quantity) to that in the BPMF. This was also an issue raised in public comment.

In response to public comment and discussions with DEH, DFWA has committed to implement a research level observer program over the next 5 years. This program will involve DFWA research staff going out on commercial trips in the BPMF each year to verify bycatch quantity and composition in the fishery.

The introduction of a research observer program will provide valuable data to inform the ESD risk assessment and report when it is next reviewed in 5 years. DFWA is also conducting a research project in other WA trawl fisheries, comparing the biodiversity of trawled and untrawled areas, which is likely to provide information relevant to a number of trawl fisheries.

Assessment

Four non-retained species groups were identified in the ESD report as bycatch in the BPMF; invertebrates, finfish (including sharks) and two groups of protected species (discussed in Objective 2 of this report). Very rough estimates from the 1987 surveys indicate that bycatch levels are similar to that seen in Shark Bay, with bycatch levels between 5 – 10 times the volume of target catch. In the SBP fishery the bycatch is 4 to 8 times the volume of the target catch and 70-80% of the bycatch is small finfish. The 21 species of fish captured in the SBP fishery were individually assessed using criteria developed by Stobutzki et al. (2000). Only two species were rated as being highly susceptible to trawling, but given the high turnover rates and wide distribution range of these species it was concluded that the fishery would be of minimal risk to these species.

DFWA states that the risk to bycatch species in the BPMF is low due to the low number of operators, restricted season and small area actually fished. The introduction of BRDs in 2003 and FEDs in 2004/05 will further minimise the impact of the fishery on bycatch species. The BRD being used has similar specifications to those used in the SBP and EGP fisheries. Data from SBP

shows that total bycatch has decreased by 50% and the capture of large specimens (turtles etc) has decreased by 100% since the introduction of BRDs. DEH welcomes these measures to reduce bycatch and concurs that the risk to bycatch is likely to be low.

Management response
The area in which fishing is allowed is a small part of the overall fishery area. Areas of similar habitat are interspersed throughout the region and are likely to provide refuge for those species that are taken as bycatch in the BPMF, outside of the actual area trawled. A biodiversity research project is underway in WA to test the assumption that untrawled grounds provide protection to similar species to those located on trawl grounds.

The management objectives of the BPMF, contained within the ESD report, do not currently contain an objective to minimise the take of bycatch, impacts on protected species or impacts on the marine environment. Minimising the incidental take of non-retained species and protecting listed species and the marine environment from impacts of the fishery should be priorities in the management of the fishery, regardless of the level of impact. DEH recommends that a management objective to minimise impacts on bycatch, protected species and the marine environment be developed and incorporated into the management regime.

Recommendation 5: *DFWA to incorporate into the management regime, an objective to minimise protected/listed species interactions, to minimise or maintain at sustainable levels the take of other non-retained species and to minimise impacts on the marine environment.*

The ESD workshop concluded that the BPMF is of low risk to bycatch species. DFWA consider that an expansion of effort or area fished in the BPMF would increase the risk to bycatch species. The ESD report was therefore amended to incorporate a trigger for re-examination of the risk assessment and a review of the fishery if there is a greater than 50% increase in effort. Due to the small amount of trawled areas in the BPMF, DEH considers the inclusion of this performance measure and the commitment to conduct a research observer program to monitor bycatch sufficient to detect and respond to significant changes in bycatch. The collection of information on bycatch composition and quantity in the BPMF will provide a greater data set on which to review the performance measure at the next review in 5 years.

Conclusion
DEH considers that there is a high likelihood the fishery is conducted in a manner that does not threaten bycatch species. Should this situation change, or new information indicate otherwise, DEH expects that DFWA would undertake appropriate actions to ensure that bycatch species are not threatened by the fishery.

A recommendation has been developed and commitments have been made by DFWA that will ensure that the risk of unacceptable impact on bycatch species is detected and responded to appropriately.

Protected species and threatened ecological community protection

Objective 2: *'The fishery is conducted in a manner that avoids mortality of, or injuries to, endangered, threatened or protected species and avoids or minimises impacts on threatened ecological communities'*

Information requirements
Information on interactions with protected species in the BPMF is limited to anecdotal reports and personal notes by fishers in the voluntary logbooks. Data from the SBP and EGP fisheries were used in the risk assessment for the BPMF.

Seasnakes, sawfish, and syngnathids are found in the region of the BPMF. Loggerhead, flatback, green, hawksbill and Pacific Ridley turtles are also known to occur in the region, however it is unlikely they would be present in large numbers as the benthic structures and productivity is poor in the region. No species of turtle are known to breed within the BPMF region.

Given the potential for protected species interactions, DEH considers that priority should be given to establishing data collection systems that provide a more reliable means of monitoring and managing the impact of the fishery on protected species. The reporting of protected species interactions in the BPMF was also raised in public comment. DFWA has committed to investigating options for methods of recording interactions with protected species.

One of the biggest barriers to successful commercial reporting of protected species interactions is the capacity of the fishers to identify the species involved. In addition, many operators may not be aware of the importance of reporting for the species involved. Both of these barriers can be reduced through education programs and opportunistic advice from observers and researchers. DEH recommends that an education program on the importance of protected species reporting and identification be run in conjunction with the introduction of logbook reporting to increase the value of this approach. Due to involvement of the BPMF fishers in the NPF, operators are likely to be familiar with protected species legislation and reporting requirements, however education on the species and logbooks unique to the BPMF should still be conducted.

Recommendation 6: *DFWA to provide a mechanism, which allows fishers to record interactions with protected/listed species. DFWA to implement an education program to ensure that industry has the capacity to make these reports at an appropriate level of accuracy.*

Further information on interactions with protected species in the BPMF will also be provided from the research observer program to be implemented in the next 5 years. This information would be valuable for validation of data collected from logbooks and for use in the review of the ESD report in 5 years.

There are no listed ecological communities in the fishery area.

Assessment
The voluntary logbooks contain no reports of protected species interactions in the BPMF. Seasnakes are known to be taken in the fishery however exact numbers of seasnakes caught is unknown. Data from an observer program in the SBP found that 194 seasnakes were caught from 916 trawls, with 99% returned alive. Anecdotal evidence suggests that turtles are occasionally caught in the fishery but most are returned alive. The BRDs in nets are thought to have eliminated the risk of capture of turtles in trawl nets in the BPMF. DFWA considers the risk the fishery poses to protected species is negligible.

Management response
Interactions with protected species are thought to be limited due to the short season, restricted fishing area and low number of operators. The risk is further minimised through the introduction of BRDs in the fishery in 2003 and FEDs in 2004/05. As a result the ESD report rated the risk to

protected species from the fishery as negligible. DFWA considers that an expansion of effort or area fished in the BPMF may pose a greater risk to protected species and have therefore incorporated a trigger in the ESD report to re-examine the risk assessment and review the fishery if there is a greater than 50% increase in effort.

The implementation of reporting and monitoring in the fishery will provide valuable data for the annual review of the fishery against performance measures relating to the take of protected species as bycatch in the fishery and the review of the ESD report in 5 years. DFWA has committed to reviewing performance limits once more data is available and responding appropriately if an increase in interactions or an inappropriate level of interactions is detected.

The management objectives of the BPMF, contained within the ESD report, do not currently contain an objective to minimise the impact of the fishery on protected species. DEH recommends that a management objective to minimise impacts on protected species be developed and incorporated in the management regime (see Recommendation 5).

Conclusion
DEH notes that there appears to be minimal interactions with protected species in this fishery and considers that the fishery is conducted in a manner that avoids or minimises mortality of, or injuries to, endangered, threatened or protected species. Should this situation change, or a risk assessment process indicate otherwise, DEH suggests that appropriate actions be undertaken to ensure the fishery avoids mortality, injury to these species and avoids or minimises impacts on threatened ecological communities.

A recommendation has been developed and commitments have been made by DFWA that will ensure that the risk of unacceptable impact on protected species is minimised in the longer term.

Minimising ecological impacts of fishing operations

Objective 3: *'The fishery is conducted, in a manner that minimises the impact of fishing operations on the ecosystem generally'*

Information requirements
Fishery dependent data, including catch, effort, gear design and knowledge of the spatial and temporal closures have been used in the assessment of the risk of this fishery to the ecosystem. The submission does not indicate that sediment and habitat data exist for the BPMF. Data on environmental indicators including sea surface temperature, sea level and rainfall are collected by DFWA. Information has also been gathered from work on trophic interactions undertaken in similar fisheries. Some surveys on the trawl grounds were undertaken before the fishery commenced.

DEH is concerned at the lack of information collection and research covering the fishery's impact on the ecosystem and environment generally. However, DEH understands that this lack of information is the case across a range of Australian and International fisheries and until appropriate research techniques and programs are developed and implemented this will continue to be the case. DEH strongly supports research in this area.

Assessment
The BPMF risk assessment concluded that the fishery was of low risk to trophic interactions, negligible risk to benthic biota of sand and mud, and discarding/provisioning poses a negligible risk to the ecosystem. The assessment considered the high natural mortality of prawns, spatial and temporal closures and the small number of operators in the BPMF. As none of the issues were of a sufficient risk rating, no specific targets or performance measures have been developed.

An expansion of effort or area fished in the BPMF may pose a greater risk to benthic habitats or associated organisms and a trigger has been incorporated in the ESD report to re-examine the risk assessment and review the fishery if there is a greater than 50% increase in effort.

Surveys undertaken prior to the establishment of the managed fishery showed that the sea floor in the trawl area was sand and mud, suggesting that there would be minimal impacts to infaunal communities. Similar habitat to that trawled in the BPMF is interspersed throughout the region both inside and outside the gazetted fishing area.

An observer program in the EGP showed that of the discarded catch, 50% of the fish sank, most dead, and become available to bottom feeders. Most invertebrates also sank but were considered to have a relatively high survival rate. As the total tonnage of catch taken in the fishery is relatively low and removal only occurs 9 weeks a year, DFWA considers that the risk of impact to the ecosystem is small. DEH concurs and encourages DFWA to continue to collect data and conduct research to inform management of ecosystem impacts.

Management response
The limited number of fishers in the BPMF, restricted season and small fished area relative to the area closed to fishing ensure that the fishery poses a minimal risk on the ecosystem. The introduction of BRDs and FEDs serves to minimise the impact of the fishery on food chain structure and productivity by reducing the amount of bycatch (and therefore biological material) taken out of the ecosystem. Ongoing work to refine these devices could be expected to further reduce this impact.

The management objectives of the BPMF, contained within the ESD report, do not currently contain an objective to minimise the impact of the fishery on the marine environment. DEH recommends that a management objective to minimise impacts on the marine environment be developed and incorporated in the management regime (see Recommendation 5).

Impacts on water quality through the discharge of plastic wastes and pollution from vessels are controlled under MARPOL legislation. Operators in the BPMF are required to comply with the legislation.

The increased reporting and monitoring of bycatch (including protected species) will provide further data to validate the risk assessment at the next review in 5 years. DFWA has committed to take appropriate management action if future studies indicate it is required.

Conclusion
DEH considers that the fishery is conducted in a sufficiently precautionary manner to minimise the impact of fishing operations on the ecosystem generally.

REFERENCES

D Jones, G Morgan (1994) A field Guide to Crustaceans of Australian Waters. Western Australian Museum.

Stobutzki, IC., Blaber, S., Brewer, D., Fry, G., Heales, D., Jones, P., Miller, M., Milton, D., Salini, J., Van der Velde, T., Wang, U.-G., Wassenberg, T., Dredge, M., Cortney, A., Chilcott, D. and Eayrs, S. (2000) – "Ecological Sustainability of Bycatch and Biodiversity in Prawn Trawl Fisheries". FRDC Final Report 96/257

LIST OF ACRONYMS

BPMF	Broome Prawn Managed Fishery
BRD	Bycatch Reduction Device
CAESS	Catch and Effort Statistics System
CRA	Compliance Risk Assessment
DEH	Australian Government Department of the Environment and Heritage
DFWA	Department of Fisheries, Western Australia
EGP	Exmouth Gulf Prawn fishery
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
ESD	Ecologically Sustainable Development
FED	Fish Excluding Device
FRMA	*Fish Resources Management Act 1994*
MAC	Management Advisory Committee
MARPOL	International Convention for the Prevention of Pollution from Ships
NAFMW	Northern Australian Fisheries Management Workshop
NPF	Northern Prawn Fishery
NT	Northern Territory
SA	South Australia
SBP	Shark Bay Prawn fishery
UNCLOS	United Nations Convention on the Law of the Sea
VMS	Vessel Monitoring System
WA	Western Australia