



Australian Government

Department of the Environment and Heritage

**Assessment of the
Kimberley Prawn Managed Fishery**

November 2004

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This document is an assessment carried out by the Department of the Environment and Heritage of a commercial fishery against the Commonwealth's 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 EPBC Act. The views expressed do not necessarily reflect those of the Minister for the Environment and Heritage or the Commonwealth Government.

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**Assessment of the ecological sustainability of management arrangements for the
Western Australian Kimberley Prawn Managed Fishery**

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EXECUTIVE SUMMARY

Background

The Department of Fisheries Western Australia (DFWA) has submitted a document addressing the Australian Government *Guidelines for the Ecologically Sustainable Management of Fisheries* for assessment under Parts 13 and 13A of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

The final *Application to the Australian Government Department of the Environment and Heritage on the Kimberley Prawn Managed Fishery* (the submission) was received by the Department of the Environment and Heritage (DEH) in June 2004 after a period of discussion between DFWA and DEH, during which preliminary drafts were refined. The submission was released for a thirty-day public comment period that expired on 12 July 2004. Two submissions were received and DFWA provided a response to the issues raised. No changes were made to the submission as a result of public comment.

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

Summary of the KPMF

Area	Western Australian and Commonwealth waters between Cape Londonderry and Koolan Island off the Kimberley Coast of Western Australia
Fishery status	Fully fished - all prawn species are being maintained at acceptable levels to maintain ecologically viable stock levels and ecosystems
Target species	Banana prawns (<i>Penaeus merguensis</i>) Brown tiger prawns (<i>Penaeus esculentus</i>)
Byproduct species	Endeavour prawns, squid, coral prawns, black tiger prawns, western king prawns, bugs, fish, and other invertebrates (scallops, cuttlefish)
Gear	Twin otter rig trawl gear (with try net gear)
Season	Season runs from early April to late November with a mid-season closure between May and September.
Commercial harvest 2002	378t of prawns
Value of commercial harvest 2002	\$4.9m
Recreational harvest	There are no significant recreational fisheries for prawns in the Kimberley area

Commercial licences issued	135 licences
Management arrangements	Limited entry Effort Pool system: cap on the number of days that can be fished. Gear controls: Maximum of two demersal otter trawl nets with total combined headrope not exceeding 58.5m; One "try net" with headrope not exceeding 5m; mesh size restrictions; boat size restrictions. Seasonal closures - December to March and May to September Spatial closures of nursery areas
Export	Product is marketed on both domestic and export markets
Bycatch	Seasnakes, turtles, syngnathids and a variety of fish species
Interaction with Threatened Species	Seasnakes, turtles and syngnathids

While the area of the fishery extends into Commonwealth waters, the KPMF operates solely in Western Australian waters between Cape Londonderry and Koolan Island off the Kimberley Coast of Western Australia (WA). The fishery abuts the western boundary of the Australian Government Northern Prawn Fishery (NPF) and the eastern border of the WA Broome Prawn Managed Fishery (BPMF). The fishery is managed under the *Kimberley Prawn Management Plan 1993* that obtains its authority from the *WA Fish Resources Management Act 1994*.

The fishery targets banana prawns (*Penaeus merguensis*) and brown tiger prawns (*Penaeus esculentus*). Both target species are widely distributed in Australian waters.

Within Australian waters banana prawns are found from Shark Bay, WA, across northern Australia to the Tweed River in northern New South Wales. Banana prawns are also widely distributed throughout the Indo-West Pacific region and the South China Sea. Stock structure is not known, however there are likely to be separate 'stocks' in areas often associated with embayments and river systems. The banana prawn is thought to live a maximum of 1.5 years. Adults of the species generally inhabit low energy coastlines and are known to aggregate in high numbers forming a "boil" on the surface. Predation by sharks and finfish on banana prawns is high.

Brown tiger prawns are found in significant numbers along the northern coast of Australia from WA to southern Queensland. The submission states that although no genetic differences have been detected between brown tiger prawn populations it is thought they operate as functionally independent stocks. The species can live for over two years but current harvesting operations rarely catch individuals over two years of age. Tiger prawns are typically associated with hard sand or sandy mud substrate in their adult phase. They are highly fecund and release between 50,000 and 400,000

eggs per spawning. In their larval stages they are particularly vulnerable to predation by fish species and small sharks and, as adults, are prey to a variety of species including squid, cuttlefish and a variety of demersal fishes.

Species currently retained by the fishery as byproduct include endeavour prawns, squid, coral prawns, black tiger prawns, western king prawns, bugs, fish and other invertebrates such as scallops and cuttlefish. There is no limit to the quantity of these species that may be retained.

The KPMF is the third largest of WA's seven prawn fisheries. In 2002 total landings of the three main prawn species were approximately 378t (239t of banana prawns, 80t of brown tiger prawns and 58t of endeavour prawns). An additional 17t of byproduct species (13t of squid, 3t of bugs and 1t of scallops) was recorded. Byproduct and target catch is generally snap-frozen at sea and sold on both domestic and export markets. Catch was valued at \$4.9m in 2002.

Acceptable catch ranges have been established for the target species and major byproduct prawn species, based on catch history. The upper and lower limits of these catch ranges are broadly ranged in recognition of the considerable variation in catches over the years, due largely to the strong link between environmental factors such as rainfall and abundance of prawn stocks.

The fishery currently targets prawn species with twin otter trawl gear. Restrictions apply to the size of the boat, number of trawl nets, the combined length of headrope and mesh size. Bycatch reduction devices (BRDs) targeting reduction in turtle catch were phased into the fishery from 2001 and have been mandatory in all nets since the commencement of the 2003 season. By the end of 2006 all nets will be required to include fish exclusion devices (FEDs).

In addition to gear restrictions the fishery is managed by limited entry (135 licences in 2002), total effort caps (number of fishing days) and spatial and temporal closures. A mid-season closure operates between May and September (actual dates vary to reflect those in the NPF). Nursery areas in York Sound, Collier Bay and Admiralty Gulf are permanently closed to fishing.

The level of bycatch from the KPMF is typical of tropical trawl fisheries (ie up to about 6:1 relative to the target species). Bycatch species include fish, seasnakes, syngnathids and marine turtles. Seasnakes and syngnathids are listed marine species under the EPBC Act, as are the four species of marine turtles known to have been taken in the KPMF – olive ridley, flatback, hawksbill and green. These four turtle species are also protected under the WA *Wildlife Conservation Act 1950*. Interaction with these species is assessed under Principle Two of this report. There are no significant recreational or indigenous fisheries for prawns in the Kimberley region.

In preparing its application to DEH, DFWA completed an ecologically sustainable development (ESD) report for the KPMF using the National ESD Reporting Framework (Fletcher *et al.*, 2002). A comprehensive account of the risk assessment outcomes and current performance of each of the environmental and governance components of that Framework was included in the application as a basis for assessment of the fishery against the Australian Government *Guidelines for Ecologically Sustainable Management of Fisheries*. The actions, performance measures and monitoring requirements contained in the ESD report have been considered during the DEH assessment.

Overall assessment

The material submitted by DFWA demonstrates that the management arrangements for the KPMF meet most of the requirements of the Australian Government *Guidelines for the Ecologically Sustainable Management of Fisheries*.

While the fishery is relatively well managed, DEH has identified a number of risks that must be managed to ensure that their impacts are minimised:

- Dependence on unvalidated catch and effort data for both stock assessment and performance measurement of target and byproduct species;
- No formal stock assessment and limited confidence in existing performance measures for target species;
- Inadequate performance assessment of the key byproduct species, squid;
- The absence of fishery specific bycatch monitoring; and
- Cross jurisdictional management implications.

Recommendations to address these issues have been developed and commitments made by DFWA to ensure that the risk of impact is minimised in the longer term. Through the implementation of the recommendations and the continuation of a responsible attitude to the management of the fishery, management arrangements are likely to be sufficiently precautionary and capable of controlling, monitoring and enforcing the level of take from the fishery while ensuring the stocks are fished sustainably.

The management regime aims to ensure that fishing is conducted in a manner that does not lead to over-fishing and for fishing operations to be managed to minimise their impact on the structure, productivity, function and biological diversity of the ecosystem. On balance, the fishery is being managed in an ecologically sustainable manner and is working to address existing problems and minimise environmental risks.

The operation of the fishery is consistent with the objects of Part 13A of the EPBC Act. Given the management arrangements specified in the ESD report, including the recent measures to cap effort in the fishery, spatial and temporal closures and annual review of acceptable catch ranges for target and major byproduct species, DEH considers that the fishery will not be detrimental to the survival or conservation status of the taxon to which it relates in the short term. Similarly, it is not likely to threaten any relevant ecosystem in the short term.

DEH therefore recommends that the fishery be declared an approved Wildlife Trade Operation (WTO) with the actions specified in the recommendations to be undertaken by DFWA to contain the environmental risks in the long term. DEH considers that the fishery, as managed in accordance with the management plan is not likely to cause serious or irreversible ecological damage over the period of the export decision. Specifically, the WTO declaration would allow the export of product from the fishery for a period of 3 years. The WTO declaration will require annual reporting on the progress of implementing the recommendations of this report and other managerial commitments. The implementation of the recommendations and will be monitored and reviewed as part of the next DEH review of the fishery in 3 years time

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 sea snakes, syngnathids, cetaceans, turtles, crocodiles, sawfish, seabirds and dugongs. While there are logbook and anecdotal reports of fishery interactions with marine turtles, syngnathids and seasnakes, the incidence of interactions is low and the consequences are likely to be minimal due to the implementation of bycatch mitigation measures such as the compulsory use of bycatch reduction devices in the trawl nets. While further monitoring and assessment arrangements for the fishery must be implemented, DEH considers the actual and potential impact on Part 13 species under the management arrangements to be low and the level of protection adequate. There are no listed threatened ecological communities in the fishery area.

DEH recommends that the *Kimberley Prawn Management Plan 1993* 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 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.

The implementation of recommendations and other commitments made by DFWA in the submission will be monitored and reviewed as part of the next DEH review of the fishery in 3 years time.

Recommendations

1. DFWA to advise of any material change to the KPMF's legislated management plan and/or management arrangements that could affect the criteria on which the EPBC decisions are based, within 3 months of that change being made.
2. The ESD report, including all performance measures, responses and information requirements, to be formally incorporated into the management regime and decision making process.
3. DFWA to ensure, where appropriate, that any relevant community, research, indigenous, conservation and recreational interests in the fishery are considered through consultative mechanisms.
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 develop and implement a system to validate fishery dependent data on catch and effort for all target and byproduct species within 2 years.
7. DFWA to review, within 1 year, the performance measures for all target species in the KPMF to ensure they are appropriately precautionary and sufficient to detect significant changes in stock abundance.
8. DFWA to develop, within 1 year, an interim performance indicator and performance measure for squid, based on best available information.
9. DFWA to continue to cooperate with other relevant jurisdictions to pursue complementary management and research of shared stocks and ecologically dependant species for all target and by-product species which may be affected by

cross-jurisdictional issues. In particular, DFWA will cooperate with AFMA, NT and Qld fisheries management agencies in relation to squid.

10. DFWA will provide a mechanism by which fishers are able to record interactions with those non-retained species that are at risk from the fishery.
11. 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.
12. DFWA to review the specifications of the BRD grids used in the KPMF to ensure they are effective at reducing the incidental catch of turtles and other large bycatch species likely to be encountered in the fishery.

PART 1 - MANAGEMENT ARRANGEMENTS

The Kimberley Prawn Managed Fishery (KPMF) is managed by the Department of Fisheries Western Australia (DFWA). It is the third largest prawn fishery in WA. The management regime is governed by the following documents, all of which are, or will be, publicly available:

- The *Kimberley Prawn Management Plan 1993*;
- The Kimberley Prawn Fishery Managed Fishery Licence;
- The Kimberley Prawn Fishery Ecologically Sustainable Development (ESD) Report;
- The WA *Fish Resources Management Act 1994*;
- The WA *Fish Resources Management Regulations 1995*; and
- Relevant Gazetted notices and licence conditions

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

Further information on the fisheries and their performance 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.

DEH considers it important that management arrangements remain flexible to ensure timely and appropriate managerial decisions. Due to the importance of the documents discussed above 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 KPMF's legislated management plan and/or management arrangements that could affect the criteria on which the EPBC decisions are based, within 3 months of that change being made.*

The ESD report is yet to be finalised and is not currently a formal component of the legislative arrangements for the fishery. The management commitments specified in the ESD report have been fundamental in DEH's assessment and consequent

recommendations. Although DEH is satisfied that this lack of a legislative base will not cause issues in the fishery in the short term, we recommend that the report be formally incorporated into the management regime and decision making process. DFWA have advised that they propose to formally publish the management objectives and performance measures for the fishery as part of a series of Ministerial guidelines. The Ministerial Policy Guidelines will provide the policy framework for the management for each fishery. This document will reflect the management objectives, philosophy and guidance for decision making, the ESD report, and as relevant, reference to other documents.

Recommendation 2: *The ESD report, including all performance measures, responses and information requirements, to be formally incorporated into the management regime and decision making process.*

Public comment raised concern about the lack of external consultation and participation in the ongoing management of the fishery. While workshops involving all major stakeholders (industry, conservation, research, government) have been held for the Shark Bay Prawn and Exmouth Gulf Prawn Managed Fisheries during the development of the ESD reports for those fisheries, no such workshop was held for the stakeholders of the KPMF. While the cost-effectiveness of this approach is acknowledged the approach precludes broad stakeholder participation in the management process.

In line with DFWA policy on consultation in smaller fisheries, consultation in the KPMF takes the form of direct annual meetings between departmental officers and the fishing industry and through the production of discussion papers on proposed fisheries management arrangements, but there is no formal Management Advisory Committee (MAC). DFWA states that management decisions made in the Shark Bay Prawn, Shark Bay Scallop and Exmouth Gulf Prawn Joint Trawl MAC (representing the three major trawl fisheries in WA and including community and conservation sector members) are carried over to the minor trawl fisheries such as the KPMF.

The WA *Fish Resources Management Act 1994* (Section 64) specifies the requirements for consultation prior to determining a management plan. These requirements include that interested persons be invited to comment on the draft plan and to make representations to the Minister on the draft. DEH accepts that these requirements were adhered to in determining the *Kimberley Prawn Management Plan 1993*. However Section 65 of the Act requires only that those specified in the Plan itself are consulted when amending the Plan. Section 23 of the *Kimberley Prawn Management Plan 1993* requires only licence holders to be consulted before the plan is amended or revoked.

Consequently there has been little consultation with stakeholder groups, other than the industry, on the management arrangements of the KPMF since the Plan was

determined in 1993. DEH considers that DFWA should provide further opportunities for other parties to be involved in the management of the fishery. DEH also encourages DFWA to consider expansion of the next review of the KPMF ESD report to a workshop involving greater consultation with stakeholders.

Recommendation 3: *DFWA to ensure, where appropriate, that any relevant community, research, indigenous, conservation and recreational interests in the fishery are considered through consultative mechanisms.*

The fishery is managed according to the policy regime described in the *Kimberley Prawn Management Plan 1993*. 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 II of this report.

The performance of the major aspects of the KPMF 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 five years including examination of the appropriateness of the objectives and performance measures. DEH considers that a five year review of the overall KPMF management is appropriate provided that periodic review of the performance of the fishery against performance measures is undertaken on a regular basis and is publicly available. The outcomes of these reviews should be made publicly available in the annual *State of the Fisheries Report*. DEH also considers that, consistent with Recommendation 3 above, a wider range of stakeholders beyond the management agency and fishing industry should be provided the opportunity for input into the reviews of the performance of the fishery. This could include expanding the existing annual meetings with industry to include a broader range of stakeholders including community and conservation sector representatives.

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.*

While operational objectives, performance indicators and performance measures have been developed for target species and some byproduct species, these have not been developed for bycatch, protected species or the marine environment and are not contained within the ESD report to provide a focus to minimise the take of bycatch, the impact on protected species or impacts on the marine environment. DFWA do not consider it necessary to develop objectives for these elements of the fishery as the risk assessment process undertaken in the development of the ESD report considered the risk posed by the fishery to them to be either low or negligible. The ESD report notes the bycatch in the KPMF is typical of tropical trawl fisheries, up to a ratio of 6:1 relative to target species. DEH notes there are very little data available to demonstrate the extent of bycatch, and has concerns that the fishing method and the acknowledged

high ratio of bycatch presents continuing potential risk of impacts on non-target species and 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 an explicit priority in the management of the fishery, regardless of the level of impact. For the KPMF, the current fishing operations warrant at least an objective to minimise these impacts. DEH recommends that a management objective to minimise impacts on bycatch, protected species and the marine environment be developed and incorporated in 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.*

DEH suggests that performance indicators and measures, once developed, should be capable of detecting and responding to changes in the fishery. This would require ongoing monitoring of the fishery against such performance measures and a clear process for responding to breaches of performance measures. DFWA has advised that if there is a breach in a performance measure, this 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

Management of the fishery is based entirely on input controls:

- Limited entry
- Effort limit (fishing days)
- Gear and vessel restrictions
- A seasonal closure for the whole fishery
- Permanent spatial closures in nursery areas

While there are 135 licences issued for the KPMF only 20 to 30 vessels have actually operated in the fishery in recent years. Most vessels licensed for the fishery are also licensed for other WA prawn fisheries and/or NPF and fishing in the KPMF is largely complementary to their main operations in these other fisheries. Of the vessels that do fish in the KPMF relatively few operate in the fishery for the entire fishing season. The introduction, in 2003, of an upper limit on the number of fishing days in the fishery provides an effective mechanism to address the potential for activation of the relatively high levels of latent effort in the fishery.

Compliance and enforcement tools implemented in the fishery include:

- a Vessel Monitoring System (VMS), implemented in 2002, to monitor a vessel's location and speed, for among other things, surveillance of fishery boundaries, closed areas and seasons, and, more recently, the effort cap on fishing days;
- random at-sea patrols to ensure restrictions on gear and other operational rules are being adhered to; and
- inspections of catches at the point of landing and processing factories.

While the ability to conduct at-sea compliance patrols on the Kimberley coast is limited, because of patrol boat size and availability, the application of VMS provides comprehensive spatial and temporal coverage of the fleet. DFWA notes that over the last two years very few offences have been detected in the KPMF and these were minor. DEH is satisfied that the compliance regime is adequate for existing operations to enforce critical aspects of the management arrangements for the fishery. However, given the high number of unutilised licences, the dual licensing of many of the operators with the NPF and the capacity for technological change to influence fishing behaviour and effort, DEH encourages DFWA to give priority to a compliance risk assessment for the fishery to ensure that the available compliance resources remain effective in meeting future management objectives.

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, VMS data and voluntary daily logbooks, which have had limited use since the 1990s. Limited fishery independent information is collected. 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 live and the fishery operates is also contained under Principle Two of this report.

A range of species harvested by the KPMF such as squid, target and byproduct prawn species, bugs and scampi are likely to belong to the same stocks that are also regularly caught by other fisheries in northern Australian waters. The current management arrangements for the KPMF stocks do not include explicit collaborative stock assessment or research arrangements with other jurisdictions. Ideally, management arrangements affecting a single stock should be under a single jurisdiction, or at least complementary across jurisdictions. DFWA is informed on common stock issues through participation in the Northern Australian Fisheries Management Workshop (NAFMW), which includes State, Territory and Australian Government Fisheries managers, researchers, and compliance staff, as well as representatives from Indonesia and East Timor. Further discussion of complementary management requirements is in Part Two of this report.

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 has 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.

Conclusions

DEH considers that the KPMF management regime is documented, publicly available and transparent, and is developed through a consultative process that could be further improved. The management arrangements are adaptable and underpinned by appropriate objectives and performance criteria by which the effectiveness of the management arrangements for the target and major byproduct species can be measured, enforced and reviewed. Further enhancements are needed to provide a more appropriate framework to effectively manage impacts on non-target species and the marine environment.

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 adheres to arrangements established under Australian laws and international agreements, but needs to continue to improve cooperation with relevant jurisdictions on management of shared stocks.

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 are obtained through mandatory submission of monthly catch and effort statistical system (CAESS) returns. These CAESS returns provide information on total catch of all target and byproduct species landed and effort recorded as days fished. Monthly CAESS data has been collected since the 1980s.

Some fishery dependent data is also collected through voluntary daily logbooks. These logbooks collect daily and shot by shot catch, hours trawled and area of operation. However, DFWA acknowledges that data collection from daily logbooks has been limited since the 1990s. The ESD report notes that a few vessel skippers have agreed to complete voluntary daily logbooks to provide additional spatial catch and effort information for the fishery. While DFWA has indicated its intention to have a representative number of boats from the KPMF participating in the voluntary logbook system at some stage in the future, it also states that existing resources are precluding any immediate implementation of these proposed arrangements. Around 50% of KPMF operators also fish in the NPF and these operators also submit compulsory Australian Fisheries Management Authority (AFMA) daily logbooks that include details on the total weight of each target species, location of the greatest catch and interactions with threatened species.

There are no fishery independent data for the KPMF. DFWA states in the submission that due to the perceived low risk to stocks, limited funding and logistical difficulties of vessels operating out of Darwin and being at sea for several weeks each trip, it does not intend to implement any fishery independent research or monitoring in the fishery.

Given the reliance on fishery dependant information to determine the status of stocks, DEH is concerned that no validation processes are currently in place for this data. Validation of spatial and temporal effort of the fleet should now be possible using VMS data. The use of VMS for analysing total effort and effort distribution commenced in 2003. Other options exist to validate catch data, such as using processor records, catch and disposal records and in-port or on-board observers. DEH notes that processor records and VMS data are used to validate logbook data in the Exmouth Gulf and Shark Bay prawn fisheries. DFWA has advised that a database is now in place to enable logbook records to be entered and validated against processor data, and that it is working to negotiate and implement a mechanism for obtaining processor data, to be utilised in validating fishery data, within 2 years.

Public comments also raised concerns on the absence of fishery independent data and reliance on research data from the geographically distant Shark Bay and Exmouth Gulf fisheries to inform the management of the KPMF. Given the lack of any fishery independent data, validation of fishery dependent commercial data is essential to verify management measures in place, in particular the primary management tool of effort caps recently implemented under the effort pool system. DEH recommends that DFWA continue to develop and implement a system to validate commercial reporting of catch and effort for target and byproduct species in the KPMF.

Recommendation 6: *DFWA to develop and implement a system to validate fishery dependent data on catch and effort for all target and byproduct species within 2 years.*

There is no indication in the current KPMF management regime of research being undertaken on the fishery or in relation to the stock assessment of specific landed species. No research strategy is in place and, as indicated above, this is not a priority given financial and logistical constraints within the fishery. The ESD report highlights the influence that environmental conditions can have on many prawn species, in particular the catch levels and recruitment of the main target species, banana prawns. Preliminary analysis using historical catch and summer rainfall data has been undertaken in the KPMF to determine a rainfall-catch relationship for banana prawns, and the ESD report notes the intention of DFWA to further refine this relationship.

The management regime of the KPMF is completely reliant on fishery dependent data. Given that this data is not validated, DEH is concerned about the reliability of the information collection system in place in the fishery. Continuation and expansion of existing data collection systems, combined with validation of commercial catch and effort data will be important for the future management of the fishery.

Assessment

The status of the breeding stocks and intra-annual variation for all the major prawn species are assessed and evaluated every year using a synthesis of information obtained based on catch data provided by the CAESS returns and voluntary logbooks. The performance of the fishery is assessed at least once every year and includes a review of the total catch, level of effort, catch rates and spatial and temporal distribution of effort. The assessment is reported in the annual *State of the Fisheries Report*. DEH has recommended broader stakeholder participation in management arrangements (Recommendation 3) and periodic reviews of the performance of the fishery against performance measures that relate to the sustainability of the fishery (Recommendation 4).

The submission states that a very reliable estimate for sustainable yield has been calculated for the KPMF. However, what this estimate is or how it was calculated is not evident in the submission, ESD report or *State of the Fisheries Report*. Formal stock assessments have not been conducted for target species in the KPMF, and no stock recruitment relationship or sound biologically based estimates of spawning biomass have been established for target species. As noted above there is no independent data to inform the annual review of stocks and no indication of any ongoing sampling programs to inform changes in stock structure and abundance.

The ESD report uses the catch history of the target species as the basis for evaluating changes in the stock abundance of these species. The performance measures for target species outlined in the ESD report are identified as acceptable catch ranges, with the performance indicators the annual catch. These acceptable catch ranges are very broad, based on the past 10-15 years catch history for most species and generally set at the outside extremities of historical landings. DFWA notes that the main target species, banana prawns, undergoes large natural fluctuations in abundance due to environmental factors such as amount of rainfall, suggesting that the species is unlikely to be severely impacted by the fishery.

The ESD report notes that where the acceptable catch range limits are exceeded, a review is conducted and, where the review concludes that the fishery is impacting unacceptably on the stock, specified management action is taken. As previously stated in Part I of this report, DFWA has committed to reporting breaches of performance measures in the annual *State of the Fisheries Report* and pursuing those breaches that impact on the sustainability of target species with management actions within specified timeframes.

Catch histories for the target species since 1990 show that while for most years the catches of the three target species have been within their respective acceptable catch ranges, each species has breached its respective catch limits at some stage over the last 12 years. The most recent breach was for brown tiger prawns which recorded its

highest catch on record in 2002 of 80 tonnes. While this was substantially above the acceptable catch range of 15 to 60 tonnes, this species was within its acceptable catch range for the 12 previous years and as a secondary target species, DFWA's review concluded that the increases were related more to environmental fluctuations rather than targeted fishing effort. DFWA did not make specific management changes in response to this breach but has committed to closely scrutinising future years catches to detect trends of increased impacts on brown tiger prawn stocks. DEH concurs with this approach in the short term but strongly urges DFWA to closely monitor the status of tiger prawn stocks and ensure that appropriate response actions are initiated for any adverse stock trends.

While the submission states that catch rates for target prawn species are taken into account in the annual review of the fishery, catch rates are not explicitly identified in the existing performance indicators and measures in the ESD report, or assessed as part of the review outcomes reported in the *State of the Fisheries Report*. DFWA acknowledges in the ESD report that the robustness of the catch indicators used for assessing the relative abundance of target stocks is at best medium to low, and in the case of the minor target species, brown tiger prawns, may not be suitable as the primary means of assessing relative stock abundance.

While DEH understands that a formal stock assessment is not economically feasible for the fishery, it is concerned that the existing measures may not be sufficiently precautionary to detect significant trends in catch. DEH considers that the primary reliance on catch data would not adequately inform performance measures to reliably detect trends in stock abundance, and that other indicators, such as catch rates, are not used as performance indicators or analysed in the annual WA *State of the Fisheries Report*. DFWA has advised it intends to review the performance measures in 2005, and will use more rigorous methods for determining catch ranges in the future. DEH urges DFWA to take account of the above issues when reviewing the current performance measures for all target species and to give priority to ensuring that the performance measures are appropriately precautionary and are sufficient to detect changes in stock abundance.

Recommendation 7: *DFWA to review, within 1 year, the performance measures for all target species in the KPMF to ensure they are appropriately precautionary and sufficient to detect significant changes in stock abundance.*

The distribution of the target species is well understood from past studies and the harvesting of these species by several other fisheries in northern Australian waters. Stock structure is less clear, as is the extent of larval distribution of banana prawns in the Kimberley region. However, the submission notes that juvenile settlement and recruitment patterns are habitat specific, often associated with sheltered waters such as embayments, creeks and rivers, and this influences the establishment of

commercial quantities of prawns in separate locations. DFWA therefore considers that prawn stocks in the KPMF to be functionally separate from other regions where fishing for these species occurs. DEH concurs with this view but notes that the existence of functionally separate and habitat specific stocks limits the value of extrapolating research findings and data from other prawn fisheries, such as Shark Bay and Exmouth Gulf, in the assessment and management of the KPMF.

Potential removals of species targeted by the KPMF include direct harvest by the commercial fishery, recreational and indigenous harvest, mortality from damage caused by trawl operations, illegal and unreported catches and discarding of the species in the fishery. DFWA considers that the nature of the fishery requires only the estimates of removals by the commercial sector to be included in the assessment of target stocks. Commercial catch and effort data for the target species have been continuously collected since the 1980s. DEH has previously raised concerns in this report on the reliability of this data and of the need for more stringent validation processes (see Recommendation 6).

There are no other commercial fisheries in the Kimberley region with the capacity to remove significant quantities of prawns. Information on indigenous and recreational catch of the target species is currently limited. DFWA notes there are no significant recreational or indigenous fisheries for prawns in the Kimberley region and no indication of significant recreational or indigenous prawn catches. DFWA considers that the nature of the fishery and the high value of licences influences fishers to report any illegal fishing and the risk of unauthorised commercial fishing is considered to be minimal. Recent compliance and surveillance data have not indicated any illegal harvest of prawns. Discard levels are currently not factored into target species assessments. The wide range of the acceptable catch limits and the nature of fishing operations that enables most of the catch to be retained results in minimal discarding of target species.

DEH considers that while appropriate measures are in place to provide a reasonably accurate estimate of the extent of removals of target species from the fishery, monitoring, compliance and data collection systems should continue to be closely scrutinised and refined to ensure these systems continue to provide adequate protection of the target stocks.

Management response

The ESD report contains performance indicators, performance measures and management responses for the three target prawn species (banana, brown tiger and endeavour prawns). The ESD report specifies review and response requirements should these ranges be breached. DEH has recommended a review of the performance measures, currently based on fairly broad acceptable catch ranges, to provide a more robust mechanism for detecting changes in stock abundance (see Recommendation 7).

The management regime in the KPMF aims to maintain ecologically viable stock levels through a range of input controls. These include:

- Limited entry with licenses limited to 135;
- An Effort Pool system (whereby the number of fishing days is limited to 600 in the first part of the season and 900 in the second);
- Gear restrictions (twin otter trawl gear with restrictions on headrope length and number of nets, ground chain and mesh size);
- Requirements for Bycatch Reduction Devices (BRDs) in all nets (since the 2003 season) and for Fish Excluder Devices (FEDS) by the end of 2006;
- Vessel size restrictions;
- A seasonal closure of the whole fishery;
- Permanent spatial closures of nursery areas.

DFWA introduced the effort pool system in 2003 as a key mechanism to control the level of overall catches and address the potential problem of latent effort in the fishery. Discrete effort caps have been established for each of the periods that the fishery is open each year to provide a more targeted response to fishing effort levels. The temporal closures in the fishery result in only 12 weeks of fishing each year, in two separate periods from early April to May and September to late November. DFWA has already taken direct action in response to the effort cap system by closing the fishery in the second period of the 2003 season when the cap of 900 fishing days was reached. Additionally, DFWA advises that only 8% of the fishery area is regularly fished each season. The compulsory use of VMS provides for daily monitoring of effort levels and compliance with the spatial and temporal closures.

DEH considers that the combination of input controls and the recommended enhancements to the performance measures should ensure adequate protection of the target stocks while sustainable yield estimates are refined.

Byproduct caught in the KPMF includes minor prawn species, bugs, cuttlefish, octopus, saucer scallop and squid. Finfish can no longer be landed unless the operator is also licensed to fish in the Northern Demersal Scalefish Managed Fishery (NDSMF) that operates in the same fishery area as the KPMF. Information is collected for byproduct species through the compulsory catch and effort monthly returns. Performance indicators in the form of catch, and performance measures in the form of acceptable catch ranges, have been established for the take of the two key byproduct prawn species in the KPMF, black tiger prawns and coral prawns, with respective acceptable catch ranges of 0-1 tonnes and 0-6 tonnes. The ESD report indicates that both species have been well within their respective acceptable catch ranges in recent years. The ESD report suggests that both species have limited

vulnerability to fishing pressure - coral prawns because they are widely distributed and capable of falling through the cod-end mesh due to their small size; and black tiger prawns because their inshore locations are not regularly fished due to fishery closures or unsuitable access for trawlers. DEH concurs with this assessment, given the low catch of both these species, and expects that the performance measures for both species will provide for early detection of any developing catch trends.

Public comments raised concerns about the lack of performance measures to detect changes in abundance of other byproduct species, and the need for improved understanding of squid populations in the fishery. The ESD report has been amended to trigger the re-examination of the risk assessment and a review of the fishery if the catch of either western king prawns and bugs exceeds 10 tonnes in any one year, or the catch of other invertebrates (such as octopus, scallop and cuttlefish but excluding squid) exceeds 2 tonnes. DEH considers that this is a sufficiently precautionary measure that will allow management to determine if there has been a switch in targeting practices.

However, DEH is concerned that a similar precautionary performance measure has not been established for squid, despite being the major byproduct species in the KPMF, with 18.7 tonnes caught in 2002 (equivalent to 5% of the total prawn catch in the KPMF) and being assessed with the highest risk rating (moderate) of all byproduct species in the ESD report. Squid catches have varied significantly in recent years in several northern fisheries and there is uncertainty whether this is the result of overfishing or environmental conditions. The ESD report identified that monitoring of the trend in squid landings over the next few years is required. Since 1995 the annual squid catch has ranged from 0-19 tonnes per year in the KPMF, a significant drop from those of around 400 tonnes per year in the early to mid 1990s. The KPMF has an operational objective for squid that seeks to ensure that targeted squid fishing does not impact on breeding stocks. While targeted squid fishing in the KPMF is not evident in recent years, targeted fishing of squid in the neighbouring Pilbara region in 2003 resulted in substantial squid catches. The species composition of squid catches in the KPMF is also unclear and likely to be a combination of several species commonly found in tropical Australian waters (such as mitre squid, north-west pink squid and northern calamari). Catch ranges would provide more robust indications of stock trends if the species of squid taken in the KPMF were identified along with the relative proportion that they contribute to the catch.

DFWA has indicated it will develop an acceptable catch range for squid in the KPMF within 5 years, using further catch data made available for the fishery. Given that squid:

- is the most prominent byproduct species in the KPMF;
- has the potential to be targeted in the future;

- has a highly uncertain stock abundance;
- experiences significant variability in catches; and
- has cross-jurisdictional management implications

DEH considers a more precautionary approach to managing squid stocks in the short term is warranted. DEH recommends the development and implementation of an interim performance measure for squid so that appropriate management responses can be undertaken for significant variations in squid catches. DEH also encourages DFWA to obtain further information on squid population dynamics and abundance sufficient to enable a more biologically based performance measure over the next 5 years.

Recommendation 8: *DFWA to develop, within 1 year, an interim performance indicator and performance measure for squid, based on best available information.*

Squid, along with a range of other species harvested by the KPMF, are likely to have shared stock implications with other fisheries in northern Australian waters. DFWA participates with AFMA, Queensland and Northern Territory (NT) in the annual NAFMW which provides a forum for State, Federal and Territory fishery agencies to address the status and future directions of commercially important species across northern Australia and identify future priorities and ensure complementary activities are undertaken.

Concerns were raised in the NAFMW in Darwin 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. DFWA, along with Queensland and NT, are partners in a proposed 3 year joint Australian Research Council/Strategic Research Fund for the Marine Environment (SRFME) research proposal to examine northern squid population dynamics. However, the status of funding approval for this project is unclear, and, in the event of the project funding being rejected, DFWA has indicated that further consideration needs to be given to obtaining additional information on squid populations.

In the assessments of other major trawl fisheries in northern waters, such as the NPF and the Queensland East Coast Otter Trawl Fishery (both significant harvesters of squid), DEH has made specific recommendations relating to cross jurisdictional cooperation in the management of shared stocks such as squid. KPMF usually has the most significant squid catch levels compared with other WA commercial fisheries and given its far northerly location is likely to contribute significantly to the cumulative impacts on squid populations in northern waters. DEH acknowledges attempts by DFWA to address the limited knowledge on squid stocks through further research, but in the absence of a dedicated research program the fishery needs to give priority to

complementary management and research arrangements with other jurisdictions. Cross jurisdictional stock management issues in these northern waters are not restricted to squid, so DEH considers that a similar priority should be given to other target and byproduct species where necessary, consistent with the approach being pursued through the NAFMW forum.

DEH therefore recommends that DFWA continue to cooperate with other relevant jurisdictions to pursue complementary management and research of shared stocks such as squid that may be affected by cross jurisdictional issues.

Recommendation 9: *DFWA to continue to cooperate with other relevant jurisdictions to pursue complementary management and research of shared stocks and ecologically dependant species for all target and by-product species which may be affected by cross-jurisdictional issues. In particular, DFWA will cooperate with AFMA, NT and Qld fisheries management agencies in relation to squid.*

Conclusion

DEH considers that the management regime in the KPMF is appropriately precautionary and has provided for the fishery to be conducted in a manner that has not led to over-fishing and is unlikely to do so in the short term. DEH considers that the quality of information being collected, the information collection systems and the stock assessment approach are generally sufficient in the short term, under the current scale of operations, to ensure that the fishery is conducted at catch levels that maintain ecologically viable stock levels with acceptable levels of probability.

DEH considers there is a need for more rigorous data management and performance measurement processes in the fishery to better inform the status of both target and non-target stocks. Enhancements to data validation measures and refined stock assessment and performance measurement for both target and byproduct species would provide greater certainty in the longer term that stocks are being maintained at ecologically viable levels.

DEH has provided a number of recommendations to address these management improvements in the longer term.

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. Performance measures and management responses are in place, or under consideration, to ensure that the risk of

overfishing any of the target stocks remains low. Target species are within defined reference limits. DEH considers that while the existing performance reporting system indicates target stocks are being harvested and managed at sustainable levels, more robust and integrated stock monitoring and assessment measures are required to provide further certainty on the status and trends of both target and non-target stocks. Recommendations to this effect have been made earlier in this report.

Conclusion

DEH considers that the KPMF target 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 stock would recover to ecologically viable stock levels within nominated timeframes. The adoption of recommended improvements to catch and effort data validation and performance measurement should result in even greater confidence in this area in the future.

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

No system is in place for the regular collection of information on bycatch caught in the KPMF, nor has there been any survey of bycatch in this fishery. As a result, limited information exists on the level and nature of bycatch in the KPMF, both currently and historically. The information available is obtained from very limited voluntary logbook data on declared non-target catch in the fishery collected some years ago, periodic information submitted by operators completing compulsory AFMA logbooks for the NPF, and from observer programs in similar WA fisheries, in particular extrapolation of bycatch data from Shark Bay and Exmouth Gulf prawn fisheries.

The submission suggests that DFWA intends to continue to rely predominantly on data collected in similar fisheries to underpin its ESD report risk assessment for bycatch in the KPMF. In particular the Fisheries Research and Development Corporation (FRDC)-funded project to sample catches and determine biodiversity indicators in the Shark Bay, Exmouth Gulf and Onslow Prawn fisheries, planned for 2004/05, will be used in future assessments of the KPMF. Given the lack of data on

catch of bycatch species, the relatively small size of the fishery and the similarities between the fisheries, this is accepted as a cost-effective approach. However, the proposed projects are finite projects conducted over a relatively short time and are not specific to the KPMF. While these projects may provide valuable information, periodic monitoring of bycatch levels and species composition is necessary to identify long term trends in a fishery. In addition, there has been no analysis of the validity of drawing conclusions about issues such as bycatch in the KPMF from data obtained in other fisheries. DEH has concerns regarding the extrapolation of bycatch data from Shark Bay and Exmouth Gulf as neither of these fisheries target banana prawns, they harvest functionally separate stocks and operate in regions some distance from the KPMF, and, unlike the KPMF, are predominantly night time fisheries and have closures over the full moon period. These five factors could result in the bycatch being significantly different (both in terms of composition and quantity) to that in the KPMF.

DFWA advises that it does not have the resources for a bycatch monitoring observer program in the KPMF, and that it is logistically not feasible as the KPMF vessels generally depart from Darwin and are at sea for weeks.

DEH notes that DFWA has committed to observer programs in the Broome and Nickol and Onslow Bay prawn fisheries that will provide data to verify bycatch levels and inform the ESD risk assessment process. These are smaller and lesser value fisheries than the KPMF. DEH also notes that the neighbouring NPF has a fairly comprehensive and ongoing bycatch monitoring program to address fishery impacts on a range of species that may also be impacted by KPMF operations, and that a number of vessels in the KPMF also operate in the NPF and Nickol and Onslow Bay prawn fisheries. The absence of data to verify the extent of bycatch from a key trawl fishery such as the KPMF in these northern waters would appear to be inconsistent with, and significantly weaken, the complementary management approach being pursued through the NAFMW forum.

DEH acknowledges that the risk of bycatch impacts is tempered by the fishery only operating in around 8% of the fishery area and for around 12 weeks of the year. However, the concentration of fishing effort and the high levels of bycatch taken by trawl gear has the capacity to have significant localised impacts on non-target species. DEH considers that, at a minimum, some form of bycatch monitoring mechanism specific to the KPMF needs to be implemented to confirm that bycatch data extrapolated from other fisheries is valid for the KPMF. DEH recommends that DFWA implement ongoing fishery specific mechanisms to record bycatch in the KPMF, and periodically validate these bycatch details, either through periodic observer surveys or other scientifically sound mechanisms.

Recommendation 10: *DFWA will provide a mechanism by which fishers are able to record interactions with those non-retained species that are at risk from the fishery.*

DFWA has advised that, as a preliminary assessment in 2005 of the extent of non-retained species at risk from the fishery, it will first consider the outcomes of the proposed 2005 observer program that will monitor bycatch in the Nickol Bay Prawn Managed Fishery (targeting the same species as the KPMF), and also available information from the NPF, prior to implementing appropriate fishery-specific bycatch monitoring mechanisms in the KPMF in 2006.

Assessment

The submission states that the discard rate in the KPMF relative to target catch is approximately 6:1. The survival rate of bycatch species, after interaction with trawl gear, is largely unknown but believed to be very low.

Non-retained species include fish and protected/listed species including seasnakes, syngnathids and turtles. The protected/listed species interactions are considered under Principle 2 Objective 2. Apart from the protected species, the ESD report does not provide any further indication of the extent of species or species groups that comprise bycatch in the KPMF.

The ESD report risk assessment of non-retained fish species concluded that while trawling contributes to the mortality of several non-commercial fish species, the low spatial coverage of the fishery (around 8% of the total area is trawled) meant that the impact of the fishery on bycatch fish populations would be low. The submission notes that the proposed biodiversity studies in the Exmouth Gulf, Shark Bay Prawn and Onslow Prawn managed fisheries will provide bycatch sampling data to be used in the future assessments of the KPMF. DEH has recommended above (Recommendation 10) the development of fishery specific measures to confirm the extent of bycatch in the KPMF.

DEH has previously recommended the development of an objective to minimise the take of non-retained species (Recommendation 5). DFWA has amended the ESD report to include a performance measure to review the fishery if the spatial extent of the area fished increases by more than 50%. DEH considers, in the absence of available data confirming significant bycatch impacts, that this is an appropriate interim measure, on the understanding that DFWA obtains further information confirming the extent of bycatch from existing operations in the KPMF and reviews the appropriateness of this performance measure once additional bycatch information is obtained.

Management response

BRDs incorporating grids and turtle exclusion hatches were trialled in the KPMF in 2002 and became mandatory in the fishery in 2003. FEDs will be trialled over

2004/05 and compulsory in all nets by 2006. These should substantially reduce the catch of some select species of fish. DEH commends DFWA on this proactive approach to reducing the catch of non-target species. The submission indicates that a Bycatch Action Plan (BAP) will be developed for the KPMF after the completion of this assessment. DEH considers the BAP will provide the opportunity to formalise bycatch data collection arrangements in the KPMF (see Recommendation 10) and develop specific response actions to changes in bycatch levels and composition. The submission does not identify how the effectiveness of the BRDs and FEDs in the KPMF will be assessed and DEH considers that the BAP should also address this issue.

The survival of bycatch species that escape through bycatch reduction devices is still largely uncertain in most, if not all, trawl fisheries in Australia. While FEDs may result in a significant reduction in bycatch landed, this does not necessarily translate to a similar reduction in mortality. This is an issue in a number of fisheries in Australia and DEH believes this should be a priority for research in the future, and a further issue to be addressed under the new BAP for the KPMF.

The submission notes that the biodiversity surveys in the Exmouth Gulf, Shark Bay and Onslow prawn fisheries, which will survey both trawled and untrawled grounds and determine the role of refuge areas in protecting bycatch species, will further inform the management of bycatch in the KPMF.

DFWA considers the risks to bycatch in the KPMF to be low given the small amount of trawled areas in the fishery and the introduction of BRDs and FEDs to further reduce the amount of non-target catch. DEH concurs with this assessment, noting that the submission also states that current performance limits may need to be reviewed if additional data finds current assumptions on bycatch to be incorrect. This further emphasises the importance of the early development of fishery specific data collection processes (see Recommendation 9) to verify the current risk assessment findings and management responses concerning bycatch.

Conclusion

DEH considers that while there is a likelihood the fishery is conducted in a manner that does not threaten bycatch, further fishery specific data collection is needed to verify that impacts are low. 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.

Recommendations have been developed and commitments made by DFWA to 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 KPMF is limited to anecdotal reports and the comments section of the voluntary logbook program that provides for recording of interactions with endangered, threatened or protected species. The current compulsory CAESS report does not provide for the recording of bycatch data. Data from the Shark Bay and Exmouth Gulf prawn fisheries have been used in the risk assessment for the KPMF. DFWA expects to draw on data from the above mentioned biodiversity surveys in the Shark Bay, Exmouth Gulf and Onslow prawn fisheries for future assessments of protected species impacts in the KPMF.

The extrapolation of data on non-target species from other fisheries is in common with other WA prawn fisheries' programs. However in those fisheries, programs such as on-board observer programs, and research surveys, have provided some information on interaction with these species. DEH believes that the importance of validating the use of external data for risk assessment purposes is heightened with respect to endangered, protected and threatened species. DFWA has indicated in the submission that it will investigate mechanisms for fishers to identify and record interactions with protected species.

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. 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 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 KPMF 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 KPMF should still be conducted.

Recommendation 11: *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.*

Assessment

Seasnakes, sawfish, marine turtles, dugong, seabirds, crocodiles, whales, dolphins and syngnathids are found in the region of the KPMF. The ESD report identified the most likely interactions to be with turtles, seasnakes and syngnathids. The analysis concluded that there was a negligible risk to the breeding stock of seasnakes and turtles and a low risk to syngnathids from capture in prawn nets.

It is unknown how many seasnakes are caught in the KPMF. The negligible risk rating given to seasnakes derives from the observer program in the Shark Bay Prawn Managed Fishery, where 194 seasnakes were caught in 916 trawls, with 99% returned to the sea alive, and the high survival rate recorded in studies of seasnakes returned to the sea.

While the amount of syngnathids caught in the KPMF is also unknown, DFWA notes that its likely to be low as trawling occurs over areas such as mud and sand habitats that are mostly unfavourable to syngnathids. The majority of fishery operations in the KPMF occur outside the areas of seagrass and detached algae communities favoured by syngnathids. Observer data from the Shark Bay Prawn Managed Fishery identified low catches of around one syngnathid per night across the fleet.

Loggerhead, flatback, green, hawksbill and Olive and Pacific ridley turtles have been recorded as caught in the KPMF. Up to 23 turtles have been recorded caught in one year, and most have been returned alive. However this information relies on the reporting of interactions in the limited data collected under the voluntary logbook program. The negligible risk to turtles is based on the recent introduction of BRDs in nets which are thought to have eliminated the risk of capture of turtles in the KPMF.

There are no threatened ecological communities associated with this fishery.

DFWA considers that given the low level of interaction with protected species the overall risk of significant impact by the KPMF on these populations is considered negligible. DEH concurs with this conclusion based on the limited data available on protected species interactions. DEH has made recommendations earlier in this report to implement a management objective to minimise protected species interactions (Recommendation 5) and to develop a fishery specific mechanism to record interactions with protected species (Recommendation 11) to verify the extent of

interactions with protected species in the fishery and any changes to these interactions.

Management response

Interactions with protected species are thought to be limited due to the short season and restricted fishing area. DFWA believes that this, combined with the use of BRDs, is likely to provide sufficient refuge for protected species that are at risk from the fishery. As noted above, DFWA intends to develop a BAP for the KPMF. This Plan will also address interactions with endangered, threatened and protected species in this fishery. 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.

While nets in the KPMF have been fitted with BRD grids since the 2003 season, the 200 mm bar spacing in these grids is larger than that used in grid devices in other trawl fisheries in Australia. The submission notes that the NPF vessels operating in the KPMF use smaller grid spacing as required by the NPF management arrangements. DEH considers it inconsistent with the complementary management approach being pursued in northern waters for different levels of protection to apply to overlapping populations of protected species. DEH is highly supportive of the review of and continual improvements to BRD performance and notes that work has been undertaken in northern Australian prawn fisheries to ensure grid specifications will effectively remove all turtle species likely to be encountered by a fishery.

As a result DEH recommends that DFWA review the specifications of the BRD grids used in the KPMF to ensure they are effective at reducing the catch of all turtle species and other large bycatch species likely to be encountered in the fishery. DEH has also made this a draft recommendation for the Abrolhos Islands and Mid-West Trawl Managed Fishery and the Onslow and Nickol Bay Prawn Managed Fisheries and notes that this desktop exercise could be undertaken once to assess the effectiveness of BRD grids used in all WA trawl fisheries.

Recommendation 12: *DFWA to review the specifications of the BRD grids used in the KPMF to ensure they are effective at reducing the incidental catch of turtles and other large bycatch species likely to be encountered in the fishery.*

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.

Recommendations have been developed 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

No specific work has been undertaken on the impacts of the KPMF on the ecosystem and the environment generally. However data on catch and effort, gear design and understanding of spatial and temporal closures has been collected over the 20-year history of the fishery. The recent introduction of VMS will also assist in monitoring the spread of effort. 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. DFWA considers that the proposed biodiversity study will provide additional information on habitat and species distribution in and around Shark Bay and Exmouth Gulf that may be relevant to the KPMF.

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 KPMF risk assessment concluded that the fishery was of low risk to trophic interactions, low 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, lack of dedicated predators, protection to spawning stocks provided by spatial and temporal closures and the use of BRDs and FEDs. 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 KPMF 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 area fished.

DFWA note that studies of the impacts of prawn trawling on mud and sand habitats similar to those regularly trawled in the KPMF indicate only minimal impacts to infaunal communities.

An observer program in the Exmouth Gulf prawn fishery 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 around 12 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 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.

DEH has previously recommended in this report the implementation of a management objective for the KPMF to minimise the impact of the fishery on the marine environment (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 KPMF are required to comply with the legislation.

The recommended increased reporting and monitoring of protected species and other bycatch (see Recommendations 9 and 10) 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. Recommendations have been developed to ensure the risk of significant impact by the fishery on the marine environment generally is minimised in the longer term.

REFERENCES

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LIST OF ACRONYMS

AFMA	Australian Fisheries Management Authority
BAP	Bycatch Action Plan
BPMF	Broome Prawn Managed Fishery
BRD	Bycatch Reduction Device
CAESS	Catch and Effort Statistics System
DFWA	Department of Fisheries, Western Australia
DEH	Department of the Environment and Heritage
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
ESD	Ecologically Sustainable Development
FED	Fish Exclusion Device
FRDC	Fisheries Research and Development Corporation
KPMF	Kimberley Prawn Managed Fishery
MAC	Management Advisory Committee
MARPOL	International Convention for the Prevention of Pollution from Ships
NAFMW	Northern Australian Fisheries Management Workshop
NDSMF	Northern Demersal Scalefish Managed Fishery
NPF	Northern Prawn Fishery
NT	Northern Territory
SRFME	Strategic Research Fund for the Marine Environment

TED	Turtle Exclusion Device
UNCLOS	United Nations Convention on the Law of the Sea
VMS	Vessel Monitoring System
WA	Western Australia
WTO	Wildlife Trade Operation