



**Australian Government**

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**Department of the Environment and Heritage**

Assessment of the  
**Pilbara Trap Managed Fishery**

**November 2004**

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Assistant Secretary  
Wildlife Trade and Sustainable Fisheries Branch  
Department of the Environment and Heritage  
GPO Box 787  
Canberra ACT 2601

ISBN: 0642550980

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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 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 Pilbara Trap 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 *Final Application to the Australian Government Department of Environment and Heritage on the Pilbara Trap Managed Fishery* (the submission) was received by the Department of the Environment and Heritage (DEH) in April 2004. The submission was released for a thirty-day public comment period that expired on 14 June 2004. One public comment was received. While DFWA provided a response to the issues raised, no changes were made to the submission as a result of the public comment.

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

**Table 1: Summary of the Pilbara Trap Managed Fishery**

<b>Area</b>	Waters adjacent to the State of Western Australia out to 200 nautical miles (Commonwealth and State waters).
<b>Fishery status</b>	Fully exploited
<b>Target Species (% by weight of landed catch)</b>	blue-spot emperor <i>Lethrinus hutchinsi</i> (19%) red snapper <i>Lutjanus erythropterus</i> (13%) goldband snapper <i>Pristipomoides multidens</i> (12%) scarlet perch <i>Lutjanus malabaricus</i> (4%) red emperor <i>Lutjanus sebae</i> (12%) spangled emperor <i>Lethrinus nebulosus</i> (12%) Rankin cod <i>Epinephelus multinotatus</i> (7%)
<b>By-product Species</b>	Around 21% by weight of annual harvest including cod species (Serranidae), Lutjanids, trevally (Carangidae) and small quantities of various other scalefish and shark species, mainly wobbygongs
<b>Gear</b>	Rectangular traps with single opening and 50 mm x 70 mm rectangular mesh panels.
<b>Bait</b>	Mainly pilchards and blue mackerel imported from other regions of WA. Limited use of some bycatch species such as barracuda, bludger trevally and catfish as bait.
<b>Season</b>	Unrestricted – year-round
<b>Commercial harvest 2002</b>	306 tonnes
<b>Value of commercial harvest 2002</b>	\$1.3 million
<b>Effort in 2002</b>	5282 trap days
<b>Recreational harvest</b>	Estimated at 300 tonnes in 1999-2000 (excluding charter fishing). Recreational and charter catches comprise a wide range of species including some commercial target species such as red emperor, spangled emperor, Rankin cod and goldband snapper.
<b>Commercial licences issued</b>	6 licences (all available effort allocated for these licences currently used by only 2 operators).

<b>Other commercial harvest in region</b>	Demersal finfish species targeted by the PTMF are also targeted in the Pilbara region by the Pilbara Trawl Interim Managed Fishery (PTIMF) and the currently unregulated WA wetline fishery. Demersal scalefish landed catch for these two fisheries in the Pilbara region in 2002 was 2,310 and 90 tonnes respectively.
<b>Management arrangements</b>	Input controlled through Individual Transferable Effort (ITE) quota Limited entry Defined fishery area, including an area closed to trapping Mandatory fitting of Vessel Monitoring System (VMS) Legal minimum lengths for 3 species. Rock lobsters may not be retained.
<b>Export</b>	Catch sold on domestic markets and exported.
<b>Bycatch</b>	Unquantified, but considered low, consisting mostly of small quantities of many scalefish (incl. under-sized fish of target species), sharks, crustaceans, molluscs and other invertebrates.
<b>Interaction with Threatened Species</b>	Limited interactions overall, minor incidence of interactions with sea snakes and syngnathids.

The area of the fishery includes waters of the continental shelf and upper slope, at depths of 30-200 metres off Western Australia, north of 21° 35' S and between 114° 9' 36" and 120° E. Part of the 25,400 sq nautical mile fishery area is in Commonwealth waters, however the entire fishery is managed by Western Australia under an Offshore Constitutional Settlement (OCS) between the Australian Government and the Government of Western Australia.

The fishery generally targets long lived, high value demersal scalefish, in particular red emperor (*Lutjanus sebae*), scarlet perch (*Lutjanus malabaricus*), spangled emperor (*Lethrinus nebulosus*), Rankin cod (*Epinephelus multinotatus*) and goldband snapper (*Pristipomoides multidens*). However, in recent years there has been a trend to increased catches of lower value species such as blue-spot emperor (*Lethrinus hutchinsi*) and red snapper (*Lutjanus erythropterus*) that now comprise over 30% of the total PTMF catch.

Apart from rock lobsters, which may not be retained, there is no limit on the quantity or species that may be taken as byproduct by the fishery. Species currently retained by the fishery as byproduct are mainly scalefish (at least 38 species) and small quantities of sharks. Further discussion on byproduct management is contained in Part II Principle 1 of this report.

Most of the target species are widely distributed across northern Australia and through the Indo-Pacific. Only blue-spot emperor is restricted to northern Western Australia and the Northern Territory. These species are also harvested – to varying degrees - in other trap, trawl, line and recreational fisheries off northern Australia, including the Pilbara and Kimberley regions. Trap fishing catches tend to target feeding aggregations of fish around bottom structures or habitat features. Genetic studies of the populations of several target species show little differentiation, but stable isotope ratios suggest limited mixing between populations. Together with limited movement observed in adult fish, the indications are that regional populations should be treated as separate stocks for management purposes.

Most target species are slow growing, living to 30-40 years, with maximum lengths of 90-100 cm. Sexual maturity for most species occurs at lengths of 40-55 cm, with legal minimum lengths of 41 cm specified for red emperor and spangled emperor. Juveniles generally occur singly or in

schools in inshore waters and tend to form schools and to move further offshore with age, to maximum depths ranging from 90 to 245 m. Rankin cod are protogynous hermaphrodites with males predominating among the larger members of the population. Blue-spot emperor differ in living to only 14 years and 35 cm, with 50% of females maturing at 24 cm and a legal minimum length of 28 cm. A significant point is that, despite the differences in their biology, ecology and behaviour and their apparent genetic homogeneity, each of the target species can be regarded as having separate regional stocks that lend themselves to area-based management arrangements.

There is a history of fishing for demersal scalefish in the Pilbara region that was far more intensive than recent operations. Substantial trawl fishing by Japanese and Taiwanese vessels for demersal scalefish in the North West Shelf region took place in various stages between the early 1960s and 1989, with peak catches up to 30,000 tonnes in the 1970s. In comparison, the PTMF dates back to the early 1980s, with historical catches varying between 200 and 300 tonnes. In 2002 the PTMF landings totaled 306 tonnes, worth \$1.3 million. When formal management for the PTMF commenced in 1992 there were 14 licensed operators; removal of latent effort reduced the number to 6 in 1995. In 1998 an area of 880 sq nautical miles was closed to trap and trawl fishing to reduce fishing pressure on Rankin cod, red emperor and other long-lived target species. Since 2000, the trap fishery has been managed by annual effort quota, based on the total number of trap units (number of trap deployments per day multiplied by days fished) originally calculated to constrain the catch to 300 tonnes. Transfers of quota have resulted in the effort allocations for the fishery being consolidated to the extent that the fishery is currently being conducted through the equivalent of two full time vessels operating in the fishery. In 2002, the trap fishery effort quota was reduced by 7% after performance limits for two target species were breached. The compulsory use of VMS since 2000, along with sea and port inspections and periodic sea patrols and radar watches in the region, provide a sound basis for compliance arrangements with the limited number of operators in the PTMF.

Fishing trips generally involve 80-120 trap lifts/day and last 5-9 days. Catches are chilled in brine, then packed and held at 1-4 °C in chilled holds ready for local processing or transfer to Perth markets.

Traps used in this fishery are made of 50 x 70 mm galvanised steel mesh with dimensions of 1500 mm by 1500 mm by 700 mm and a single opening of approximately 150 mm by 700 mm. While there are no specific limits on the number of traps that can be deployed from each licensed vessel, the effort limits in place curtail the number of traps that can be deployed each year. The primary management tool in the fishery is the annual effort quota system. The effort system is managed to ensure that catches do not exceed an acceptable catch range of 300 tonnes of major demersal scalefish species. This figure is based on recent historical catch and effort data for the fishery. In addition to effort controls (quotas), fishery management arrangements include spatial closures, legal minimum lengths, and a prohibition on the take of rock lobsters. The number of licences for this fishery is limited to six. Fishery boundaries, closed areas and effort controls are supported by monitoring of vessels by the use of satellite-based VMS, mandatory in all vessels.

As no details of non-retained catch are reported, information on bycatch in the fishery is limited. The combination of anecdotal and extrapolated information from other fisheries suggests that starry triggerfish (*Abalistes stellatus*) is the most common bycatch species, with smaller numbers of a wide variety of other scalefish and small sharks. Undersized target species, notably red emperor, are released in large numbers in some areas, although survival rates are unknown and not likely to be high for deepwater catches. Jellyfish and epibenthos tangled in the trap mesh are caught occasionally. Anecdotal information suggests that the incidence of manta rays entangled in buoy ropes is extremely rare. Minimal times between retrievals of baited traps and strict requirements for leaving any traps unattended in the water assist with reducing bycatch impacts. Limited evidence to

date suggests that interaction with any protected species group is very low, with the most likely interactions with traps occurring with sea snakes and sygnathids. These interactions are assessed under Principle Two of this report.

The PTMF is one of several fisheries currently in the Pilbara region that target demersal finfish stocks. The major demersal finfish fishery in the region is the PTIMF. The PTIMF operates within the area of the PTMF and catches a similar range of demersal finfish species to the PTMF. The demersal scalefish catch for the PTIMF in 2002 was 2310 tonnes. An unregulated commercial wetline fishery also operates in the region. It targets the same range of demersal scalefish species as the PTMF and in 2002 caught 90 tonnes. The catch by recreational fishers in the Pilbara region is significant and estimated at 300 tonnes in 1999-00 and is believed to be increasing. Most of the recreational catch is taken inshore of the trap fishery area and includes a wide range of fish species. The main commercially targeted species caught by recreational fishers are spangled emperor and red emperor. The proportion of recreational catch of commercially targeted species compared with the commercial sector catches has to date been relatively minor but is expected to increase, particularly in the charter fishing sector. The charter fishery operates further offshore, with 85 fishing tour licences issued for the northern coast region. A catch and effort logbook system was introduced for the charter fishery in 2001. Target commercial species such as Rankin cod, goldband snapper and red emperor are regularly caught by charter operations. DFWA advises that there is no indigenous fishing for species targeted by the trap fishery.

Given the overlapping fishery areas and targeting of the same range of species, there is a close relationship in the management of the PTMF and PTIMF. The performance of both fisheries, along with the unregulated commercial wetline fishery, is covered in a combined review of the Pilbara Demersal Finfish Fisheries in DFWA's annual State of the Fisheries Report. The catch and effort data of all three commercial fisheries, along with data on the recreational catch, is factored into the stock assessment and review process and in the establishment of performance indicators and measures and management controls for both the PTMF and PTIMF. The larger trawl fishery strongly influences the demersal finfish management arrangements in the Pilbara region, and data from the PTIMF largely provides the basis for effort quota levels, primary performance indicators and measures for target species, information on stock structure and localised depletions and bycatch impacts for both the PTMF and PTIMF. More detailed information on the assessment of the cumulative impacts and inter-related management arrangements of the various fishery sectors is provided in Part II of this report.

The PTMF is managed under the *Pilbara Trap Managed Fishery Management Plan 1992*, the *WA Fish Resources Management Act 1994* and various regulations under the *WA Fish Resources Management Regulations 1995*. DFWA has prepared an Ecologically Sustainable Development (ESD) report for the fishery that, when completed, will also become part of the formal management documentation for the fishery and be publicly available. Based on the best available information this includes a formal assessment of the risks posed by the fishery to target, by-product and bycatch species; threatened species and communities; and the environment.

## **Overall assessment**

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

While a relatively sound overall management framework has been established for the PTMF, consideration must also be given in these arrangements to the cumulative impacts of other fisheries in the Pilbara region on stocks targeted by PTMF or caught as by-product or bycatch. The use of

three different fishing methods in the same region on the same target stocks significantly reduces the available refuges for stocks and increases the potential for both localised and fishery wide depletion. There is therefore the need for a high degree of interdependence in management arrangements across the commercial and recreational demersal finfish fishery sectors in the Pilbara region to ensure the ongoing sustainability of both target and non-target stocks.

In this regard DFWA needs to examine the respective management regimes of the trap, trawl and line demersal finfish fisheries in the Pilbara region to ensure complementary arrangements and a robust management regime across all sectors that minimises the cumulative demersal finfish fishing impacts across the Pilbara region. For this assessment DEH has identified a number of specific risks for the PTMF that must be addressed to ensure that its contribution to the cumulative impacts is minimised:

- Reliance on data from the overlapping trawl fishery to inform the stock assessment, performance measurement and management responses in the trap fishery;
- Absence of fishery independent monitoring and research to inform and validate the assessment of the status of target and byproduct species;
- Formal stock assessments limited to two key target species;
- No performance measures for byproduct species;
- No management objectives to minimise impacts on bycatch, including protected species, and the marine environment;
- No fishery specific monitoring and validation of bycatch levels, including protected species.

Recommendations to address these issues have been developed 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 continue to be fished sustainably.

The PTMF has moved beyond the developmental phase to a formally managed stage and has made considerable progress in developing sound management arrangements. While further improvements are needed, the management regime aims to ensure that fishing is conducted in a manner that does not lead to over-fishing of target stocks and for fishing operations to be managed to minimise their impact on the structure, productivity, function and biological diversity of the ecosystem. On current indications, the fishery is being managed in an ecologically sustainable manner. As the recommended improvements are implemented, DEH is confident that this will be demonstrated more clearly.

The operation of the fishery is consistent with the objects of Part 13A of the EPBC Act. Given the management arrangements specified in the submission and the annual review of stock status and control measures, DEH considers that the fishery will not be detrimental to the survival or conservation status of the taxa to which it relates in the short term. Similarly, it is not likely to threaten any relevant ecosystem in the short term. However, DEH considers that the cumulative impacts on demersal finfish stocks in the Pilbara region by both commercial and recreational fishing sectors places significant pressure on both target and non-target species in the Pilbara region and requires integrated and comprehensive management to ensure the ongoing sustainability of stocks in the region. DEH has recommended a range of follow up actions for the PTMF, including more integrated research and monitoring, monitoring of bycatch and improved performance reporting on byproduct, to provide more certainty that the management of stocks and the fishery environment is ecologically sustainable in the medium to longer 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 regime, 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 three years. The WTO declaration will require annual reporting on the progress of implementing the recommendations of this report and other managerial commitments.

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, sygnathids, cetaceans, turtles, seabirds, whale sharks and dugongs. A small number of interactions with these species have been reported with fishing gear in waters in the Pilbara region and the incidence of interactions with the trap fishery is considered extremely infrequent and the consequences are likely to be minimal. While 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 PTMF management regime 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 regime 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 regime 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 regime, 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 three years time.

## **Recommendations**

1. DFWA to advise DEH of any material change to the fishery's legislated management plan and/or arrangements that could affect the criteria on which EPBC decisions are based, within 3 months of the change being made.
2. DFWA to ensure, where appropriate, that any relevant indigenous, conservation, world heritage 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 incorporated into the management regime and decision making process.
4. DFWA, within 2 years, to incorporate into the management regime fishery specific objectives, performance indicators and performance measures for major byproduct species

or species groups. DFWA, within 1 year, to also 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.

5. 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.
6. DFWA to review the fishery monitoring and research information needs and priorities to meet the stock assessment and management information requirements for the demersal finfish fisheries in the Pilbara region, and develop a research strategy to address and implement priority needs.
7. DFWA to review the status of goldband snapper stocks in the Pilbara region and work towards more refined yield estimates for this species. In the interim, by the end of 2006, DFWA to implement a precautionary performance measure for goldband snapper to apply to all commercial demersal finfish fisheries across the Pilbara region.
8. 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.
9. 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 Pilbara Trap Managed Fishery (PTMF) is managed by the Department of Fisheries, Western Australia (DFWA).

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

- *Pilbara Trap Managed Fishery Management Plan 1992*
- *Fish Resources Management Act 1994 (FRMA)*
- *Fish Resources Management Regulations 1995 (FRMR)*
- annual State of the Fishery reports.

DEH notes that the *Pilbara Trap Managed Fishery Management Plan 1992* sets out the formal legislative and administrative aspects of the management regime but not its management objectives, performance indicators and measures and other related aspects of the regime. Once completed, the performance report on the fishery included with the DFWA submission, the ESD report, will become part of the formal and publicly available management documentation for the fishery and DFWA has committed to formalising and publishing the performance indicators and measures for the fishery. These commitments will add to the transparency of the management arrangements by setting out explicitly the goals, objectives, performance measures and indicators, performance assessments and management responses which have been specified for the fishery. DEH endorses the formal incorporation of these key features into the management regime and decision making process.

A number of other documents, including research reports, scientific literature and discussion papers, are integral to management of the fishery. Any discussion papers and proposals for modification to the above management arrangements are distributed widely to stakeholder groups and, where appropriate, are available on the DFWA website.

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, an amendment could change the outcomes of our assessment and decisions stemming from it. Hence DEH requests that DFWA advises of any changes to the management plan that may impact on the ecological sustainability of the PTMF.

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

The management plan and legislation were developed and amendments are made through processes that feature consultation and the opportunity for involvement of stakeholders and members of the public. The FRMA outlines specific procedures for amending a management plan, which includes specification of who is to be consulted before the plan is amended and consultation with that group on any proposed amendments. The DFWA submission also describes how, while there is no formal management advisory committee for the PTMF, DFWA meets with industry members at the end of each year to review the fishery's performance and management arrangements. DFWA also involved industry representatives in the preparation of the submission. These arrangements satisfy the requirements of Western Australian legislation.

The submission gives no indication of how the fishery management arrangements will progress in a way that will ensure involvement of a wider range of expertise and community interests.

A wider stakeholder involvement in the management arrangements is particularly relevant given that the PTMF is one of three commercial fisheries that target the same range of demersal finfish stocks in overlapping areas of the WA North West Shelf region. The other fisheries are the PTIMF and the unregulated wetline fishery operating in the region, with by far the greater proportion of catch being taken in the trawl fishery. Essentially these three fisheries could be considered as one demersal finfish fishery operating in the region with three different sectors differentiated by gear type. The annual performance of the commercial trawl, trap and line demersal finfish fisheries in the Pilbara region is consolidated by DFWA under a single entity, the Pilbara Demersal Finfish Fisheries, in the annual WA State of the Fisheries Reports. These reports detail assessments of each of these three commercial sectors and of the overall status of the main target stocks in the light of information combined for all three sectors. The State of the Fisheries Report also addresses recreational catch in the region, which is equivalent to the total annual PTMF catch. While demersal finfish species targeted by the commercial fisheries in the region currently constitute a relatively low proportion of the overall recreational catch, the recreational sector, particularly charter activities, is growing and is likely to have continued impacts on demersal finfish stocks in the region. This highlights the need for integrated management arrangements that take account of the various sectoral impacts on the target stocks.

The management inter-dependence between the PTMF and PTIMF is demonstrated by DFWA drawing on the outcomes of a public workshop for the trawl fishery to develop the ESD report for the PTMF. DFWA considers this was appropriate given the overlap of species targeted and areas of operation of both fisheries. The trawl workshop involved a wide range of participants with government, industry, conservation, indigenous and recreational fishing interests. In contrast, the ongoing management advisory arrangements for the PTMF do not directly involve the broad range of stakeholders with interests in the fishery. The submission indicates that DFWA's only regular consultation is with industry. DEH considers that DFWA should ensure that the broader stakeholder interests are appropriately consulted so that all stakeholders have the opportunity to contribute to the key management arrangements in the PTMF. As the PTMF has the potential to impact on the trawl and line sectors, consultative linkages to these sectors should also be accommodated. The DFWA submission noted consideration had been given to forming a Pilbara Demersal Finfish Management Advisory Committee but had not proceeded due to budget constraints. DEH notes that, if costs preclude the establishment of a formal management advisory committee, DFWA should seek other mechanisms to ensure adequate ongoing involvement and consultation of all stakeholders.

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

Section 5 of the PTMF submission outlines the ESD report and includes details of the operational objectives, performance indicators and performance measures by which the effectiveness of the management arrangements are measured, with an emphasis on long-lived target species. It also outlines the strategies being used to meet the objectives. In relation to the target species, DEH believes that the arrangements specified are sufficiently strategic and that the objectives, performance indicators, performance measures and responses outlined are important elements that should be formally incorporated into the management regime and decision making process.

The ESD report, on which the submission is largely based, is also an integral part of the management regime. It examines benefits and costs associated with the fishery. It also identifies and assesses risks posed to the fishery and environmental components. The ESD report is yet to be finalised and is not currently a formal component of the legislative arrangements for the fishery.

When finalised, the ESD Report will document the performance of the fishery and its management in terms of the ecological, economic, social and governance issues associated with the fishery. This report will be publicly available in hard copy and on the DFWA website. The management commitments specified in this 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 has advised that it proposes to formally publish the management objectives and performance measures for the fishery as part of a series of Ministerial guidelines, as an adjunct to the management plan. The Ministerial Policy Guidelines will provide the policy framework for the management for the fishery. This document will reflect the management objectives, philosophy and guidance for decision making including the legislated management plan, the ESD report, and as relevant, reference to other documents.

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

The ESD report contains, for target species, triggers for action should performance measures not be met. A range of indicators are used to inform the performance measures including spawning biomass of key target species and catch levels and catch rates of major target species. Specific response timeframes are not stipulated in the management regime in the event of the performance measures being triggered. Part II Principle 1 of this report provides further discussion on the details and appropriateness of existing performance indicators and measures for target species.

DEH notes that where the ESD report has identified breaches in performance measures for certain species in the fishery in recent years, management action to address these breaches has not been evident in all instances. 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 byproduct, bycatch, 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.

While objectives, performance indicators and performance measures have been established in the PTMF for the key target species, the current ESD report does not contain a set of specific strategic objectives and performance measures in relation to the sustainability of the fishery in terms of the byproduct species, bycatch, protected species and the environment. Minimising the take of bycatch, including protected species, and impacts on the marine environment should be an explicit priority in the management of the fishery, regardless of the level of impact. Given the cumulative impacts of the range of fisheries on demersal finfish stocks and other species in the North West Shelf region, this should be an even greater priority for the PTMF management regime.

While the DFWA submission indicates that catch of individual byproduct species are very minor, byproduct still comprises around 21% of the total scalefish catches of the PTMF and includes a broad range of at least 38 taxa, including species targeted by the trawl fishery. Public comments also suggested an increasing market demand for a wider range of species caught by the fishery. With this increasing market trend to lower value non-target species, catches of some byproduct species such as flagfish are almost equivalent to some target species. The cumulative impacts of increased trap catch and ongoing targeting from the trawl sector will make the major byproduct

species increasingly vulnerable to fishing pressure, and warrants consistent performance measurement across the Pilbara fishery sectors to detect any adverse stock trends. Some of the major PTMF byproduct species have already triggered performance measures in the Pilbara trawl fishery in recent years, emphasising the need to closely monitor both target and major byproduct species impacts across the region.

DEH considers that similar levels of performance monitoring for target species should be extended at least to major byproduct species in the PTMF. DEH considers that major byproduct species or species groups would be those where catch levels are in excess of 10 tonnes each year (similar to key byproduct species in the Northern Demersal Scalefish Managed Fishery). On 2002 catch levels this would apply in the PTMF to flagfish and the general cod group (Serranids). DEH therefore recommends that specific objectives, performance indicators and performance measures be developed for major byproduct species or groups (where it is appropriate to use groupings) based on the best available information

**Recommendation 4:** *DFWA, within 2 years, to incorporate into the management regime fishery specific objectives, performance indicators and performance measures for major byproduct species or species groups. DFWA, within 1 year, to also 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.*

DFWA's State of the Fisheries Reports provide an annual 'report card' on ESD performance for all of the State's major commercial fisheries and some recreational fisheries. The annual reports include assessments of target and byproduct stocks, non-retained species, ecosystem effects and a research summary. This provides the mechanism to review the performance of the major aspects of the PTMF. This report also includes periodic review by the WA Office of the Auditor General. In addition, the ESD report will be reviewed every five years. This review will include an external review and full assessment, including examination of the validity of the objectives and performance measures. The full ESD report, once finalised, will be available via publication and on the DFWA website.

DEH considers that a 5 year review of the overall PTMF management is suitable provided that critical aspects, such as 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 publicly available in the annual State of the Fisheries Report.

**Recommendation 5:** *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.*

DEH considers that, once more comprehensive consultation and strategic management arrangements are developed (see Recommendations 2 and 4), DFWA will have, through the Annual State of the Fisheries report, ESD report and annual stakeholder workshops, a comprehensive, transparent and highly accessible framework for reporting on the PTMF.

Management of the fishery is based on a mixture of output and input controls, including:

- limited entry with six licences;
- annual effort control through effort quota allocations;
- ITE quotas and no limit on trap numbers, enabling flexible and efficient use of resources;
- no carry-over of unused quota;
- spatial closure to prevent overfishing of Rankin cod and red emperor;
- mandatory VMS to aid monitoring and enforcement;

- legal minimum lengths for three target species - red emperor and spangled emperor (both 41 cm) and blue-spot emperor (28 cm).

These controls are coupled with a range of operational objectives, performance indicators and measures and management actions for the primary target species described in the ESD report.

Compliance in the fishery includes a mix of sea and land patrols, fishery inspections, radar watches and compulsory use of VMS. The State of the Fisheries Report also provides detailed statistics on Departmental activities in relation to ensuring fishers' compliance with the management arrangements for each fishery. In terms of controlling the level of harvest to ensure the PTMF remains sustainable, the two main issues to be addressed are compliance with fishery boundaries and the closed area and ensuring that effort quotas are not exceeded. The combination of the small scale of the fishery (equivalent to two full-time operators) and the use of VMS makes both issues readily managed mainly from the shore, backed by random patrols, annual licence checks and gear inspections. DEH considers that these compliance measures contain the means of enforcing critical aspects of the management arrangements for the fishery.

Fishery-dependent catch, effort and locality data relating to the target and byproduct species are collected on a regular basis in the fishery. In the absence of fishery independent information relating directly to this fishery, supporting information has been drawn from the overlapping PTIMF and the adjacent Kimberley trap fishery and the Northern Demersal Scalefish Managed Fishery (NDSMF). Discussion of the information collection system can be found in Part 2 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 Part II Principle 2 of this report.

As indicated above, while most of the target species occur widely across northern Australia and beyond, DFWA has concluded that they can be managed satisfactorily as separate regional stocks. The implications of DFWA's management of the Western Australian fisheries based on these species to the south and north of the Pilbara are discussed under Principle 1 of this report.

DEH considers that the current management arrangements are consistent with all relevant threat abatement plans, recovery plans, the National Policy on Fisheries Bycatch, and bycatch action strategies developed under that policy. DEH expects that DFWA will also ensure compliance with any future plans or policies as they are developed. The FRMA provides mechanisms that allow for amendments to management of fishing practices so that they comply with any future plans of these types.

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 require 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 2 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 II, 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 PTMF management regime is documented, publicly available and transparent, and is developed through a consultative process that could be further improved. The current fishery management arrangements are adaptable and have been used effectively to maintain the fishery for target stocks at a sustainable level. However, these arrangements would be enhanced with the inclusion of more comprehensive objectives, performance indicators and performance measures so that fishery impacts on byproduct, bycatch, protected species and the environment can be more effectively measured, enforced and reviewed.

The management arrangements are capable of controlling the harvest through a combination of input and output 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 for the PTMF are obtained through compulsory catch and effort returns which fishers complete at the end of each fishing trip (average 6 to 8 days) and at the end of each month and return to DFWA. These returns provide for recording of details on all retained catch by species (in kilograms) and fishing effort (days fished, hours/day, traps pulled/day). Continuous historical data on trap catch and effort are available for the fishery since 1985. Voluntary logbooks previously provided the capacity to report catches of major species by location, however the DFWA submission noted that operators have recently stopped completing voluntary logbook returns. With the introduction of VMS in 2000, DFWA now receives spatial data on vessel locations during fishing trips, providing a comprehensive record of the spatial location of commercial fishing across the fishery and validating effort used in the fishery. VMS plots the hourly position of each vessel. DFWA advises that as fishing normally focuses on defined structures and habitats where fish aggregate, the actual areas fished each trip are usually fairly limited, providing a fairly fine scale of catch data. DFWA advises that VMS data is analyzed annually to detect any shifts in catch distribution which may indicate localised depletion. DFWA also advises that trawl data from VMS, catch returns and locational logbook data can also be used to compare catch levels and effort on target species in the area of the fishery and indicate changes in catch rates and areas of local depletions.

Catch returns are linked in the accounting process to buyer invoices and the two are compared for validation purposes. DFWA advises that this provides a sound audit trail for the only two operators in the fishery. PTMF catch and effort data is supplemented in the stock assessment process by catch and effort monitoring of the commercial demersal finfish trawl and line fisheries, recreational fishing surveys and charter fishery that target the same range of demersal finfish stocks in the Pilbara region. As the trawl fishery is the major demersal finfish fishery in the region, the trawl data provides the predominate inputs to the stock assessment process and performance measurement of the key demersal finfish species for the respective Pilbara fishery sectors.

In the ESD report, DFWA describes the robustness of the PTMF catch and effort data as “moderate”. DEH acknowledges that the capacity of the PTMF to provide a more comprehensive data management system is restricted by the small number of operators and relatively small scale of operations over an extended fishery area. DEH considers the fishery dependant data collection system to be adequate under the existing scale of operations in the PTMF. The ESD report acknowledges that catch rate information could be improved by more detailed reporting of trap catch location, and that consideration may be given to introducing management zones for the PTMF to improve the level of catch rate information for the fishery and allow area-specific effort controls. DEH notes that the Pilbara trawl fishery provides for area-based data collection and management

arrangements and supports a move to similar scale arrangements in the PTMF as a means of enhancing more integrated management of the commercial fishing sectors targeting common demersal finfish target stocks across the Pilbara region.

The submission refers to trap fishers' ability to target key species such as red emperor. The 2002/03 State of the Fisheries Report notes that improved efficiency in the PTMF has resulted in recent increases in catch rates and that further effort adjustments may be necessary to compensate for this. DFWA advises that while determining efficiency increase is problematic due to the small number of vessels, vessels constantly being upgraded or replaced, and the skippers and crew varying considerably between years, an efficiency increase is included in the assessment of catch rates. The efficiency increase factor is derived from comparisons of catch per unit effort (CPUE) before and after known changes to fishing power in the PTMF. The current efficiency factor is 3% and is also taken into consideration by DFWA in forecasting future trends in key species biomass. Effort allocations, including the nominal weighting for the average number of traps used each fishing day, are reviewed annually by DFWA in consultation with operators. DFWA advises that fishers nominate the number of traps used each fishing trip and that this is monitored under compliance and enforcement arrangements. Given the reliance on fishery dependant effort data in the management of stocks, DEH urges DFWA to continue to ensure that factors such as species targeting and efficiency increases are addressed through effort standardisation or other means of reliably determining effective effort in the fishery.

There is no ongoing or proposed fishery independent information collection specifically for the PTMF and no established observer programs specifically covering the PTMF. The Fisheries Research and Development Corporation (FRDC) funded research in the 1990s on key long lived and short lived target species in the Pilbara trawl fishery provided information on the exploitation levels, age and size structure and biological characteristics of five key target species (red emperor, Rankin cod, blue spot emperor, flagfish and rosy threadfin bream). That information provides the basis for biological data inputs in the preliminary stock assessment model used for determining performance measures and sustainable fishing effort for the key indicator species (red emperor, Rankin cod and blue spot emperor) in both the PTMF and the PTIMF.

The submission notes that a structured sampling program would be beneficial to re-assess the trawl fishery age composition data obtained in the 1990s, with a focus on the above three prime indicator species and possibly extended to goldband snapper. DFWA has advised that age composition data for red emperor and bluespot emperor was collected in 2001 and 2003 from the trawl fishery, and goldband snapper otoliths are being collected in 2004. An otolith collection program funded by industry is being planned whereby age-composition data for 3 or 4 species will be collected annually to achieve a sample in each of the 4 trawl areas every 5 years. DEH notes that FRDC project 2004/42 "Determination of a cost effective methodology for ongoing age monitoring needed for the management of finfish fisheries in Western Australia" has recently been approved. This project includes red emperor, goldband snapper and cods in the Pilbara region, and should give further impetus to providing ongoing age composition data in the stock assessment of key species.

The DFWA submission notes the considerable amount of recreational and charter boat activity in the Pilbara region. A 12 month creel survey of recreational boat and shore-based fishing in the Pilbara region in 1999-2000 estimated recreational scalefish catch of around 300 tonnes, which is 10% of the total commercial demersal scalefish catch in the Pilbara region and equivalent to the total annual Pilbara trap catch. The recreational catch estimates did not include charter boat fishing which has increased substantially in the Pilbara region in recent years. Charter vessels have been required to provide catch and effort trip summaries since 2001.

The 1999-2000 creel survey data is complemented by recreational catch data available from the 2000/01 National Recreational Fishing Survey in determining the recreational component in the stock assessment process. The ESD report notes that there are no immediate plans to conduct another recreational survey in the Pilbara region, and that it will be increasingly problematic to detect increases in recreational catch in the future. DEH considers the continued reliance on recreational survey data from 1999-2000 is increasingly questionable with time, given the reputed growth in the sector, and no indication of how the data are used in assessments. The ESD report also notes concerns from commercial trap fishers that the charter and recreational catches are being under-estimated.

DEH also considers that information on the extent of removals from the fishery due to discarding is limited as there is no provision for trap fishers to record discarded species and no mention of the estimation and allowance for fishing-induced bycatch mortality in the stock assessment process.

DEH considers that the current monitoring arrangements and the application of information gained from nearby trawl, trap and line fisheries have been adequate to meet stock assessment, risk assessment and other management needs during the development phase of the fishery. However, given the consolidation of operations in the PTMF, potential changes in species targeting and continuing cumulative impacts of fishing from various sectors on the target stocks, DEH considers a range of issues concerning the data collection and monitoring systems and research programs still require addressing. These include:

- No consolidated research strategies for the Pilbara demersal finfish sectors to build on the baseline research in the region and refine yield estimates for overall stocks and individual target species;
- No independent monitoring to validate fishery dependant catch and effort data and confirm estimates of spawning biomass and recovery from past overfishing;
- Need to establish consistent performance measures for the pending formal management of the line fishery in the region;
- Inconsistent spatial scale of management between the trawl and trap fisheries;
- Reliance on trawl data to inform the stock assessment processes for the PTMF despite different gear, species targeting and areas fished;
- Need to take account of catch selectivity of the various Pilbara fishing sectors and its effect on stock assessment process when determining stock structure, localised impacts and the cumulative impacts across the lifecycle of targeted and non-targeted species; and
- The magnitude of the recreational catch and the uncertainty surrounding future recreational catch estimates.

DEH considers that the above issues warrant a strategic examination of the monitoring and research requirements of demersal finfish stocks in the Pilbara region to ensure that stocks are being managed on a sustainable basis in the longer term. Development of a strategic research plan would provide greater certainty that these issues are being given priority and dealt with on an integrated fisheries basis.

DEH considers that the data needs of the PTMF cannot be addressed just at the single fishery level but should be addressed at a whole-of-stock level, involving the examination of the monitoring, research and assessment needs for all commercial and recreational Pilbara demersal finfish sectors as a whole. Ensuring sustainability of target, byproduct and bycatch species requires coordinated action across all demersal fisheries in the region, in terms of information collection and management responses – and in terms of cost efficiency spread equitably across all sectors.

**Recommendation 6:** *DFWA to review the fishery monitoring and research information needs and priorities to meet the stock assessment and management information requirements for the demersal finfish fisheries in the Pilbara region, and develop a research strategy to address and implement priority needs.*

## **Assessment**

As previously noted, there are multiple and overlapping impacts on demersal finfish stocks in the Pilbara region from a range of fishing sectors that target a similar range of both short and long lived demersal finfish species. Therefore DEH considers it is imperative that assessments of these stocks take account of the past and present cumulative impacts of these various sectors on both key target and non-target species and that integrated management responses to the various stock trends detected are needed.

Fishing for Lutjanids (tropical sea perches and snappers such as red emperor, scarlet sea perch and red snapper), Serranids (rock cods and coral trouts such as Rankin cod) and Lethrinids (emperors and sea bream species such as blue spot emperor and spangled emperor) by Western Australian, Northern Territory and Queensland commercial fishers dates back many years. Until around 1990 there were also substantial fisheries for these species by Japanese and Taiwanese trawlers on the North West Shelf. Between 1959 and 1963 Japanese stern trawlers caught around 16,700 tonnes, primarily of Lethrinids, and contributed to a considerable change in the size composition of these species. Taiwanese pair trawlers operated from 1972 to 1989, with peak catches of 20,000 to 30,000 tonnes per year in the early years of the fishery, targeting Lethrinids, Lutjanids, threadfin bream and lizardfish. CSIRO research indicated that the demersal habitat of the region was significantly modified by substantial trawling effort during this period. Impacts included changes to species composition, such as decreases in size of large snappers and emperors and increases in the abundance of short lived species such as threadfin bream and lizardfish, and changes to the physical topography and sponge garden assemblages associated with the sand bottom. The public comments from the trap industry acknowledged the fishing pressure on North West Shelf stocks from this period by noting that fishing grounds in the North West Shelf are still in an extended recovery phase from this sustained foreign demersal trawl activity.

In comparison to the earlier foreign fishing activity, the catches from domestic commercial fishing operations for demersal finfish that have operated in the region since 1989 are significantly less. The PTIMF commenced in 1989 and primarily targets high volume and lower value snapper and bream species such as threadfin bream, blue spot emperor, red snapper and flagfish. This fishery reached a peak catch of 3,210 tonnes in 1996 before catches declined to 2,310 tonnes of demersal scalefish in 2002. The PTMF, which commenced in the early 1980s and primarily targets long lived, high value species such as red emperor, scarlet perch, spangled emperor, Rankin cod and goldband snapper, caught 306 tonnes in 2002. The open access line fishery also operating in the region caught 90 tonnes of demersal finfish in 2002, which included significant catches of goldband snapper and spangled emperor.

Attachment 1 of this report outlines a range of data from the ESD report used in 2002 to assess the respective Pilbara demersal finfish sectors and provide estimates of stock status and trends. The table clearly shows that the PTIMF takes the greatest proportion of demersal finfish species in the Pilbara region except for spangled emperor and Rankin cod, where the PTMF takes the a major proportion of the catch.

The influence of the trawl fishery is reflected in the stock assessment process. The primary stock assessment process uses a preliminary stock assessment model that draws on catch rate data and age structure data from past and current trawl catches, supplemented by catch data from all sectors

(both commercial and recreational), to derive annual spawning biomass estimates, expressed as percentages of virgin spawning biomass, for three indicator demersal finfish species targeted across the region - Rankin cod and red emperor (used as the primary indicator species for the status of more vulnerable long lived species) and blue spot emperor (used as an indicator of less vulnerable and faster growing species). Red emperor is used as the indicator for the suite of long-lived snappers and emperors while Rankin cod represents more site attached species. DFWA uses the stock assessment model to determine the likely impact of various levels of fishing effort on stocks of the three primary indicator species and hence the eventual effort allocations that apply across the managed Pilbara trap and trawl fisheries. Given the primary reliance on trawl data to inform the stock assessment model and the restrictions on trawling in the eastern and western portions of the PTMF fishery area, the ESD report has acknowledged that there are some limitations in terms of the spatial coverage and reliability of applying stock assessment outcomes across all areas of the Pilbara demersal finfish fisheries.

DFWA has set a precautionary lower limit of 40% of virgin spawning biomass as the basis for the performance measure for the above indicator species. Attachment 1 shows that the estimated spawning biomass of each of the three indicator species was above this lower limit at the 2002 review. The outcomes of the annual stock assessments are reported in the DFWA State of the Fisheries Report.

The formal stock assessment process is supplemented by annual reviews of catch and catch rates for all Pilbara demersal finfish fishery sectors to provide a broader indication of the status of stocks. These reviews are also reported in the DFWA State of the Fisheries Reports. Catch and catch rate evaluation is undertaken for the ten main target commercial finfish species listed in Attachment 1 that are caught across the various Pilbara commercial fishing sectors. Performance measures based on annual catch and catch rate analysis are in place for both the trap and trawl fishery for the six major long lived target species that are considered most vulnerable to overfishing (on the basis of significant harvest levels, relatively long life spans, slow growth rates and late age of maturity) – red emperor, Rankin cod, scarlet perch, goldband snapper, red snapper and spangled emperor. Additional performance measures for four short lived target species – blue spot emperor, rosy threadfin bream, flagfish and frypan snapper – are in place for the trawl fishery. The ESD report includes an operational objective of maintaining the spawning stocks of these 10 species at or above levels that minimise the risk of recruitment overfishing.

The ESD report and State of the Fisheries Report take account of the outcomes of the formal stock assessments, annual reviews of performance measures for major target species and recent effort reductions in concluding that the stock levels for all target species are at adequate levels for the short to medium term. While DEH concurs with this immediate assessment it also notes from the outcomes of the stock reviews shown in Attachment 1 that four species targeted by the PTMF will require further management attention – Rankin cod, red snapper, goldband snapper and spangled emperor. Rankin cod and spangled emperor are primarily targeted by the PTMF, and while the stock assessment for Rankin cod and performance measures for these species in the PTMF were not triggered in the latest review, the recent adverse catch rate trends in the trawl sector indicate potential problems with their stock levels across the fishery sectors.

DFWA has been responsive to trends in these reviews by acknowledging, in the ESD report, the need to closely monitor these species and the possible requirement for further reductions in trawl effort. DFWA has previously addressed adverse catch rate trends with Rankin cod and spangled emperor and localised depletions of the primary indicator species, detected through the stock assessment process, by reducing allocated effort in 2002 by 10% in two of the management areas of the trawl fishery experiencing localised depletions, and by 7% across the whole trap fishery.

DEH acknowledges these responses but notes that specific responses to the triggering of performance measures in the PTMF for red snapper and goldband snapper have not been undertaken, despite the indications from Attachment 1 and the ESD report of increased targeting of these species across the Pilbara fishing sectors. The great majority of red snapper catch is from the trawl sector and the most appropriate management responses to stock trends would be through the PTMF management. However, DEH has concerns with the growing multiple impacts on goldband snapper across the Pilbara region.

The 2002/03 State of the Fisheries Report and the ESD report both raised concerns over the rising catches of goldband snapper in both the PTMF and trawl fishery, following the near-doubling of the catch by all sectors between 2000 and 2001. As a long-lived species that is vulnerable to over-exploitation, goldband snapper is not one of the indicator species and therefore not subject to formal stock assessment. The trends in goldband snapper stocks are assessed through the generic secondary performance indicators, based on catch and catch rates, applied to the ten demersal finfish target species in the region. This points to the importance of exercising flexibility in stock assessment and management strategies in response to emerging issues and trends. It also emphasises the need for complete and accurate catch and effort monitoring for all retained species. Although goldband snapper make up only 12% of the harvest by the PTMF, catches from the commercial demersal finfish sectors in the Pilbara region comprise around 32% of the WA landings of this species. The ESD report notes that operators in the PTMF have suggested goldband snapper be subject to detailed stock assessment.

Goldband snapper is an important commercial species in the North West Shelf and adjoining regions, being a major target species in the adjoining NDSMF in the Kimberley region and in the Northern Territory Demersal Fishery, where DEH has recommended the development of precautionary trigger points as an interim measure while the knowledge base and productivity estimates are improved. Given the susceptibility of goldband snapper to overfishing and the increased landings of the species across commercial and charter Pilbara finfish fishing sectors in recent years, there are strong indications that this species may come under increasing fishing pressure in the Pilbarra region.

DEH supports a review of goldband snapper data across all demersal finfish sectors of the Pilbarra region and the development of more refined yield estimates for this species that would lead to species-specific performance measures and formal stock assessment. As noted earlier in this report age-composition data for goldband snapper is being collected from the trawl fishery in 2004. DEH acknowledges that the necessary data to further develop robust goldband snapper measures would depend on the progressive implementation of changes arising from the recommended review of assessment and management information needs (see Recommendations 6). However, DEH recommends that a preliminary performance measure specific for goldband snapper, to apply across the commercial demersal finfish fishing sectors in the Pilbara region, be established in the interim to improve detection of adverse stock trends.

**Recommendation 7:** *DFWA to review the status of goldband snapper stocks in the Pilbara region and work towards more refined yield estimates for this species. In the interim, by the end of 2006, DFWA to implement a precautionary performance measure for goldband snapper to apply to all commercial demersal finfish fisheries across the Pilbara region.*

DEH considers that a relatively comprehensive framework has been established to review stock trends and estimate relative abundance of the target species of demersal finfish in the Pilbara region. However, given the cumulative impacts from the various fishing sectors and reliance on data from various sources, the stock assessment process does require further enhancement to provide more robust estimates of stock status and productivity. The ESD report notes that the stock

size and recruitment relationship is unknown for all target species in the fishery. The DFWA submission indicates that 20 years of monitoring and research has enabled a very reliable estimate of the sustainable yield to be calculated for the trap fishery. However, no quantified estimates of sustainable yield or potential productivity for demersal finfish stocks in any of the Pilbara demersal finfish fisheries are provided in the DFWA submission or the WA State of the Fisheries Reports.

A provisional yield limit for the overall catch of major demersal finfish species has been established, based on recent historical catch and effort figures. This is expressed as an acceptable total catch limit of approximately 300 tonnes for the PTMF. However, there is no indication whether this acceptable catch limit takes account of the cumulative impact of catches across the various Pilbara demersal finfish fisheries. The ESD report notes that within this overall catch figure, further consideration needs to be given to catches at a species level, in particular for Rankin cod and red emperor. DEH concurs with the need to take a more species-specific approach to stock assessment and performance monitoring.

DEH is encouraged to see that, within the scope of available information, stock assessments and management responses are generally being considered collectively for the Pilbara trap, trawl and line fisheries before detailed fishery-by-fishery assessments and responses are undertaken. In this regard the current reliance on catch and catch rate trend data is unlikely to provide an adequate basis for ongoing performance measurements and stock assessments for the PTMF target species, particularly as DFWA acknowledges in the submission that variations in trap catches reflect changes in fishing practices rather than changes in stock abundance. This issue and the apparent absence of a periodic review of the stock assessment and data requirements for the PTMF emphasise the need for a thorough review of assessment and management information needs across all the Pilbara demersal finfish fisheries (see Recommendation 6).

The submission gives no indication that the stock assessment approach used is periodically reviewed and updated or exposed to independent peer review.

As previously noted, fishing for Lutjanids, Serranids and Lethrinids by Western Australian, Northern Territory and Queensland commercial fishers dates back many years and contributes to the historical knowledge of the distribution and spatial structure of the respective stocks. Combined with the intensive and sustained fishing pressure on demersal finfish stocks in the North West Shelf region from the 1960s to the 1980s by Japanese and Taiwanese trawlers, the distribution, spatial and stock structure of the target finfish species in the Pilbara region have been well documented. Apart from catch and effort data from foreign fishing vessels obtained for that period, catch monitoring programs have been conducted at various stages by the Taiwan University, Australian Federal Department of Primary Industry and by DFWA. In addition, CSIRO has conducted research on species composition and biological characteristics of target stocks. Accordingly, the results as they apply to this fishery have been incorporated in fishery assessments and management responses. VMS data has also expanded the capacity to spatially identify stocks of the target species based on spread of fishing effort.

The DFWA submission states that while most species are very widely distributed, the available information suggests limited larval dispersal and adult movement within populations of each target species. However, the 2002/03 State of the Fisheries Report notes the potential for exchange of eggs and larvae of goldband snapper with the Kimberley region, where it is a key target species in the NDSMF, and the need to consider the implications of any impacts on stock recruitment for this species in the adjacent Pilbara and Kimberley fisheries. DEH considers this issue should be further examined in the context of developing interim performance measures for goldband snapper (see Recommendation 7).

The available information generally supports DFWA's position that the target demersal finfish species constitute separate regional populations and should be treated as separate stocks for management purposes. Research in recent years has been undertaken to assess demersal fish stocks in the deeper waters off the Pilbara coast. The FRDC project 97/138 in 1998 surveyed the distribution and abundance of adult and juvenile stocks of several of the major finfish species caught in the Pilbara fisheries, including scarlet perch and goldband snapper, in depths of 100 to 200 metres and found that commercial catches were more viable in depths of less than 140 metres. Over a similar period FRDC project 98/152 involved surveys of the deepwater demersal finfish resources in the adjoining North West Shelf Trawl Fishery that also resulted in low catch rates for the deepwater areas surveyed.

As previously noted in this report, there are a wide range of commercial and recreational demersal finfish removals in the Pilbara region that are relevant to the assessment of stocks available to the PTMF and factored into the stock assessment process for the major target species. Long term catch and effort databases for commercial removals from the fishery, with trap fishery records date back to 1985, trawl catch and effort datasets from the early 1960s for foreign trawlers and from 1989 for domestic trawling, and monthly summary line catches from 1985. The 1999-2000 creel survey of recreational boat and shore-based fishing in the Pilbara region provides the basis for estimating recreational catch removals, along with charter catch and effort trip summary that have been available since 2001. The ESD report indicates spangled emperor, red emperor, barramundi, threadfin salmon and mackerel species as prime recreational catch species that are also caught by the commercial sectors. The 1999-2000 creel survey identified substantial recreational catches of spangled emperor (12 tonnes) and red emperor (6 tonnes). The 2002/03 State of the Fisheries Report recorded charter fishing catches of 3 tonnes of red emperor and 1 tonne of Rankin cod.

DEH has previously identified in this report the need to provide for more robust recording of discards so that they can be taken into account in the stock assessment process. The adequacy of existing data collection measures for monitoring removals from all sources, including recreational, charter and discarded commercial catch, should be addressed in the recommended review of monitoring and research requirements (see Recommendation 6).

## **Management response**

The management regime for the trap fishery takes account of the cumulative fishery impacts on target demersal finfish stocks through the use of integrated performance indicators for commercially targeted species linked to performance measures. The status of the two formally managed commercial fisheries in the region, the PTMF and the trawl fishery, are assessed every year against the performance measures established for the target species. As previously noted the fishery data from the Pilbara trap, trawl and line fisheries are combined to assess fishery impacts on indicator stocks, the sustainability of the fishery and the need for management interventions. The overall catch objective for the PTMF is to maintain the total catch of the major demersal finfish species within the historical acceptable catch range for the 6 major demersal finfish species in the PTMF. For the PTMF this acceptable catch range is 150 to 300 tonnes. The target for the performance measure is to maintain the catch of major demersal finfish species in the PTMF at around 300 tonnes. This performance target provides the basis for setting indicative effort allocation in the PTMF.

More detailed analysis of the indicative stock trends is provided by the comprehensive suite of operational objectives and primary and secondary performance indicators and performance measures applicable to the main target species discussed earlier in this report. The outcomes of the 2002 evaluation of these performance measures are shown in Attachment 1.

The primary performance measures applying to the three indicator species - red emperor, Rankin cod and blue spot emperor – requires the maintenance of median spawning biomass at above 40% of the estimated virgin spawning biomass levels. Virgin levels for red emperor and Rankin cod are assumed to be spawning biomasses as at 1972 and 1989 respectively, which coincide with the earliest available catch data for these species. While DEH agrees that this is a precautionary strategy it has some concerns about the validity of using 1989 as the baseline for virgin spawning biomass levels for Rankin cod, given the previously mentioned extensive targeting of demersal finfish species by trawling that occurred in the region prior to 1989. The secondary performance measures in the PTMF are triggered if the catch of the six target species monitored (red emperor, Rankin cod, scarlet perch, spangled emperor, goldband snapper and red snapper) increases by more than 20% above the average annual catch of the previous four years, or the catch rate decreases in two consecutive years.

The ESD report notes the requirement to conduct a review to determine the causes of breaches in the performance measures for the fishery. Management responses to these breaches depend on whether there is evidence of declines in spawning biomass. Response actions are therefore heavily weighted towards detecting changes in the stock status of the three primary indicator species. While specific management responses are not prescribed, the main tool used to address declines in spawning biomass is adjustment of effort allocations through total effort reductions, area closures or redistribution of effort across fishery areas. These measures may be implemented for the management regimes of both the Pilbara trap and trawl fishery sectors to address the cumulative impacts on target stocks, as occurred with the previously mentioned effort allocation reductions in both the trap and trawl fisheries to address detected localised depletions of primary indicator species following the 2002 stock assessment and review.

As noted in the previous Assessment section of Principle 1 of this report, DEH has concerns that no evident response was undertaken for the triggering of the red snapper and goldband snapper performance measures in the 2002 review, despite, in the case of goldband snapper, the acknowledgement in the ESD report of recent targeting of the species by all commercial sectors and the growing charter fishery. The above response process implies a management focus on evidence of spawning biomass declines before implementing management actions in response to breaches in performance measures. This may preclude the requirement for immediate action on those species that trigger secondary performance measures, such as noted above for goldband snapper and red snapper, but are not yet subject to formal spawning biomass assessments. DFWA has agreed to implement more definitive responses to future breaches in performance measures within clear timeframes (see Part I of this report).

DEH considers that the suite of performance indicators and measures currently in place are adequate for the existing scale of the PTMF but could be improved to ensure effective detection and response to future changes in harvesting trends. Measures should be more robust once the improvements to catch and effort analysis and stock monitoring recommended under Recommendations 6 are implemented.

The current trap fishery management regime aims to maintain ecologically viable and productive stock levels through a range of input controls and limited output controls for certain species. These measures were outlined in Table 1 and Part I of this report.

The primary management tool for this fishery is the use of annual effort quotas calculated to constrain the annual PTMF to a limit of 300 tonnes. There are also minimum legal size limits in WA for some of the commercial finfish species targeted in the Pilbara region, with a legal minimum size of 41 cm applying for red emperor and spangled emperor and 28 cm for blue spot emperor. The management of the PTMF under ITE quota arrangements commenced in January 2000. This

measure has capped the number of trap days and assisted in reducing latent effort in the fishery to the point that effort quotas in the fishery are currently concentrated into the operations of two licensees. Effort allocations are reviewed annually and adjusted in response to trends in stock abundance. As previously mentioned, the total effort allocation for the trap fishery was reduced by 7% in 2003 in response to localised depletions detected in the key indicator species (Rankin cod, red emperor and blue spot emperor). These recent reductions in annual effort applied to both the trap and trawl sectors have demonstrated DFWA's capacity to apply corrective measures in a timely manner, coordinated across fishing sectors.

As previously noted, while the trawl fishery is zoned into management areas with access restricted to certain parts of the fishery, the PTMF is not zoned into specific management areas. Allocated fishing effort quota for the PTMF may be used in any part of the fishery apart from Area 3 of the trawl fishery (central part of the trap fishery), where a permanent closure exists for trap and trawl fishing as it is an area of relative abundance of longer lived species such as Rankin cod and red emperor. Public comments noted that operators have adopted practices that effectively distribute effort across the fishery area on a rotational basis. While this is reflected in some way in the VMS spatial effort data, the ESD report acknowledges that finer scale management of the PTMF would provide for a wider range of management responses to the triggering of performance measures for target species. In particular this could entail redistribution of effort away from areas where over exploited species occur to areas of less vulnerable species, as currently provided for in the trawl fishery. DEH concurs with this approach and has suggested earlier in this report that DFWA explore further means of managing the PTMF on a similar spatial scale to the Pilbara trawl fishery.

As mentioned in Part I of this report, DEH considers that the combination of mandatory VMS, sea and land patrols, fishery inspections, radar watches, gear inspections and annual licence checks provides adequate measures to enforce compliance with the management arrangements given the current scale of the trap fishery. The introduction of VMS monitoring has facilitated a high level of compliance with effort quotas essential to effectively control the annual take. The ESD report notes that since the introduction of VMS in 2000, no offences have been reported in the trap fishery. While the ESD report also noted that a compliance risk assessment for the fishery will be used to direct priorities for compliance measures, the submission provides no further details on what the risk assessment would entail and when it would be implemented. DEH considers that a compliance risk assessment may have some bearing on the previously recommended review of monitoring arrangements across the various Pilbara fishing sectors and suggests DFWA give priority to the early development and implementation of a compliance risk assessment for the PTMF.

The regulated trawl and trap fisheries provide for structured management responses to control the removal of demersal finfish. However, DEH is concerned that the unconstrained take by the commercial line, recreational and charter fishing sectors has the potential to undermine the effectiveness of these management measures and the overall sustainability of fishing for the target species. The absence of specific controls in the line sector also prevents a fully effective integrated management approach being undertaken for target species.

The ESD report notes that an acceptable catch range of 50 to 115 tonnes has been established for the commercial line sector based on historical line catch data and that commercial line catches have been well within this range since 1997. However, the line fishery has a significant impact on several key long-lived target species, accounting for 17% of goldband snapper, 12 % of spangled emperor and 8% of Rankin cod catches for all commercial sectors in 2002. Trap operators are concerned that line fishing effort on these species is increasing significantly. DEH concurs with the trap fishers' views expressed through public comments on the DFWA submission that while fishing effort in the line sector remained essentially unregulated, confidence in the sustainability of stocks across all fishing sectors is undermined.

DEH notes that DFWA is currently undertaking a review of the wetline fishing sectors across WA to formalise management arrangements, while the ESD report notes that a management plan for the wetline fishery is currently being developed. DFWA has advised that while the immediate priority for wetline management arrangements is being given to the Gascoyne and West Coast regions to the south of the Pilbara, the WA Minister for Agriculture, Forestry and Fisheries has indicated intentions to implement interim measures to restrict line fishing in the Pilbara region until the longer term access and allocation issues can be more thoroughly addressed. These interim management arrangements are expected to be in place by the end of 2004 following relevant consultations. DFWA also advise that the data integrity requirements of the catch and effort data for the wetline sector will be addressed as part of the wetline review of the Pilbara region. DEH urges DFWA to incorporate the wetline sector within the recommended review of monitoring and research arrangements and other integrated management measures across the Pilbara region.

The ESD report noted that the recreational fishery in the region is subject to bag and size limits but otherwise there was no limit on access by charter or recreational fishers to demersal finfish in the Pilbara region. The ESD report also notes the recent boom in charter operations in the region, with 85 fishing tour licences and 5 ecotour licences now issued for the north coast bioregion that includes the Pilbara. DEH considers that the growing significance of recreational use of demersal finfish resources in the Pilbara region requires that further attention be given to the adequacy of management measures for the sector. The ESD report notes that an Integrated Fisheries Management Review Committee (IFRMC) has been established in WA to develop a strategy to integrate the management and sustainable use of fish resources. The IFRMC is addressing the issue of resource allocation for fish stocks across WA and reported to the WA Fisheries Minister on a proposed allocation framework in November 2002. The Minister is expected to respond to the report in 2004. DEH encourages DFWA to give early consideration to the decisions made concerning resource allocation to ensure that a sustainable management system is in place to address the impacts of recreational and charter fishing on demersal finfish stocks in the Pilbara region.

The ESD report indicates that the PTMF byproduct catch in 2002 was 66 tonnes, or 21% of the overall PTMF catch. The DFWA submission indicates that catches range across at least 38 taxa and are recorded on monthly (or trip-based) catch and effort returns by trap fishers. Apart from rock lobsters, any species may be retained as byproduct. Most catches were below 1 tonne for the respective species, with the majority of catches above 1 tonne coming from non-target Lethrinid (emperors, sea-breems), Lutjanid (sea perches, snappers) and Serranids (rock cods, coral trouts, groupers) species and sweetlip, javelin fish and trevally species. The ESD report notes that these major byproduct species have life history traits such as rapid growth, high natural mortality, moderate fecundity and wide distribution that gives them a low vulnerability to overfishing and that PTMF byproduct catches are therefore unlikely to adversely impact on these stocks.

While the catch of individual byproduct species in the PTMF may be relatively minor, a small number of byproduct species in the PTMF are also taken as a significant part of the catch by other Pilbara fishing sectors. For example, 12 tonnes of flagfish and 1 tonne of frypan snapper were taken as byproduct by the PTMF in 2002. Between them, these species constituted 11% of the total catch by the trawl fishery. The DFWA submission also notes that catches of lower value species have been increasing in the PTMF since 1996, and as previously noted public demand is growing for a wider range of market species. This illustrates the importance of complete and accurate reporting and assessment of all harvested species in all Pilbara fishing sectors.

DEH considers that the extent of byproduct taken in the PTMF, the cumulative impacts on byproduct species from overlapping fisheries and the increasing market demands for a wider range

of species to be landed warrants ongoing monitoring and assessment of at least the major byproduct catch in the PTMF. DEH has recommended earlier in this report (see Recommendation 4) the development of objectives, performance indicators and performance measures for major byproduct species or groups, based on best available information, so that any adverse trends can be more readily detected and addressed.

## Conclusion

On all current indications, DEH considers that the management regime in the PTMF is sufficiently precautionary and has provided for the fishery to be conducted in a manner that has not led to overfishing 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 a more rigorous management processes to take account of the cumulative impacts of other commercial and recreational fishing sector operations in the fishery area on both target and non-target stocks and the broader ecosystem. Review and enhancements to existing information collection systems, development of research programs, more species specific-stock assessments for target species and performance measures for major byproduct species, along with more consistency in management measures with other demersal finfish fishery sectors in the Pilbara region, would provide greater certainty in the longer term that stocks are being maintained at ecologically viable levels.

DEH has provided 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 PTMF at present. Public comments on the submission make the point that North West Shelf fish stocks are, in a sense, still in a recovery phase following decades of large-scale trawling by foreign operators. The comments indicate the industry view that such a recovery is, indeed, occurring. 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.

Performance measures and management responses are in place, or under consideration, to avoid the risk of overfishing of demersal scalefish by the PTMF. The commercial trap and trawl sectors of the Pilbara demersal finfish fisheries are being managed in such a way that effort quota allocations are being co-ordinated and adjusted where necessary to address the triggering of performance measures and compensate for localised depletions of key long lived indicator species such red emperor and Rankin cod. DEH has recommended earlier in this report that DFWA extend appropriate responses to other species affected by breaches in relevant performance measures.

DEH considers this to be both a precautionary and suitably adaptive management strategy. Recommended enhancements to the management arrangements including reviewing monitoring arrangements, developing demersal finfish research strategies, more species-specific management measures and byproduct performance measures will be integral to the continued recovery of the stocks and longer term sustainability of the fishery.

## **Conclusion**

DEH considers that the PTMF target stocks are not consistently below any of the defined performance measures 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 data collection and monitoring systems, research 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 collection of information on bycatch caught in the PTMF, nor has there been any survey of bycatch in this fishery. Voluntary logbooks used to record bycatch during the 1990s are no longer in use. As a result, the only available information is a combination of anecdotal information and data extrapolated from the PTMF and the trap fishery to the north, the NDSMF in the Kimberley region. The bycatch survey in the trawl fishery was undertaken in 2002 over a 5 month period and provides a single estimate of bycatch species in the areas of the Pilbara trawl fishery. This survey provided estimates of scalefish, sharks and rays and invertebrates caught and discarded in the trawl fishery, including species such as triggerfish that are also known to be caught in the PTMF. Along with triggerfish, anecdotal information indicates small quantities of moray eels, tropical lobsters, bugs, crabs, octopus, small elasmobranchs such as wobblygongs and other scalefish such as catfish and barracuda are occasionally caught as bycatch in the PTMF.

The DFWA submission notes that there are no plans to conduct a bycatch survey or to require trap fishers in the Pilbara region to systematically record bycatch. While consideration is being given by DFWA to conducting an observer supported bycatch survey every 5 years in the Pilbara trawl fishery, there is no indication from DFWA that these arrangements will extend to monitoring the levels of bycatch in the PTMF. DEH considers that reliance on bycatch information from other fisheries has limited value for the PTMF. The bycatch by traps and trawl nets are clearly different as are the likely survival rates of bycatch released after capture by these two methods.

The DFWA submission notes that the NDSMF uses different fishing methods to the PTMF, and the submission and the State of the Fisheries Reports show quite clearly the differences that can exist between catches in the different areas of operation within the various Pilbara demersal finfish fisheries. Furthermore, the DFWA submission states that "under-sized red emperor can be caught in significant quantities in some areas" by the PTMF. As a key indicator species for both the trap and trawl fisheries with recent indications of localised depletion, DEH considers that ongoing

monitoring of the discarding of this and other key species is essential for effective sustainable management of stocks across the Pilbara region.

DEH considers that at least a periodic fishery specific mechanism needs to be implemented to monitor and validate future levels of bycatch. DEH notes the PTMF has provided for ongoing logbook recording of discards and non-retained species and that an observer program will be developed to enable bycatch verification every 5 years. DEH considers that a similar approach is warranted in the PTMF to ensure an integrated approach is taken across the Pilbara region to detecting and responding to any adverse bycatch trends.

**Recommendation 8:** *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.*

### **Assessment**

The ESD report outlines the risk assessment approach undertaken for the impacts of the PTMF on bycatch species, based primarily on available information from the 2002 PTMF survey, anecdotal reports of fishers and comparisons with bycatch data from the NDSMF. The outcomes of this assessment found that the extent of discarding in the PTMF presented only negligible risks to elasmobranchs, scalefish, and macro-invertebrates. The assessment found that triggerfish (mainly *Abalistes stellaris*) are the most discarded species with estimated catches of 2.9 tonnes or around 1.1% of the total PTMF catch. The DFWA submission notes that previous studies on the triggerfish in the region indicate a high survival rate for discards. Other bycatch species addressed by the risk assessment included wobblygongs, moray eels, tropical lobsters, crabs, bugs and octopus. All these species were estimated to be caught in very small quantities and their vulnerability to fishing was found to be minimal due to their broad distribution, including areas that are closed to trap and trawl fishing, and the relatively small scale of trap fishing operations.

DEH acknowledges that the risk assessment approach used is the most appropriate given the limited available bycatch data directly relevant to the PTMF. However, for reasons outlined above, DEH considers the sources of data used as inadequate to accurately inform ongoing risk assessments for the PTMF. Accordingly, DEH concludes that while the risks to bycatch species may indeed be negligible, more reliable information is needed as the basis for ongoing management of PTMF impacts on bycatch (see Recommendation 8).

### **Management response**

The existing management arrangements do not include any specific bycatch mitigation measures, apart from the stipulated mesh size for the traps that allows for escapement of smaller non-target species and a requirement that traps which are left in the water unattended must be unbaited and have their access panels open to allow free exit of fish. DEH considers the relatively short time period for traps to be in the water before retrieval (up to 2.5 hours) should also contribute to reducing the susceptibility of bycatch species to capture. DFWA considers that the management arrangements in place for target species in the PTMF, primarily the low total fishing effort, area closures and small area fished (relative to the distribution of bycatch species), provides for minimal impacts on non-target species. DEH has previously recommended in this report the development of a management objective to minimise bycatch (see Recommendation 4).

While minimum legal size limits apply for some commercial species targeted by the fishery, the depths that the fishery generally operates at would most likely result in landed species suffering some form of barotrauma that would adversely impact on the survival of discarded species including undersized target species. A more effective approach would be to minimise the retention in the traps of non-target species and small fish of target species through use of optimal mesh size

in the traps. The DFWA submission indicates that the legal minimum size for two of the six major target species is 41 cm while the mean sizes at first maturity for the other four species range from around 40 to 60 cm. Despite this, the 50 x 70 mm mesh size used in traps is capable of retaining much smaller fish and other bycatch. DEH notes that traps used in the Northern Territory Demersal Fishery, that targets a similar range of finfish species in the Timor Sea region, have a slightly larger mesh size of 50 x 75 mm. DEH considers that the potential benefits of larger mesh sizes should be examined as a means of minimising impacts on bycatch (including undersized target species) and protected species in the PTMF.

No indicator species or species-groups are being monitored to measure the impact of the PTMF on bycatch species. This situation is unlikely to change until the measures proposed in Recommendation 10 are implemented and prospective indicator species are identified. DEH suggests that DFWA further consider and implement appropriate management strategies such as spatial management or gear modifications to supplement the recommended bycatch monitoring system and precautionary bycatch performance measures.

## **Conclusion**

DEH considers that, based on the available information, there is a reasonable likelihood that the fishery is conducted in a manner that does not threaten bycatch species. Should this situation change, or the risk assessment process indicate otherwise, DEH expects that DFWA would undertake appropriate actions to ensure bycatch species are not threatened by this fishery. The main weakness in the existing management arrangements is the absence of reliable bycatch information relating directly to this fishery. This matter should be rectified to improve the level of confidence in future risk assessments.

Recommendations to address this have been developed to ensure that the risk of unacceptable impact on bycatch species is detected and minimised in the longer term.

## **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**

As with general bycatch species, no system is in place for the collection of information on PTMF interactions with protected species, nor has there been any survey of such interactions. As a result, as with general bycatch, the only available information is a combination of anecdotal information and data extrapolated from the PTMF bycatch survey and the NDSMF. A wide range of protected species are known to occur in the Pilbara region, including sea snakes, syngnathids, dugongs, turtles, cetaceans, seabirds and whale sharks. From the information available relevant to the trap fishery, there are indications of minor interactions primarily with sea snakes and syngnathids.

The DFWA submission acknowledges that vessel skippers should be recording details of protected species interactions, and suggests the possible re-introduction of voluntary logbooks for this purpose, although no commitment is made in the submission as to when or if this would eventuate. Given the legislative requirements under the EPBC Act to avoid interactions and report those that incidentally occur, DEH considers it vital that there be reliable ongoing monitoring and assessment of interactions with protected species in the future, commensurate with the nature and scale of the fishery. DEH suggests that a system to collect and report information on interactions with protected

species should be addressed in conjunction with establishing the recommended bycatch monitoring system (see Recommendation 8). DEH also notes that one of the biggest barriers to effective reporting of bycatch and protected species interactions is fishers' capacity to identify the species involved. In addition, many fishers may not be aware of the importance of this reporting. Both of these barriers can be reduced through education programs and opportunistic advice from observers and researchers as appropriate.

**Recommendation 9:** *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**

The risk assessment outlined in the ESD report for the impacts on bycatch species also addressed key impacts on protected species. The assessment found that the protected species most vulnerable to the fishery were sea snakes and syngnathids, due to their slow growth and reproduction rates and limited information on their local population size and distribution. The risk assessment found that the fishery presented only negligible risks to both species groups. While the catch levels of both sea snakes and syngnathids in the trap fishery are unknown the risk assessment concluded that they would be much less than those observed for the trawl fishery, estimated from the 2002 trawl bycatch survey. This conclusion was also based on their observed easy escapement from traps, the relatively low scale of trap fishing operations and the restriction of trap fishing from areas known to contain these species, including inshore shelf waters and closed areas within the fishery. The risk assessment also noted the expected high survival rates of sea snakes and syngnathids from trap capture based on observed escapements from hauled traps, and high survival rates of sea snakes from past studies in the prawn trawl fisheries, to justify the negligible risk rating to these species.

DEH acknowledges that the above outcomes from the risk assessment and the relatively benign fishing methods employed in the fishery justifies DFWA's rating of risks for these and other protected species by the existing PTMF operations as negligible. However, the indirect information sources underpinning DFWA's risk assessment do not provide an adequate basis for managing the potential protected species impacts of this fishery into the future, which places an increasing importance on the early development of suggested bycatch and protected species reporting systems in Recommendations 8 and 9.

There are no listed ecological communities in the fishery area.

## **Management response**

Although there are currently no management responses specific to protected species interaction, DFWA notes that as more monitoring data becomes available, performance limits may need to be reviewed and appropriate changes to fishing practices may need to be made. The implementation of Recommendation 4 will address the absence of a clear management objective to minimise interactions with protected species.

DEH considers that protected species interactions mentioned in the submission would be constrained by the relatively small number of pot-days conducted annually, the very short soak times (up to 2.5 hours) and the small number of operators compared with the area of the fishery. This may also account for the fact that entanglement of other protected species such as whales and turtles in buoy-lines – a problem in many other pot or trap fisheries – is not raised as an issue in the bycatch risk assessment nor in the DFWA submission.

## **Conclusion**

DEH acknowledges that there is a very low probability of interactions with protected species in this fishery and considers that 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. Should this situation change, or the risk assessment process indicate otherwise, DEH expects that appropriate actions would be undertaken by DFWA to ensure the fishery avoids mortality, injury to these species and avoids or minimises impacts on threatened ecological communities.

A recommendation has been developed to ensure that the risk of unacceptable impacts 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**

The ESD workshop and report has drawn on information on the size, nature and operational area of the PTMF to identify potential threats and to assess risks posed to the ecosystem. The main sources of information are fishery dependent reports of catch, effort and location and descriptions of trap fishing gear, its use and the spatial and temporal nature of fishing operations. Descriptions of the biology, distribution and habitat associations of target species and studies of trophic interactions and of other fisheries operating in the region have also contributed to DFWA's assessment. The submission indicates DFWA's recognition of the need for specific objective information to improve the understanding of the ecosystem impacts of all types of fishing – including trap fishing. While no research has been undertaken on the impact of fishing activities on ecologically related, associated or dependent species, DFWA recognises the benefits of assessing the trophic impacts of fisheries at the regional level. To assist with improving the understanding of the trophic implications of fishing, DFWA proposes to investigate fishing impacts on the structure of fish communities in the region over the last 40 years.

DEH is concerned at the lack of information collection and research covering the fisheries 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 ESD workshop identified potential threats to the general ecosystem systematically and comprehensively. The impacts of the fishery on benthic biota were assessed as negligible as was the impact of ghost fishing. Video evidence of trap operations in habitats similar to the PTMF indicates minimal disturbance to substrate and benthic communities, and fishers in the PTMF observe minimal epibenthos attached to retrieved traps. The limited trap soak and retrieval times reduces the risk of lost gear and the provisions for unattended traps to be unbaited and escape doors left open significantly reduces the risks of incidental mortality from ghost fishing.

The impacts of the PTMF on trophic interactions and the movement of biological material (for instance, through hull fouling and the baits used) were assessed as low. While no research has been

undertaken on the effects of removing upper level predators such as the target scalefish species from the local food chain, the target species are generalist carnivores that are not known to have a keystone role in the ecosystem. Due to low levels of catch in the trap fishery, the harvesting effect is considered to be minimal. DEH understands that the limited understanding of the ecosystem effects of fishing is not unique to this fishery and that the amount of information available on these aspects in any of the world's fisheries is scant.

The amount of discarded material is considered to be extremely low, as catch is not processed on board, and the estimated level of discarded catch compared to the area of the fishery is extremely low. The limited number of vessels operating in the fishery reduces the risks of translocation of biological material on hulls and the conditions surrounding the use of pilchard bait are considered by DFWA to be unlikely to be conducive to the introduction of exotic diseases. DEH agrees that the risks of disease introduction and fouling by wastes are low given the scale and mode of the fishery's operations.

As fishing takes place between 30-200 metres, the only interaction with the water column is when fishing gear is lowered and retrieved. Therefore interaction on water column communities is likely to be minimal. Impacts on water quality through the discharge of plastic wastes and pollution from vessels are controlled under MARPOL legislation. Operators are required to comply with the legislation and must retain any plastic waste and dispose of it only when the vessel returns to port. The small number of commercial operators reduces the likelihood of any significant impact on water quality.

DEH concurs with DFWA that the dispersed nature of the fishery, the small number and short duration of trap lifts, sustainable take of target species and the manner in which traps are set and hauled all mitigate against significant interactions with the ecosystem and environment generally. While the trap fishery operations may have minimal impacts, DEH notes that the surrounding ecosystem has been subjected in the past to substantial foreign trawl fishing targeted many of the same stocks for decades until around 1990. Public comments indicate trap fishers' observations that the North West Shelf benthic ecosystems continue to show signs of recovery from the impacts of decades of sustained trawling previously undertaken by foreign fleets. DEH notes, however, that the area of the fishery continues to be subject to the cumulative impacts of trap, trawl and line fishing operations that compound the impacts on trophic relationships and the benthic environment. DEH suggests DFWA provides for ongoing assessment of the broader ecosystem in the integrated management arrangements for the Pilbara demersal finfish fisheries.

DEH considers that in cases such as the PTMF where it is extremely difficult to obtain comprehensive information on which to base a decision, a risk assessment conducted in a precautionary way is a suitable basis for decision making. DEH has made several recommendations in this report aimed at improving the information base used for assessments.

### **Management response**

Management measures that restrict the number of boats, trap lifts and take of target species over a large fishery area and the way that traps are used all contribute to the assessed low impacts of this fishery on ecological communities, food chains and the physical environment. The low incidence of bait discarding and the current measures in place to maintain healthy fish stocks are important factors which mitigate against impacts on higher or lower trophic levels. The proposed investigation of changes to coastal fish community structure in the region can be expected to improve the understanding of the impacts of trapping and other fishing on the fish community and trophic interactions.

DFWA and the public comments note the small number of operators in this fishery have a high level of awareness of their obligations. DEH accepts that the risks to the physical environment posed by the equivalent of two full time vessels in a fishing area of 25,400 sq nautical miles are negligible.

In addition, public comments indicate the industry view that trapping has relatively low environmental impacts and that this has influenced some participants' decision to invest in this fishery.

Taken together, these factors suggest that there is no need for further specific management measures at this stage to ensure against damage to the general ecosystem. DEH is confident that the fishery will continue to be managed in a manner that aims to minimise ecosystem and broader environmental impacts.

### **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 further reduce ecosystem impacts and to improve the information base on which future assessments are based. The implementation of these recommendations should help to ensure that the risk of significant impacts by the fishery on the marine environment generally is minimised in the longer term.

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## LIST OF ACRONYMS

CPUE	Catch per unit effort
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DEH	Department of the Environment and Heritage
DFWA	Department of Fisheries, Western Australia
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
ESD	Ecologically Sustainable Development
FRDC	Fisheries Research and Development Corporation
FRMA	<i>Fish Resources Management Act 1994</i>
FRMR	<i>Fish Resources Management Regulations 1995</i>
IFRMC	Integrated Fisheries Management Review Committee
ITE	Individual Transferable Effort
MARPOL	International Convention on Marine Pollution
NDSMF	Northern Demersal Scalefish Managed Fishery
PTIMF	Pilbara Trawl Interim Managed Fishery
PTMF	Pilbara Trap Managed Fishery
OCS	Offshore Constitutional Settlement
UNCLOS	United Nations Convention on the Law of the Sea
VMS	Vessel Monitoring System
WA	Western Australia
WTO	Wildlife Trade Operation

## OUTCOMES OF 2002 REVIEW OF DEMERSAL FINFISH FISHERIES IN PILBARA REGION

Species	Total Pilbara catch	PTMF		PITMF		wetline		Primary perf. measure (% virgin spawning biomass)	Sec perf measure triggered in PTMF?	Sec perf measure triggered in PITMF?	Catch trend PTMF (2000-02)	Catch rate trend PTMF (2000-02)	Catch trend PITMF (2000-02)	Catch rate trend PITMF (2000-02)
		catch	% Pilbara total catch	catch	% Pilbara total catch	catch	% Pilbara total catch							
# Red emperor	121	36	30%	79	65%	6	5%	50%			stable	increasing	stable	increasing
# Rankin cod	40	20	50%	17	42%	3	8%	55%		√	decreasing	stable	decreasing	decreasing
Red snapper	319	41	13%	278	87%	-	-	-	√		increasing	increasing	increasing	increasing
Goldband snapper	164	38	23%	99	60%	27	17%	-	√		increasing	increasing	increasing	increasing
Scarlet perch	100	12	12%	82	82%	6	6%	-			stable	stable	stable	stable
Spangled emperor	67	37	55%	19	28%	11	12%	-		√	increasing	increasing	decreasing	decreasing
# Blue spot emperor	411	57	14%	353	86%	1	0%	At least 40%			increasing	increasing	increasing	increasing
Flagfish	224	13	6%	211	94%	-	-	-		√	-	-	increasing	increasing
Threadfin bream	363	-	-	363	100%	-	-	-		√	-	-	increasing	increasing
Frypan snapper	43	1	2%	42	98%	-	-	-			-	-	increasing	stable
Other demersal scalefish	854	51	6%	767	90%	36	4%	-			-	-	-	-
<b>All demersal scalefish</b>	<b>2,706</b>	<b>306</b>	<b>11%</b>	<b>2,310</b>	<b>85%</b>	<b>90</b>	<b>4%</b>							

**PTIMF** = Pilbara Trawl Interim Managed Fishery

**PTMF** = Pilbara Trap Managed Fishery

# = primary indicator species subject to annual stock assessment to estimate available spawning biomass

**Primary performance measure** = median spawning biomass of indicator species to be above 40% of virgin spawning biomass

**Secondary performance measures** = annual catch of target species should not increase by more than 20% above average annual catch of the previous 4 years; annual catch rate of target species should not decrease in two consecutive years.