



Australian Government

Department of the Environment and Heritage

**Assessment of the
Western Trawl Fisheries**

November 2004

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This document is an assessment carried out by the Department of the Environment and Heritage of a commercial fishery against the 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 10, 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 Western Trawl Fisheries

TABLE OF CONTENTS

EXECUTIVE SUMMARY	4
Background	4
Overall assessment	8
Recommendations	10
PART I - MANAGEMENT ARRANGEMENTS	11
Conclusion	13
PART II – GUIDELINES FOR THE ECOLOGICALLY SUSTAINABLE MANAGEMENT OF FISHERIES	14
STOCK STATUS AND RECOVERY	14
<i>Maintain ecologically viable stocks</i>	<i>14</i>
Information requirements	14
Assessment	16
Management response	18
Conclusion	20
<i>Promote recovery to ecologically viable stock levels</i>	<i>20</i>
Conclusion	21
ECOSYSTEM IMPACTS	21
<i>Bycatch protection</i>	<i>21</i>
Information requirements	21
Assessment	21
Management response	22
Conclusion	22
<i>Protected species and threatened ecological community protection</i>	<i>23</i>
Information requirements and assessment	23
Management response	23
Conclusion	23
<i>Minimising ecological impacts of fishing operations</i>	<i>24</i>
Information requirements	24
Assessment	24
Management response	25
Conclusion	25
REFERENCES	26
LIST OF ACRONYMS	26

EXECUTIVE SUMMARY

Background

The Australian Fisheries Management Authority (AFMA) has submitted documents for assessment of the Western Trawl Fisheries (WTF), comprising the Western Deepwater Trawl Fishery (WDWTF) and the North West Slope Trawl Fishery (NWSTF), under Parts 10, 13 and 13A of the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act).

On 12 November 2002, the Minister for the Environment and Heritage (the Minister) signed an Agreement with AFMA to initiate the strategic assessment of the fisheries. Following public consultation, “*Terms of Reference for the Environmental Assessment of the Western Deepwater and North West Slope Trawl Fisheries*” were adopted. The draft document, “*Environmental Assessment Report – Western Trawl Fisheries*” (the submission) was received by the Department of the Environment and Heritage (DEH) on 17 March 2003. The document was released for a thirty-day public comment period that expired on 18 August 2003. Two public comments were received. AFMA provided a response to the issues raised and amended the submission where necessary. A final submission for assessment was received on 26 August 2004.

The submission reports on the WTF against the Terms of Reference, including the Australian Government’s *Guidelines for the Ecologically Sustainable Management of Fisheries*. The DEH assessment considers the submission and associated documents, public comments and AFMA’s response to the comments. The WDWTF and NWSTF are summarised in Tables 1 and 2, respectively.

Table 1: Summary of the WDWTF

Area	Deepwater off Western Australia - seaward from a management line approximating the 200 m isobath outwards to the edge of the Australian Fishing Zone (AFZ), north to the edge of the NWSTF and south to the edge of the Great Australian Bight Trawl Fishery.
Fishery status	Uncertain (BRS, 2003).
Target Species	<u>No defined target species.</u> Species routinely taken include: deepwater flathead, slipper lobster /bugs, gemfish, mirror dory, boarfish, oreo species, northwest ruby fish/ruby snapper and tang snapper.
Byproduct	Various finfish species, squid, crustaceans and sharks frequently taken.
Gear	Demersal crustacean and fish trawls. No restrictions on number or design.
Season	No set season - operators generally access the fishery on a part time or opportunistic basis.
Commercial harvest 2001/02	Weight: 243 tonnes Value: \$1.77 million
No. licences	11
Management arrangements	Limited entry; mandatory use of an Integrated Vessel Monitoring System (VMS); and catch and effort reporting requirements.
Export	With the exception of alfonsino and orange roughy the catch is sold on the domestic market.
Bycatch	Various species. Composition and quantity varies between trawl shots. Little direct information on bycatch.
Interaction with Protected Species	Reported interactions negligible. Potential for interaction with cetaceans and marine turtles during shooting and hauling of nets.

Table 2: Summary of the NWSTF

Area	Deepwater off north-western Western Australia - seaward from a management boundary approximating the 200 m isobath to the edge of the Australian Fishing Zone. The western boundary adjoins the WDWTF at longitude 114°E.
Fishery status	Uncertain (BRS, 2003).
Target Species	<u>Scampi</u> : Australiensis scampi, velvet scampi and boschmai scampi. <u>Deepwater prawns (penaeid and carid)</u> : pink prawn , red prawn, striped prawn, scarlet prawn, red carid and white carid prawn.
Byproduct	Squid, deepwater slipper lobsters/bugs, spear lobsters, whip lobsters and various finfish species.
Gear	Demersal crustacean trawl. Restrictions on mesh size apply.
Season	No set season - operators fish opportunistically during closures in the Northern Prawn Fishery (NPF).
Commercial harvest 2001/02	Weight: 107.8 tonnes Value: \$1.1 million
No. licences	7
Management arrangements	Limited entry; mandatory use of VMS; maximum trawl mesh size of 50 mm; and catch and effort reporting requirements.
Export	Most of the catch exported to the United States of America and Asia.
Bycatch	Various species. Composition and quantity varies between trawl shots. Little direct information on bycatch.
Interaction with Protected Species	Reported interactions negligible. Potential for interaction with cetaceans and marine turtles during shooting and hauling of nets.

The WTF are located in deepwater off Western Australia. The WDWTF operates from a management line approximating the 200 m isobath outwards to the edge of the AFZ. The fishery's northern boundary is at longitude 114°E where it runs adjacent to the waters of the NWSTF. The southern extremity lies on the boundary of the AFZ with longitude 115°08'E where the fishery runs adjacent to the Great Australian Bight Trawl Fishery. Within this area, waters within the Ningaloo Marine Park are closed to trawling.

The NWSTF operates off north western Western Australia, seaward from a management boundary approximating the 200 m isobath to the edge of the AFZ. The fishery's western boundary adjoins the WDWTF at longitude 114°E. The eastern boundary lies at approximately 125°E but does not extend to the outer limit of the AFZ due to Australian-Indonesian maritime boundaries in the Timor Sea. Areas of the fishery closed permanently to fishing include waters of the Cartier Island Marine Reserve, the Ashmore Reef Marine National Nature Reserve and the Mermaid Reef Marine National Park.

The marine habitat of the WDWTF ranges from temperate-subtropical in the south to tropical in the north and spans a large depth range from 200 metres to greater than 1500 metres. Consequently, a diversity of species with varying life history characteristics are captured across the fishery.

The WDWTF does not have defined target species as fishers opportunistically target a range of species depending on season, species abundance and market demands. Consequently, there are some species that are consistently caught in the WDWTF, while others are caught sporadically and retained in small amounts. Species that are routinely harvested in the fishery include deepwater flathead (*Neoplatycephalus conatus*), slipper lobster /bugs (*Ibacus altricrenatus*, *I. Ciliatus pubescens*), mixed finfish - dominated by gemfish (*Rexea solandri*) mirror dory (*Zenopsis nebulosus*), boarfish (*Pentaceros spp*) and oreo species (*Oreosomatidae*) and snappers (Lutjanidae) - including northwest ruby fish/ruby snapper (*Etelis carbunculus*) and tang snapper (*Lipocheilus carnolabrum*). The variety and paucity of information on species taken in the WDWTF makes discussion of individual species

distributions and biological characteristics difficult. Many deepwater species are long lived and slow growing and therefore susceptible to overfishing.

The principal species targeted in the NWSTF are scampi. Scampi species targeted by the fishery include Australiense scampi (*Metanephrops australiensis*), Velvet scampi (*M. velutinus*) and Boschmai scampi (*M. boshmai*). The three main commercially important species of scampi targeted by the NWSTF are taken from different depth distributions between 260 m to 500 m. The species have a wide distribution and occur on the continental slopes of many countries. Within Australia, their distribution is extensive but their preferred habitat is the muddy bottoms along the North-west Slope from approximately 22°S up into the Timor Sea (Wallner & Phillips, 1995).

Research by Wallner and Phillips (1995) has shown that scampi species harvested in the NWSTF are strongly K-selected. They are long living and slow growing species that may take six to eight years to attain commercial size. Females are thought to spawn annually and brood eggs for 9-10 months and produce only 100-900 larvae per brood. Larvae dispersal is thought to be limited as larvae settle and adopt a benthic habitat soon after hatching. These features are indicative of low sustainable yields and render these species susceptible to localised depletion. Length-frequency data suggests that female *M. australiensis* mature around 4+ years (~ 40 mm carapace length) and fully recruit to the fishery at 5 to 6+ years at approximately 50 mm carapace length. The species reaches a maximum carapace length of 75 mm at approximately 10 to 12 years.

Deepwater penaeid and carid prawn were once the principal target species in the NWSTF however industry has shifted its focus to the scampi stocks in recent years. In the past, Pink prawn (*Haliporoides sibogae*), Red prawn (*Aristaeomorpha foliacea*), Striped prawn (*Aristeus virilis*), Scarlet prawn (*Plesiopenaeus edwardsianus*), Red carid (*Heterocarpus woodmasoni*) and White carid (*Heterocarpus sibogae*) were the deepwater prawn species routinely targeted.

Deepwater prawns are widely distributed and are found off the coasts of New Zealand, eastern and northern Africa, Japan, the temperate Atlantic, the Mediterranean and Indo-West Pacific region. The depth distribution for deepwater prawns ranges from 100 m to 1500 m with each species displaying a preferential depth range and sediment type. With the exception of depth range and habitat information obtained through fishing records, little information or knowledge exists on the biology and ecology of deepwater prawn species. Compared with inshore prawn relatives, deepwater prawns have a relatively low productivity.

The vast range of species caught sporadically in small amounts, and retained for sale, in the WDWTF may be considered by-product. This group includes a wide variety of finfish species, squid, crustaceans and sharks. The primary by-product species taken in the NWSTF are deepwater prawns, slipper lobster, squid, bugs and some finfish species.

Scampi and deepwater prawn resources were discovered off the northwest slope of Australia over the period 1978-1984. In 1985, eight trawlers began fishing for deepwater crustaceans in what is now known as the NWSTF. The fishery was brought under management by the Australian Fisheries Service on 15 March 1985 and has been managed as a developmental fishery since that time. Despite research effort directed at identifying a commercial finfish resource base in the area of the fishery, the fishery has developed into a crustacean trawl fishery.

Effort in the fishery has varied over time, with the fleet opportunistically targeting scampi and deepwater prawns at various stages in the fishery's development. Fishing activity (trawl hours) in the NWSTF peaked in 1987-88 when 18,500 trawl hours were applied. Since then activity has fluctuated, dropping to two vessels in the mid 1990s and climbing to ten vessels during the 2000-01 and 2001-02 financial years. Effort within the fishery remains relatively low as most of the vessels are Northern

Prawn Fishery trawlers that fish opportunistically during closures in the NPF. Catches peaked in 1987-88 when almost 1000 tonnes of product was landed (primarily deepwater prawns). In recent years catches have been much smaller. Today, the fishery targets scampi, and deepwater prawns are taken as by-product. Most of the catch is exported to the United States of America and Asia. The commercial harvest in 2001/02 was 107.8 tonnes with an estimated value of \$1.1 million.

The WDWTF was established in 1987 as operators extended their exploratory fishing for scampi and deepwater prawns beyond the traditional grounds of the NWSTF. The WDWTF evolved into a fishery reliant primarily on a large variety of finfish species, with some crustacean (e.g bugs) targeted opportunistically. The fishery was founded on species such as gemfish, mirror dory, big-spined boarfish.

In 1992, explorative industry efforts in the southern area of the WDWTF resulted in encouraging catches of orange roughy (*Hoplostethus atlanticus*) and smooth oreo (*Pseudocyttus maculatus*). Orange roughy dominated the catch between 1993 and 1995. In 1996-97, while the catch continued to be dominated by southern species, the composition began moving away from orange roughy fishing to upper-slope species (e.g. gemfish, mirror dory, big-spined boarfish, deepwater flathead and deepwater sharks). Since 1997, there has been an increasing trend of fishing effort in the northern parts of the fishery and a mixture of species is routinely taken. The commercial harvest in 2001/02 was 243 tonnes with an estimated value of \$1.77 million. With the exception of alfonsino and orange roughy, the catch is sold on the domestic market.

Fishing in the WTF is conducted using demersal crustacean and fish trawls and there is no limit to the number or size of trawl nets permitted in the fisheries. A 50 mm maximum cod-end mesh size applies to the NWSTF to discourage targeting of demersal finfish resources. Both fisheries are limited entry with 11 and 7 licences issued in the WDWTF and NWSTF, respectively. In addition, the use of a VMS in each fishery is mandatory. The WDWTF is open to fishing year round, although operators generally access the fishery on a part time or opportunistic basis. Similarly, the NWSTF has no set fishing season but operators fish opportunistically during closures in the NPF, as most vessels are licensed in both fisheries. A full analysis of the management arrangements is contained in Part II of this report.

Direct information on bycatch in the fisheries is limited, but as with all trawl fisheries, the non-selective nature of the fishing gear results in unwanted catch of many species. Some species that may be affected by the WTF are currently listed protected species under the EPBC Act. Possible protected species interactions in the WTF include incidental capture of species during the shooting and hauling of trawl nets. Limited evidence to date suggests that interaction with any protected species group is very low. Bycatch and protected species interactions are discussed under Part II of this report.

AFMA considers the harvest of commercial species by recreational fishers negligible and there is no known harvest by the indigenous sector. Many species taken in the WDWTF and NWSTF are taken in other commercial fisheries (e.g. South Coast Crustacean Fishery, the West Coast Deep Sea Crab Fishery, Pilbara Line Fishery, Northern Demersal Scalefish Fishery, Western Tuna and Billfish Fishery and the Small Pelagic Fishery). An assessment of the extent to which the WTF management regime takes into account harvest of shared stocks by other jurisdictions is presented in Part I of this report.

Statutory management plans have not been established for the WTF. Since the inception of the fisheries, development plans have been in place and considerable debate about the need for long term management arrangements has ensued. A draft Management Plan for the NWSTF was developed in 1994 and distributed in 1996; however, implementation of the Plan was postponed due to ongoing discussions with the Western Australian Department of Fisheries (DFWA) over the future

management of the deepwater finfish resource. Since 1996, the WTF have been managed under a limited entry policy with a total of seven permits granted for periods of five years.

Similarly, a draft Management Plan for the WDWTF was developed in 1994, but the implementation of the Plan was postponed due to debate with DFWA over resource access. Since 1998, entry to the WDWTF has been limited to 11 fishing permits.

In 2000, after extensive negotiations, DFWA withdrew its proposal for management responsibility of the WDWTF and NWSTF but management plans have still not been developed. The WTF are currently managed under the recently developed *Western Trawl Fisheries Statement of Management Arrangements 2004* (the Management Plan), which obtains its authority from the *Fisheries Management Act 1991*.

Overall assessment

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

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

- No fishery specific objectives, performance indicators and performance measures for either fishery;
- Paucity of biological information about key species, particularly in the WDWTF;
- No validation of fishery dependent catch and effort data;
- Potential and actual significant increases in catch or shift from traditionally targeted species without appropriate management to control the level of take in this event; and
- Potential negative impact on vulnerable deepwater shark 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 fisheries, management arrangements are likely to be sufficiently precautionary and capable of controlling, monitoring and enforcing the level of take from the fisheries while ensuring that the stocks are fished sustainably.

The WTF have been in a developmental stage and AFMA has made progress in formalising sound management arrangements. DEH particularly notes the commitment to an independent observer program trial in the fisheries to collect much needed information on target species, byproduct species and bycatch. The management regime aims to ensure that fishing is conducted in a manner that does not lead to over-fishing and for fishing operations to be managed to minimise their impact on the structure, productivity, function and biological diversity of the ecosystem. On balance, the fisheries are being managed in an ecologically sustainable manner and are working to address existing problems and minimise environmental risks.

The operation of the fisheries is consistent with the objects of Part 13A of the EPBC Act. Given the limited entry and small scale nature of these fisheries that operate over large fishery areas, and a concerted effort to improve understanding and management of key components of the fisheries, DEH considers that the fisheries will not be detrimental to the survival or conservation status of the taxon to which they relate in the short term. Similarly, they are not likely to threaten any relevant ecosystem in the short term. DEH therefore recommends that the fisheries be declared an approved Wildlife Trade Operation (WTO) with the actions specified in the recommendations to be undertaken by AFMA to

contain the environmental risks in the long term. DEH considers that the fisheries, as managed in accordance with the management plan, are 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 fisheries for a period of 3 years. The WTO declaration will require annual reporting on the progress of implementing the recommendations of this report and other managerial commitments. The implementation of the recommendations will be monitored and reviewed as part of the next DEH review of the fisheries in 3 years time.

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

Protected species occurring in the areas of the fisheries include marine turtles, cetaceans, seals and seabirds. The fisheries have minimal recorded interaction with these species groups. The actual and potential impact on Part 13 species under the management arrangements is considered low and adequate protection is provided. There are no listed threatened ecological communities in the fisheries areas.

DEH recommends that the management plan 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 fisheries to which the Statement of Management Arrangements relate do not, or are 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 Statement of Management Arrangements 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 Statement of Management Arrangements, would not be expected to have a significant impact on a listed threatened species or listed migratory species protected by the EPBC Act.

Part 10 of the EPBC Act requires that Commonwealth managed fisheries undergo strategic assessment to determine whether actions taken in a fishery have a significant impact on the environment in Commonwealth Marine Areas. Under this Part, the Minister may accredit a management plan to exempt actions taken in accordance with the management plan from further impact assessment approval.

DEH considers, *inter alia*, that there has been adequate assessment of the impacts that actions approved in accordance with the management plan have, will have or are likely to have on the marine environment. DEH also considers that actions approved or taken in accordance with the management plan will not have unacceptable or unsustainable impacts on the marine environment in a Commonwealth area. DEH therefore recommends that, in accordance with Part 10, the management plan be accredited under section 33 of the EPBC Act for the matter of national environmental significance “the marine environment”.

To strengthen the effectiveness of the management, and to contain the environmental risks in the medium to long term, DEH has developed a series of recommendations. The implementation of recommendations and other commitments made by AFMA in the submission will be monitored and reviewed as part of the next DEH review of the fisheries in 3 years time.

Recommendations

1. AFMA to inform DEH of any proposed amendment to the management regime for the Western Trawl Fisheries to enable DEH to evaluate any impacts on the ecological sustainability of the fisheries.
2. AFMA to actively pursue representation of conservation interests on the Western Trawl Fisheries Management Advisory Committee (WestMAC) by July 2005.
3. AFMA to implement an ongoing independent observer program in the Western Trawl Fisheries to validate catch and effort information collected in the fisheries and collect information on key components of the fisheries, including but not limited to, bycatch taken in the fisheries, interactions with protected species and biological information on target and by-product species.
4. AFMA to review the research information needs and priorities to meet the management information, decision making and performance measurement needs of the fishery. AFMA to develop a research strategy to address identified priority areas and to explore ways to cooperatively share in or take advantage of research done in adjacent fisheries with shared stocks.
5. By December 2006, AFMA to develop fishery specific objectives, linked to performance indicators and performance measures for the target and by-product species[†] taken in the North West Slope Trawl Fishery and for those species consistently harvested by the Western Deepwater Trawl Fishery*. Objectives to minimise bycatch, interactions with protected species and the ecological impacts of fishing activities should also be developed for both fisheries.

[†] Scampi, deepwater prawns, squid and deepwater slipper lobster (bug) species

* Deepwater flathead, Bar rock cod, Mirror Dory, Scampi, Slipper lobster, Ruby snapper, Amber jack and Bight redfish

6. AFMA to take into account the harvest of shared stock species by other fisheries and to cooperate with other relevant jurisdictions to pursue complementary management of shared stocks for all target and by-product species, which may be affected by cross-jurisdictional issues.
7. AFMA to develop a management strategy for the harvesting of Slipper lobster in the Western Trawl Fisheries, which includes clearly defined management measures and performance measures, to ensure that harvesting of this species is conducted within sustainable limits.
8. By December 2005, AFMA to implement a system for the ongoing monitoring of catches of deepwater shark species in the Western Trawl Fisheries, in particular Southern dogfish and Endeavour dogfish, to ensure that fishing activities do not negatively impact upon the populations or important habitats of these species.
9. AFMA, in cooperation with relevant fisheries management agencies to develop and implement a precautionary and biologically meaningful limit for squid harvest based on best available information about the species ability to withstand fishing pressure, within 3 years.
10. Within two years of completion of the ecological risk assessment of the Western Trawl Fisheries, AFMA to identify and implement appropriate management strategies to address/mitigate impacts identified.

PART I - MANAGEMENT ARRANGEMENTS

The NWSTF and the WDWTF, collectively referred to as the WTF, are managed by the AFMA and are currently managed through permit conditions and under a newly developed Statement of Management Arrangements.

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

- The *Western Trawl Fisheries Statement of Management Arrangements 2004 (SoMA)*;
- The *Fisheries Management Act 1991*;
- The *Fisheries Administration Act 1991*;
- The *Offshore Constitutional Settlement (OCS) Agreement between the Australian and Western Australian Governments 1995*; and
- Relevant Gazetted notices and licence conditions.

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

DEH considers it important that management arrangements remain flexible to ensure timely and appropriate managerial decisions. Because of the importance of the management plan and documents referred to above to DEH's assessment of the fishery, an amendment could change the outcomes of our assessment and decisions stemming from it. Decisions resulting from this assessment relate to the arrangements in force at the time of the decision. In order to ensure that these decisions remain valid, DEH needs to be advised of any changes that are made to the management regime and make an assessment that the new arrangements are equivalent or better, in terms of ecological sustainability, than those in place at the time of the original decision.

Recommendation 1: *AFMA to inform DEH of any proposed amendment to the management regime for the Western Trawl Fisheries to enable DEH to evaluate any impacts on the ecological sustainability of the fisheries.*

Management of the WTF incorporates a clear commitment to effective consultation with a variety of stakeholders. The Western Trawl Fisheries Management Advisory Committee (WestMAC) has been established and is responsible for advising the Minister and/or the AFMA Chairman on matters relating to the overall management of the fisheries. Members are formally appointed and consist of an independent Chairman and representatives of the commercial fishing industry from the two fisheries, a representative from the Western Australian Department of Fisheries, a scientific member and the manager of the WTF. DEH is a permanent observer on WestMAC. WestMAC meets annually and an annual public meeting regarding the WTF is generally held at the same time.

DEH considers the level of consultation to be broadly adequate however has concerns about the lack of representation of conservation or community interests. DEH notes that WestMAC has in the past included representation of conservation interests, however, the current membership of the Committee does not include this stakeholder group. DEH recognises the difficulty in getting conservation groups to participate in consultation processes on an ongoing basis but believes that AFMA and WestMAC should actively seek a conservation member for WestMAC so that this stakeholder group can provide a balance to the currently industry dominated Committee. This is particularly important considering the WTF are currently going through an Ecological Risk Assessment process.

Recommendation 2: *AFMA to actively pursue representation of conservation interests on the Western Trawl Fisheries Management Advisory Committee (WestMAC) by July 2005.*

Consultation regarding the management of the WTF is also conducted outside of WestMAC. It is a requirement of the *Fisheries Management Act 1991* that AFMA consult adequately when developing management plans and in the development of other fisheries policies. Included as part of this consultation is the establishment and maintenance of an interested persons register and the advertisement of material in newspapers and on the AFMA website.

The fisheries are managed under the SoMA (the management plan), which provides the broad policy framework and management strategies for the fisheries. While the overall objectives of the *Fisheries Management Act 1991* apply to the WTF, there are no clearly defined objectives, performance indicators and performance measures for target and byproduct species specific to the WTF contained in the management plan. There is also no overall objective to minimise bycatch, interactions with protected species or impacts on the environment. DEH believes that such objectives and performance indicators and measures need to be developed to ensure that the performance of the fishery can be measured and management action taken as required (see **Recommendation 5**). This issue is discussed in detail in Part II of this report.

Management of the fisheries is based on input controls. The management arrangements are discussed under Part II, Principle 1 of this report. In summary, the following management measures apply across the WTF:

- Limited entry (7 and 11 licences for NWSTF and WDWTF, respectively);
- Mandatory use of VMS;
- maximum trawl mesh size of 50 mm (NWSTF only); and
- catch and effort reporting requirements.

Compliance and enforcement tools utilised in the WTF are limited. AFMA prioritises its compliance and enforcement activities according to the size of a fishery and the likely risk and impact of non-compliance with management arrangements. In addition to monitoring VMS records to ensure that vessels are not fishing in areas closed to the fishery, AFMA relies on field compliance activities undertaken by Western Australian fisheries officers under a contractual agreement. DEH considers the risk of impact of non-compliance to be low given the limited management arrangements in place in the fishery. The most likely area of non-compliance would be vessels fishing in closed areas, for example marine protected areas, however DEH considers that effective monitoring of vessel movements through VMS is sufficient to address this risk. Overall DEH considers the level of compliance and enforcement activities in the WTF appropriate to the scale of the fisheries.

The management plan requires that the management arrangements for the WTF are annually reviewed through WestMAC. The management plan provides for the periodic review of the performance of the fishery, including a full review of the fishery management arrangements within three years. DEH considers that a three-year review of the fisheries management frameworks is suitable while critical aspects are reviewed annually through WestMAC. In addition, the Bureau of Rural Sciences (BRS) reviews and publishes performance of the major aspects of Commonwealth fisheries, including the WTF, via the Fishery Status Reports (e.g BRS, 2003).

Fishery dependent data relating to the target species is collected on a regular basis in the WTF. An observer program is being trialed and will substantially improve the data collection capabilities for the WTF. Discussion of the information collection system can be found in Part II of this report. An analysis of the fisheries' 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 fisheries operate is contained under Principle Two of this report.

The spatial distribution of species taken in the fisheries is not well understood due to the lack of information regarding species taken generally. A number of other fisheries target species of the same stock as those taken regularly in the WTF, with the exception of scampi, which is only targeted by the NWSTF. The extent to which the spatial distribution of the stocks is factored into management of these fisheries is discussed in detail under Part II of this report.

DEH considers that the current management arrangements comply with all relevant threat abatement plans, recovery plans, the National Policy on Fisheries Bycatch, and bycatch action strategies developed under that policy. DEH expects that AFMA will also ensure compliance with any future plans or policies as they are developed.

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

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 WTF management regime is documented, publicly available and transparent, and developed through a consultative process. The management arrangements are adaptable and through implementation of **Recommendation 5** will be underpinned by appropriate objectives and performance criteria by which the effectiveness of the management arrangements can be measured, enforced and reviewed.

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

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

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

PART II – GUIDELINES FOR THE ECOLOGICALLY SUSTAINABLE MANAGEMENT OF FISHERIES

Stock Status and Recovery

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

Maintain ecologically viable stocks

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

Information requirements

The information collection system in the WTF focuses primarily on the collection of fishery dependent data. Compulsory shot-by-shot logbooks are used in each fishery to collect information on the gear used, catch composition, catch rates by species, area and depth and the estimated weight of discards. All species retained by the fisheries, i.e. target and byproduct species, are recorded in the logbooks, which provides a good source of historical catch composition. The logbook has been in place since the inception of the fisheries and the submission states that information collected through the logbooks is reliable.

To supplement existing fishery dependent data information and improve overall understanding of the fisheries, an independent observer program is currently being trialed. Stanley (2004) describes the scope and methodology of the program, which is designed to monitor catch, bycatch and environmental parameters of the WTF. Parameters to be recorded in the trial include catch composition, bycatch, biological samples of species, the fate of catch (i.e. retained or discarded), life status of target, bycatch and discard species, marine turtle and marine mammal interactions and fishing techniques used during the program. AFMA, industry and scientists were all consulted in the preparation of the program outline.

DEH commends AFMA’s and industry’s commitment to an observer program trial in the WTF and believes it to be a useful tool for collecting and validating information relevant to the fishery. An independent observer program would also enable the collection of data to compare with previous research in the area of the fisheries. In particular, the collection of biological data on target and byproduct species should be useful in improving understanding of key species taken in the fisheries and provide information to inform future harvest strategies and stock assessments. Confirming current beliefs about protected species interaction levels and the quantity and composition of bycatch would also be a valuable output of the program. It is unclear if the program is to be ongoing and if so, what level of coverage of the fisheries it would give. While DEH notes the cost constraints in these small scale fisheries, observer programs may prove to be a cost efficient way to improve the level of understanding of the fisheries. Although an observer program would not have to be conducted year round or annually, DEH believes that a commitment to continue the trial in both fisheries is needed.

Recommendation 3: *AFMA to implement an ongoing independent observer program in the Western Trawl Fisheries to validate catch and effort information collected in the fisheries and collect information on key components of the fisheries, including but not limited to, bycatch taken in the fisheries, interactions with protected species and biological information on target and byproduct species.*

DEH is concerned by the absence of any form of ongoing validation of catch and effort data collected through the logbooks in the WTF. In view of the high degree of reliance placed on fishery dependent – particularly catch and effort - data in routine monitoring of the fishery, catch and effort data validation is critical. DEH understands that AFMA intends to remedy this deficiency through the observer program (see **Recommendation 3**). VMS are mandatory in the WTF and would also be a useful effort validation mechanism if AFMA were to monitor VMS data on a regular basis and compare it against effort data in logbook returns. AFMA has advised that they intend to do this for both fisheries in the future and the fishery manager is pursuing a regular compliance checking program with relevant compliance staff within AFMA.

Fishery independent information relevant to the fisheries has been largely collected through research projects and there is no ongoing collection of fishery independent data. A research program, conducted by Commonwealth Scientific and Industrial Research Organisation in 1985, collected information on the size, mortality, growth rates and reproduction for the three main commercial scampi species in the NWSTF. The study documented catch and fishing effort by type and quantity and aimed to collect information to improve yield estimates for the fishery. In 1988 the project was expanded to include deepwater prawns, bugs and squid in the NWSTF and an exploratory fishing survey of WDWTF.

Specifically, the CSIRO project collected information in the NSWTF on the growth, number of eggs and life cycles of each species to estimate sustainable harvest levels. The project also monitored discarded catch. The exploratory fishing survey of the WDWTF entailed 95 shots by *FV Southern Surveyor* and collected information that has been used to describe the diversity, density and community structure of the demersal finfish fauna of the continental slope of the WDWTF.

Further fishery independent information was sought in 1998 when a commercial survey of the NWSTF finfish resources was commissioned. The survey aimed to identify the extent of finfish resources in the area of the fishery and to establish an information base from which a sustainable finfish fishery could be established. AFMA advises that a lack of support by industry saw the research cut short and little useful information was obtained.

Given the limitations of the current fishery dependent data, the absence of ongoing catch validation and fishery independent monitoring, the lack of mechanisms for regularly reviewing the data requirements, the paucity of biological information on species harvested in the fisheries, particularly the WDWTF, DEH considers that targeted and strategic research in priority areas is needed. While DEH notes that a major research effort may not be possible due to cost constraints, a clear articulation of the specific research needs of the fishery would benefit future research planning and help prioritise areas for future work within available funds. DEH understands that work in this area has already begun as AFMA has sought research priority advice from the scientific member of WestMAC. The observer program (see **Recommendation 3**) should also provide valuable information to help identify specific research needs.

Recommendation 4: *AFMA to review the research information needs and priorities to meet the management information, decision making and performance measurement needs of the fishery. AFMA to develop a research strategy to address identified priority areas and to explore ways to cooperatively share in or take advantage of research done in adjacent fisheries with shared stocks.*

Overall, DEH considers the information collection system to be commensurate with the small scale of the fisheries, however a greater understanding of the species taken in the fisheries is required. The implementation of an observer program and validation of fishery dependent data (see **Recommendation 3**) should facilitate improved data collection and provide valuable information for the management of the fisheries and targeted future research.

Assessment

Limited assessments have been conducted of species across the WTF and, according to assessments of Commonwealth fisheries by the BRS (2003), stocks fished by the two WTF are all of uncertain status.

Scampi, harvested in the NWSTF, is the only species for which a number of stock assessments have been conducted. Assessments, using catch per unit effort (CPUE) data from logbooks were conducted in 1992, 1993, 1998 and 2000. The first assessment suggested that the overall abundance of scampi had been reduced to approximately half of the virgin biomass and was not considered over-fished (Staples et al, 1994). Subsequent stock assessments indicated that the stock had recovered to 72-82 % of virgin biomass. The submission states that due to the apparent trends observed in previous assessments, regular assessments have not been conducted in recent years. Given scampi is the principal target species of the NWSTF, DEH strongly suggests that stock assessments be conducted on a more regular basis, for example every two years.

A single stock assessment was conducted for the deepwater prawn species, red prawn (*Aristaeomorpha foliacea*) in the NWSTF for the period 1985-1990. The assessment indicated that red prawn stocks had been reduced by around 60 %. Since that time, the fishery has not targeted red prawn and catches as byproduct now represent 3.3 % of the peak catch in 1987-88 season. Due to the change in targeting behaviour and lack of catch of the species in recent years, no further stock assessments were conducted. DEH expects that should catches of deepwater prawn species increase above recent catch levels in the future, that stock assessments of the species would be resumed.

The submission states that the stock assessments conducted for scampi in the NWSTF provide a reliable estimate of the potential productivity of the stock and the sustainable catch that could be removed from the fishery. Staples et al (1994) suggested a sustainable harvest of 100 tonne of scampi, which was supported by a stock reduction analysis that indicated that the current scampi populations are not over-fished. Scampi harvest levels have remained within the recommended 100 tonne limit since 1994 and catch rates have been stable. As discussed in Part I of this report, performance indicators and measures are required to ensure the performance of the fishery can be measured for target and byproduct species. Given that a sustainable yield has been identified for scampi in the NWSTF, DEH believes that this should form the basis of a performance measure for scampi in the fishery.

Similarly, sustainable yields have been suggested for deepwater prawns taken in the NWSTF. Although the submission states that the suggested sustainable harvest level of 200-300 tonne is less reliable than the yield suggested for scampi, DEH believes that a precautionary sustainable yield could be developed for the species. A performance measure based on a precautionary sustainable yield should be developed, which takes into account the fact that deepwater prawns are no longer targeted by the fishery and catches have remained below 30 tonne for the last nine years. Performance measures for key byproduct species (e.g slipper lobster and squid) could be precautionary rather than biologically based in the absence of robust biological data.

For the WDWTF, the paucity of information on species regularly targeted or opportunistically targeted may limit the development of indicators and measures for all species, however, analysis of catch data in the submission (Appendix 2) reveals that a number of species are consistently caught in larger quantities than others, in particular deepwater flathead, bar rock cod, mirror dory, scampi, slipper lobster and ruby snapper. Also, other species, such as amber jack and bight redfish, have been increasingly targeted by the fishery since 2002. DEH believes that performance indicators and performance measures for these species should be developed. In the absence of detailed biological information on these species, precautionary measures could be used until adequate information is available to develop more biologically based measures.

Recommendation 5: *By December 2006, AFMA to develop fishery specific objectives, linked to performance indicators and performance measures for the target and byproduct species[†] taken in the North West Slope Trawl Fishery and for those species consistently harvested by the Western Deepwater Trawl Fishery*. Objectives to minimise bycatch, interactions with protected species and the ecological impacts of fishing activities should also be developed for both fisheries.*

[†] Scampi, deepwater prawns, squid and deepwater slipper lobster (bug) species

* Deepwater flathead, Bar rock cod, Mirror Dory, Scampi, Slipper lobster, Ruby snapper, Amber jack and Bight redfish

The species taken in the WDWTF vary significantly as different species (around 40 species) are targeted opportunistically, making stock assessment difficult. The submission also states that stock assessment is further hindered by the lack of clear catch trends in the fishery due to the small number of operators, large spatial extent of the catches and high diversity in catch. A stock assessment of ruby snapper (*Etelis carbunculus*) was conducted but yielded no informative results. The assessment was confounded by the lack of knowledge of the species' local biological characteristics, disjointed catch rates, lack of specific targeting of the species, large fishery area and small number of operators.

These factors also combine to hinder estimates of the potential productivity of fish stocks. Although the submission states that catch and information suggests that productivity of species in the area of the fishery is low, no formal attempts have been made to establish productivity estimates. DEH supports AFMA's proposition that information collected through the observer program (see **Recommendation 3**), and results from targeted research identified through **Recommendation 4**, will enable stock assessments and estimates of potential productivity to be determined for key species in the future. DEH recognises that this may take some years to achieve and supports the decision by AFMA to begin the data collection phase.

The distribution and spatial structure of scampi and deepwater prawn stocks have been determined and were taken into account in the assessment of these species in the NWSTF. Specifically, the distribution of the species and the spatial and temporal aggregation of fishing activity have been factored into previous stock assessments. The submission states that the distribution of fished stocks in the NWSTF has not been explicitly factored in to management, by for example zoning the fishery based on species distribution or key habitats. However, AFMA has the capability of doing this, and if the Ecological Risk Assessment of the WTF (ERA) identifies any concerns relating to stock distribution, AFMA has advised that appropriate measures to address these concerns would be implemented in a timely manner.

In the WDWTF, the combination of the lack of information about species taken in the fishery, the low value of the fishery and the small number of operators, has meant that research into the distribution and spatial structure of the stocks has not been extensive. DEH expects that as more information is collected in the fishery through the observer program that AFMA will be in a better position to understand and factor into management, the spatial distribution and structure of fish stocks in the WDWTF in the future.

Potential removals from the fished stocks in the WTF include direct harvest by the NWSTF and WDWTF and direct harvest by other commercial fisheries operating in the same area or adjacent to these fisheries. There is no known recreational or indigenous harvest of the species taken in the WTF.

The WTF overlap with a number of Western Australian fisheries, notably the South Coast Crustacean Fishery, the West Coast Deep Sea Crab Fishery, the Pilbara Line Fishery and the Northern Demersal Scalefish Fishery. With the exception of scampi and deepwater prawns, which are harvested exclusively by the NWSTF, the spatial distribution of many species taken in these fisheries extends beyond the WTF grounds. Other fisheries, for example the Western Tuna and Billfish Fishery and Small Pelagic Fishery, harvest species that belong to the same stock as those commercially harvested

in the WTF. Removals of species by these other fisheries are obtained primarily through fishery dependent information but are not considered in the management of the WTF.

Ideally, management arrangements affecting a single stock should be under a single jurisdiction, or covered by complementary management arrangements where a stock crosses jurisdictions. DEH believes it would be beneficial, for both shared fish stocks and AFMA governance, for AFMA to be involved in cross-jurisdictional actions to address shared stock concerns. DEH believes that AFMA should directly engage with the relevant fishery managers of these other fisheries to ensure that management arrangements in the WTF take into account removals by other fisheries and to share in knowledge of shared stocks.

Recommendation 6: *AFMA to take into account the harvest of shared stock species by other fisheries and to cooperate with other relevant jurisdictions to pursue complementary management of shared stocks for all target and byproduct species, which may be affected by cross-jurisdictional issues.*

Management response

The current WTF management regimes aim to maintain ecologically viable stock levels by limiting the number of operators in each fishery. The WTF are managed as limited entry fisheries and have been since 1996 and 1998 in the NWSTF and WDWTF, respectively. In total, seven permits in the NWSTF and 11 permits in the WDWTF have been issued.

Other management measures include a maximum cod-end mesh size of 50 mm for trawl gear used in the NWSTF to discourage targeting of demersal finfish, mandatory use of VMS on all vessels in each fishery and catch and effort reporting requirements. Management arrangements are implemented through permit conditions and are outlined in the SoMA (AFMA, 2004). The submission states that management of the fisheries through permit conditions provides the flexibility to introduce specific management measures, such as temporal or spatial closures if required.

Byproduct species taken in the NWSTF are afforded the same level of management and performance measurement as that described above for the target species. The primary byproduct species taken in the NWSTF are deepwater prawns in addition to slipper lobster, squid, bugs and some finfish species. Over the last eight years, the combined annual byproduct total in the NWSTF varied between 0.1 to 5.1 tonnes. The submission states that the low volume and intermittent catches of these species make the probability of significant impact low. DEH concurs with this assumption and expects that the ERA will provide a more robust assessment of likely impact.

While the WDWTF does not have defined target species, fishers opportunistically target a range of species depending on season, species abundance and market demands. Consequently, there are some species that are consistently caught in the WDWTF while others are caught and retained in small amounts. The vast range of species caught in small amounts and retained for sale may be considered byproduct. There are no specific management measures for byproduct in the WDWTF due to the high diversity and variable volume of byproduct species.

The lack of information about species, particularly in the WDWTF, has hindered the development of species specific management measures in the past but DEH believes that AFMA has the capacity to implement precautionary measures for a number of species (e.g. slipper lobster, deepwater sharks, and squid) now and revise them as further information is collected, through for example, the observer program required in **Recommendation 3**.

In particular, DEH considers that specific management action is required to manage the harvest of deepwater slipper lobster (or bugs) in the WTF. Catches of slipper lobster have significantly increased

in recent times in the WTF, and while it has been considered a byproduct species in the past, the species is increasingly targeted by operators. WestMAC has raised some concerns that the current level of harvest may not be sustainable, especially since juveniles and berried females of the species are taken as part of the catch. DEH considers there is a need to clearly define a harvest strategy for slipper lobsters to ensure that harvesting of the species can be conducted within sustainable limits. DEH is aware of discussions held through WestMAC regarding this issue and understands that both industry and AFMA recognise the need for management action for these species. A number of options for managing the species are available, including size limits, prohibition on take of berried females, minimum net mesh size to allow juveniles to escape and catch trip limits. There may also be scope to include some size monitoring of slipper lobsters and trialing of different net sizes through the observer program. DEH suggests that management measures most appropriate for the fishery should be developed and implemented as a priority.

Recommendation 7: *AFMA to develop a management strategy for the harvesting of Slipper lobster in the WTF, which includes clearly defined management measures and performance measures, to ensure that harvesting of this species is conducted within sustainable limits.*

DEH is also concerned about the potential impact of the fisheries and lack of specific management, in particular in the WDWTF, on deepwater shark species. In general, deepwater shark species are considered vulnerable to fishing activities, primarily due to their life history characteristics. A number of deepwater shark species taken in the WTF have been recognised as particularly vulnerable and some have been nominated for listing as protected species under the EPBC Act. The submission, noting the comparison of research data collected in the past with more recent information, recognises that fishing activity in the WTF may have impacted on Southern dogfish (*Centrophorus uyato*) populations in the area of the fisheries. Endeavour dogfish (*Centrophorus moluccensis*) is also captured regularly in the WDWTF as indicated by the catch information in Appendix 2 of the submission. DEH believes that catches of deepwater sharks should be specifically monitored in the WTF. Monitoring of the species over time, and the ERA for the WTF, may identify that specific measures are required to limit the take and potential impacts on the species in the future. DEH expects that appropriate management action would be taken in this instance (see **Recommendation 10**). DEH notes that measures such as trip limits have already been implemented in the Southern and Eastern Shark and Scalefish Fishery to protect deepwater dogfish in recognition of their vulnerability to fishing and potential listing as protected species. If required, similar measures could be adopted in the WTF.

Recommendation 8: *By December 2005, AFMA to implement a system for the ongoing monitoring of catches of deepwater shark species in the WTF, in particular Southern dogfish and Endeavour dogfish, to ensure that fishing activities do not negatively impact upon the populations or important habitats of these species.*

No reference points, or other performance measures that trigger management action have been developed for either of the fisheries. DEH recognises that the low number of operators over large fishery areas reduces the likelihood of overfishing but is concerned that mechanisms are not in place to measure the performance of the fisheries and detect and respond to any threats to sustainability. The need for clearly defined performance indicators and performance measures for target and byproduct species was discussed earlier in this report (see **Recommendation 5**). DEH also suggested that current information on scampi and deepwater prawns could be used to develop such measures for the NWSTF and, while biological information about the species in the WDWTF is scant, precautionary performance measures could be developed for key species and improved as more information is obtained through the observer program as required in **Recommendation 3**.

The need for a meaningful reference point for squid species has been raised as part of the EPBC Act assessment process in all jurisdictions that take squid. Although stocks may be considered under

exploited, the species is routinely taken in these fisheries and in fisheries under other jurisdictions. The population structure of commercially harvested squid species is unknown and it is possible that stocks harvested in the WTF are shared with other jurisdictions. Consequently, harvesting the species in one fishery may impact on recruitment and stocks in other fisheries. Concerns were raised in the Northern Fisheries Managers meeting in Darwin in September 2002 that increasing fishing pressure and opportunistic targeting of squid in fisheries around the coast could significantly affect the status of this shared stock. Cooperation between jurisdictions on squid management is required and the WTF should engage in this process. A biologically meaningful reference point for squid that takes into account the harvest of the species in other jurisdictions should be developed, based on best available information if detailed robust biological data is not available.

Recommendation 9: *AFMA, in cooperation with relevant fisheries management agencies to develop and implement a precautionary and biologically meaningful limit for squid harvest based on best available information about the species ability to withstand fishing pressure, within 3 years.*

Overall, DEH considers that the limited entry nature of the fisheries provides reasonable protection of the target and byproduct stocks, but believes that clear performance measures are required to enable detection of sustainability concerns in the fishery and that more precautionary specific management for some species is required. DEH also expects that the ERA underway in the fishery may identify other species at risk from the fisheries and specific management action may be required to address impacts in the future.

Conclusion

DEH considers that the management regimes for the WTF are appropriately precautionary and provide for the fisheries to be conducted in a manner that does not lead to over-fishing. DEH considers that the small number of operators fishing over large areas ensure that the fishery is conducted at catch levels that maintain ecologically viable stock levels with acceptable levels of probability.

DEH considers that there is scope to further refine some of the existing information collection, assessment and management responses and has provided a number of recommendations for 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 currently applicable to the WTF. While no defined reference points have been established, AFMA asserts that the fishery is operating at sustainable levels and the low level of activity in the fisheries and large fishery areas ensure that ecologically viable stock levels can be maintained. The submission states that if sustainability concerns were to arise that the flexible management arrangements would provide mechanisms to ensure that stocks could be recovered through, for example, spatial and temporal closures. DEH agrees with this assessment, but considers that to enable overfishing to be detected, the performance of the fisheries needs to be assessed on a regular basis against clearly defined performance measures. Performance indicators and performance measures have been sought through **Recommendation 5**.

Conclusion

DEH considers that the fish stocks in the WTF are not below a defined reference point but should that occur in the future, the fisheries are conducted such that there is a high degree of probability the stocks would recover to ecologically viable stock levels within nominated timeframes.

Ecosystem impacts

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

Bycatch protection

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

Information requirements

Knowledge of the composition of bycatch in both the WTF is limited as only estimated weights of bycatch are recorded in the compulsory shot-by-shot logbooks. The only other current source of bycatch information is research surveys conducted in the WDWTF. Research conducted in the WDWTF in the 1990s established the community structure and composition of demersal fish fauna in the area of the fishery and led to the production of a field identification guide for fish species captured in the WDWTF. The field guide is used to accurately record retained fish species in the logbooks and is also used in the NWSTF.

The independent observer program currently being trialed is collecting information on bycatch composition and abundance. As discussed earlier, DEH considers the observer program a useful approach for collecting a wide range of information on the WTF that could be used to inform future assessment and management of the fisheries. In particular, information on bycatch in each fishery would significantly enhance the management and monitoring regimes of the fishery and help confirm assumptions that impacts on bycatch species are low due to the large area and low number of operators associated with the fisheries. **Recommendation 3** specifically seeks an ongoing commitment to an independent observer program to collect information on a range of parameters, including bycatch.

Assessment

No formal risk analysis of bycatch in relation to its vulnerability to fishing has been conducted in the WTF in the past. However, AFMA has recently commissioned CSIRO to conduct an ERA in the WTF. The ERA is designed to evaluate fishing induced impacts on ecological systems by identifying high risk activities and recommending risk management responses. The ERA in the WTF is currently in the Scoping Phase and is expected to be completed by February 2006. DEH considers that the ERA will be a crucial step in the future management of bycatch and fishing impacts in the WTF and has made a recommendation to ensure that appropriate management measures are developed to minimise impacts on those species identified as at high risk from the fisheries (see **Recommendation 10**).

The submission states that bycatch is minimal in the WDWTF due to the large percentage of the catch that is retained by fishers. The fish community structure and composition within the grounds of the WDWTF has been established however it is not clear what impact the fishery is likely to have on the fish communities. DEH expects that data collected through the independent observer program should allow identification of the communities likely to be impacted by the fishery.

Significantly less is known about the species likely to be taken as bycatch in the NWSTF and there is no data on which to base an assessment. The submission indicates that the small scale of the fishery would suggest that impacts on bycatch species are likely to be low. As for the WDWTF, DEH expects

that the observer program should provide valuable information to inform future assessment and management of bycatch in the NWSTF.

Management response

As previously stated, the WDWTF yields small amounts of bycatch due to the large range of species retained for sale. Consequently, no specific management measures to avoid capture and mortality of bycatch species have been developed for the fishery. The only measure in place in the NWSTF to reduce bycatch is a maximum cod-end mesh size of 50 mm, which was introduced to discourage targeting of demersal finfish species. For both WTF, the small number of operators and large fishery areas may also serve to reduce impacts on bycatch species. The submission states that, should the ERA identify any high risk species within the WTF, measures will be introduced to minimise impacts on such species.

While no specific group of indicator species is being monitored, the observer program required under **Recommendation 3**, and which is currently being trialed, will collect detailed information on bycatch in the WTF and may identify species that would be useful as bycatch indicators species for future monitoring. DEH acknowledges the inherent difficulties in monitoring all bycatch species captured during trawl operations due to the often high volume and high diversity of species. The use of appropriate bycatch indicator species can be an effective way of monitoring likely impacts on overall bycatch and for monitoring those species of particular concern. The ERA may identify species at risk from the fisheries that would benefit from dedicated ongoing monitoring. A recommendation has been developed to ensure that AFMA identifies and implements appropriate management strategies to address or mitigate impacts identified through the ERA (see **Recommendation 10**).

Conclusion

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

Recommendations 3 and 10 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 and assessment

The compulsory shot-by-shot logbooks used in the WTF have recently been amended to include reporting requirements for interactions with protected species. The new reporting requirement was introduced to the NWSTF and WDWTF in April 2001 and, September 2002 respectively. In addition, AFMA, in conjunction with DEH, is developing educational material to be distributed to fishers to aid identification and handling of protected species to ensure that interactions can be accurately recorded and minimal harm is done to any species that are captured.

Protected species likely to occur in the area of the fisheries include marine turtles, sea snakes, seals, sealions, whales, dolphins, Great White Sharks and Grey Nurse Sharks. The submission states that since the inception of the fisheries, the only interaction with a protected species was the capture of a Grey Nurse Shark in the WDWTF, however this was prior to the species being listed under the EPBC Act. The submission recognises that other protected species may have been taken over the years but not reported since reporting of interactions has only recently been required in the fisheries. Since the introduction of the new reporting system there has been no recorded interactions with protected species in the WTF.

As protected species reporting requirements are only recent there is little historical data on which to base a robust assessment of likely impact of the fisheries on protected species. The submission offers some assumptions about the potential risk of interaction with protected species posed by the fisheries. In general, the risk of interaction with protected species is considered minimal due to the benthic deepwater nature of the fisheries and interactions are expected only to occur while shooting or hauling the net through the water column. DEH considers that these assumptions may be accurate but believes that the observer program required under **Recommendation 3** and implementation of outcomes of the ERA (see **Recommendation 10**) should help confirm such assumptions.

In general, DEH considers that the collection of information on interactions with protected species in the WTF is adequate. The assessment of impacts on protected species should be greatly enhanced by the observer program and ERA. There are no ecological communities in the area of the fisheries so collection of information and assessment of impacts on such communities is not required.

Management response

No specific management measures are in place to avoid capture of protected species in either the WDWTF or NWSTF. A 'Code of fishing ethics' and marine turtle identification, recovery and handling procedures, which are included as part of the fishing logbook, are designed to minimise mortality of protected species if incidentally caught in the fisheries. The submission states that the low occurrence and low risk of interaction with protected species has meant that no further measures have been developed for the WTF. DEH considers that should interactions with protected species be identified as a concern, AFMA has the capacity to take appropriate and timely action to mitigate these threats. Implementation of the outcomes of the ERA will be particularly important if any protected species are found to be at risk from the fisheries (see **Recommendation 10**).

Conclusion

DEH notes that recorded interactions with protected species in this fishery are minimal 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 a risk assessment process indicate otherwise, DEH

expects that appropriate actions would be undertaken to ensure the fishery avoids mortality or injury to these species and avoids or minimises impacts on threatened ecological communities.

Recommendation 10 has been developed to ensure that the risk of unacceptable impact on protected species is identified and minimised in the longer term.

Minimising ecological impacts of fishing operations

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

Information requirements

No data on the impact of the WTF on the ecosystem is available, however, some information on the ecosystems in the area of the WDWTF has been collected. An FRDC funded survey of the WDWTF grounds was undertaken in 1991. This survey described the diversity, density and community structure of the Western Australian continental slope demersal fish fauna and identified 7 distinct fish community types. These communities were defined by depth and latitude and found to be consistent with the multiple origins, stratification and low productivity of the ocean currents adjacent to the slope region. The survey observed decreasing fish density with decreasing latitude which suggests that the density of demersal fish would be higher in the WDWTF than the NWSTF.

The information collected through the 1991 survey has significantly improved the knowledge of the western Australian continental slope, however more work in this area is needed. In particular, information on benthic communities is required given that the fisheries are demersal trawl operations and the survey did not yield any information on the non-fish benthic communities of the region and under sampled small fish species. Information is also required on the ecosystem, and fishery impacts upon it, for the area of the NWSTF.

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 nature of trawl fishing, specifically demersal trawling, means that the potential for unacceptable and unsustainable impacts on the environment generally is high. While an assessment of impacts of the WTF on ecosystem components has not been conducted in the past, the fisheries are currently going through a risk assessment process. The ERA for the WTF is determining the risk posed by the fisheries to key ecosystem components, including benthic communities and the general structure and productivity of the ecosystem. The ERA is also expected to provide a valuable assessment of the likely risks posed by the fishery on target, bycatch and protected species. The ERA is scheduled to be completed in February 2006.

The submission indicates that the impact on the benthic communities in the WTF is considered low because of the small number of operators who fish with low intensity over large fishery areas. Similarly, impacts on pelagic fish species are considered low because of the low number of operators and, as the fisheries are demersal trawling operations, they would only be expected to capture pelagic species when shooting or hauling the nets. DEH believes that these assessments of likely risk may be accurate but the ERA is the appropriate mechanism by which to confirm this assumption. Given the

absence of knowledge of key aspects of the WTF, DEH considers the ERA a critical tool for informing future management of the fisheries and that AFMA must commit to implement any necessary action to minimise risks identified through the ERA.

Recommendation 10: *Within two years of completion of the ecological risk assessment of the Western Trawl Fisheries, AFMA to identify and implement appropriate management strategies to address/mitigate impacts identified.*

Management response

As with bycatch and protected species impacts, the key management measure to ensure that significant damage to ecosystem does not result from the operation of the WTF is the restriction of the fisheries to a small number of operators whose efforts are dispersed over very large fishery areas. The flexibility of permits also allows emergency measures, such as spatial or temporal closures, to be implemented rapidly in the fisheries.

The ERA is expected to identify risks associated with the broader ecosystem impacts of the WTF and **Recommendation 10** should ensure that appropriate management action is taken in a timely manner to address any risks identified.

Conclusion

DEH considers that the fishery is conducted in a sufficiently precautionary manner to minimise the impact of fishing operations on the ecosystem generally. A recommendation has been developed to ensure that the risk of significant impact by the fishery on the marine environment generally is identified and minimised in the longer term.

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LIST OF ACRONYMS

AFMA	Australian Fisheries Management Authority
AFZ	Australian Fishing Zone
BRS	Bureau of Rural Sciences
CPUE	Catch per unit effort
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DEH	Australian Government Department of the Environment and Heritage
DFWA	Western Australian Department of Fisheries
EPBC Act	Environment Protection and Biodiversity Conservation Act 1999
ERA	Ecological Risk Assessment for the Western Trawl Fisheries
NPF	Northern Prawn Fishery
NWSTF	North West Slope Trawl Fishery
OCS	Offshore Constitutional Settlement
SoMA	<i>Western Trawl Fisheries Statement of Management Arrangements 2004</i>
UNCLOS	United Nations Convention on the Law of the Sea
VMS	vessel monitoring system
WDWTF	Western Deepwater Trawl Fishery
WestMAC	Western Trawl Fisheries Management Advisory Committee
WTF	Western Trawl Fisheries
WTO	Wildlife Trade Operation