



Australian Government

Australian Fisheries Management Authority


DRAFT EXPORT REASSESSMENT REPORT

Western Trawl Fisheries

August 2007

This report has been prepared by AFMA for consideration by the Department of the Environment and Water Resources in relation to the exemption of the Western Trawl Fisheries from export controls under the *Environment Protection and Biodiversity Conservation Act 1999*.

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 Protecting **our** fishing future

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Description of the fishery

1.1 Target and bycatch species

Target species of the North West Slope Trawl Fishery

The North West Slope Trawl Fishery (NWSTF) is based on commercial stocks of deepwater crustaceans, principally scampi and prawns. There are three main commercially important species of scampi (*M. velutinus*, *M. australiensis*, and *M. boschmai*) which are taken from different depth distributions between 260 to 500 metres (Wallner & Phillips, 1995). More recently the fishery is increasingly taking a combination of other scampi species that are marketed as mixed scampi tails (Wallner & Phillips, 1995, Moore et al. 2007a).

Scampi (Metanephropids) occur on the continental slopes of many countries. Within Australia, they occur over a wide geographic area but are concentrated on muddy bottoms along the NW Slope from approximately 22°S up into the Timor Sea (Fowler & McLoughlin, 1996; Wallner & Phillips, 1995). Scampi build extensive burrows and hence are strongly correlated with sediment type and grain size (Wallner & Phillips, 1995).

Prior to the inauguration of the fishery the biology and life histories of scampi had remained poorly known (Wallner & Phillips, 1995). However, in order to improve management of the fisheries resources, research has subsequently been undertaken that has enhanced the understanding of the life history and biology of scampi in the NWSTF. This research has revealed that the species are strongly K-selected with scampi characterised by low fecundity, a lengthy incubation period, short larval development period; they require three to five years to reach maturity and recruit into the fishery (Wallner & Phillips, 1995).

Analysis of *M. australiensis* length-frequency data collated from the NWSTF has indicated that females 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 (Rainer, 1992). The maximum lifespan is 10 to 12 years at which time the scampi attain a maximum carapace length of 75 mm (Rainer, 1992).

The biological characteristics of scampi are indicative of low sustainable yields and illustrate that they are susceptible to overexploitation if not managed appropriately. Furthermore, fishing for scampi and deepwater prawn stocks has been confined to relatively small areas within the NWSTF, principally the waters adjacent to Rowley Shoals and the Scott and Ashmore Reefs. The aggregation behaviour of crustaceans in these areas increases their susceptibility to local depletion by intense fishing (Staples et al. 1994). A stock reduction analysis completed in 1993 indicated that an annual catch of scampi from the NWSTF of 100 tonne is sustainable (Staples et al. 1994).

Deepwater prawns are widely distributed in coastal waters worldwide including in New Zealand, eastern and northern Africa, Japan, the temperate Atlantic, and the Mediterranean and Indo-West Pacific regions (Wadley, 1992). In the NWSTF four penaeid species (*Aristaeomorpha foliacea*, *Haliporoides sibogae*, *Aristeus virilis* and *Plesiopenaeus edwardsianus*) and two carid species (*Heterocarpus woodmasoni* and *Heterocarpus sibogae*) compose a high percentage (70%) of the total prawn catch. Numerous other prawn species comprise the remainder of the prawn catch with up to 41 commercial or potentially commercial crustacean species featuring in the catch of the NWSTF (Wadley, 1992). While the deepwater prawns have previously been the primary target species of the fishery, they are currently only taken as a byproduct.

Little information or knowledge exists on the biology of deepwater prawn species. The red prawn, *A. foliacea*, lives for at least four or five years and is sexually mature at one year old (Tilzey et al., 2002). The species completes its lifecycle offshore with a pelagic larval phase and demonstrates nocturnal vertical migration (Fowler & McLoughlin, 1996). Compared with inshore relatives deepwater prawns have a relatively low productivity. Based on catch history from 1986-1989, the sustainable yields in the NWSTF were thought to be approximately 200 to 300 tonnes (Fowler & McLoughlin, 1996).

Target species of the Western Deepwater Trawl Fishery

The marine habitat of the Western Deepwater Trawl Fishery (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, catch patterns are not clearly defined as a diverse range of species are captured across the fishery and targeting is opportunistic with few specific grounds identified (Evans, 1992, Moore et al. 2007b). The WDWTF can be defined as a byproduct or multispecies fishery due to the wide range of species taken in low volumes.

In the southern areas of the WDWTF, the important commercial fishes include orange roughy (*Hoplostethus atlanticus*) and oreos (Oreosomatidae) in mid-slope regions (below 700m) south of 32°S. At depths between 300m to 600m and generally south of 25°S big spine boarfish (*Pentaceros decacanthus*), alfonsino (*Beryx splendens*), mirror dory (*Zenopsis nebulosus*), gemfish (*Rexea solandri*) and deepwater flathead (*Platycephalus conatus*) form an important component of the catch.

In the northern area of the WDWTF (north of 27°S), fishing has concentrated on the upper continental slope (200-400m) where the important commercial species have included ruby snapper (*Etelis carbunculus*), Tang's snapper (*Lipocheilus carnolabrum*), apsiline snappers (Lutjanidae: Apsilinae) and sea bream (Lethrinidae). In the past, scampi (*Metanephrops spp.*) has been targeted in 300-500m of water and recently bugs (*Ibacus spp.*) have formed an important and growing component of the catch.

The stock status for all of the WDWTF resources remains uncertain and stock assessments have been hindered by the small scale of the fishery, limited research funding and the large range of species taken in addition to rapid opportunistic changes in targeted species within the fishery. Although limited research has been conducted on resources exploited by the WDWTF, it is widely acknowledged that a number of finfish species are slow growing and long lived. These species include, but may not be limited to, orange roughy (longevity > 100 years), and oreo species and eteline snappers (longevity > 25 years) (Garvey & Newman 1997).

Dichmont et al. (2002) produced a stock assessment for ruby snapper inhabiting the grounds of the WDWTF. Given a lack of information on the growth, natural mortality and length-weight relationship of ruby snapper in Western Australian waters, the assessment incorporated biological parameters from ruby snapper inhabiting other Indo-Pacific regions. However, since no vessels focussed on catching ruby snapper for more than three consecutive years and a clear lack of knowledge of the local biological parameters for ruby snapper existed, no meaningful advice on sustainable yields could be established and a high level of uncertainty shrouded results. This limited the ability of the stock assessment to provide robust management advice. It was noted that throughout the Pacific ruby snapper abundance has shown rapid decline in response to high fishing pressure. Furthermore, ruby snapper has been known to form large spawning aggregations in the WDWTF that increases the susceptibility of this species to trawling (Dichmont et al. 2002).

Bycatch species

Bycatch information is primarily collected through logbooks for the WTFs, with some augmenting observer coverage. Section 3.4 of this report gives a detailed account of bycatch taken in the WTFs. These data sources indicate that the dominant bycatch species are sponges, spurdog and mixed fish for the WDWTF and mixed prawns and mixed fish for the NWSTF.

1.2 Fishing areas

The NWSTF extends from 114°E to about 125°E off the Western Australian coast between the 200m isobath and the outer limit of the Australian Fishing Zone (AFZ), but taking into account Australian-Indonesian maritime boundaries. Fishing is conducted with demersal crustacean trawls during the day and night along bathometric contours depending upon the target species sought. Most operators in the fishery also fish in the Northern Prawn Fishery (NPF) and although the NWSTF is open all year, fishing effort has historically occurred seasonally during closed periods in the NPF.

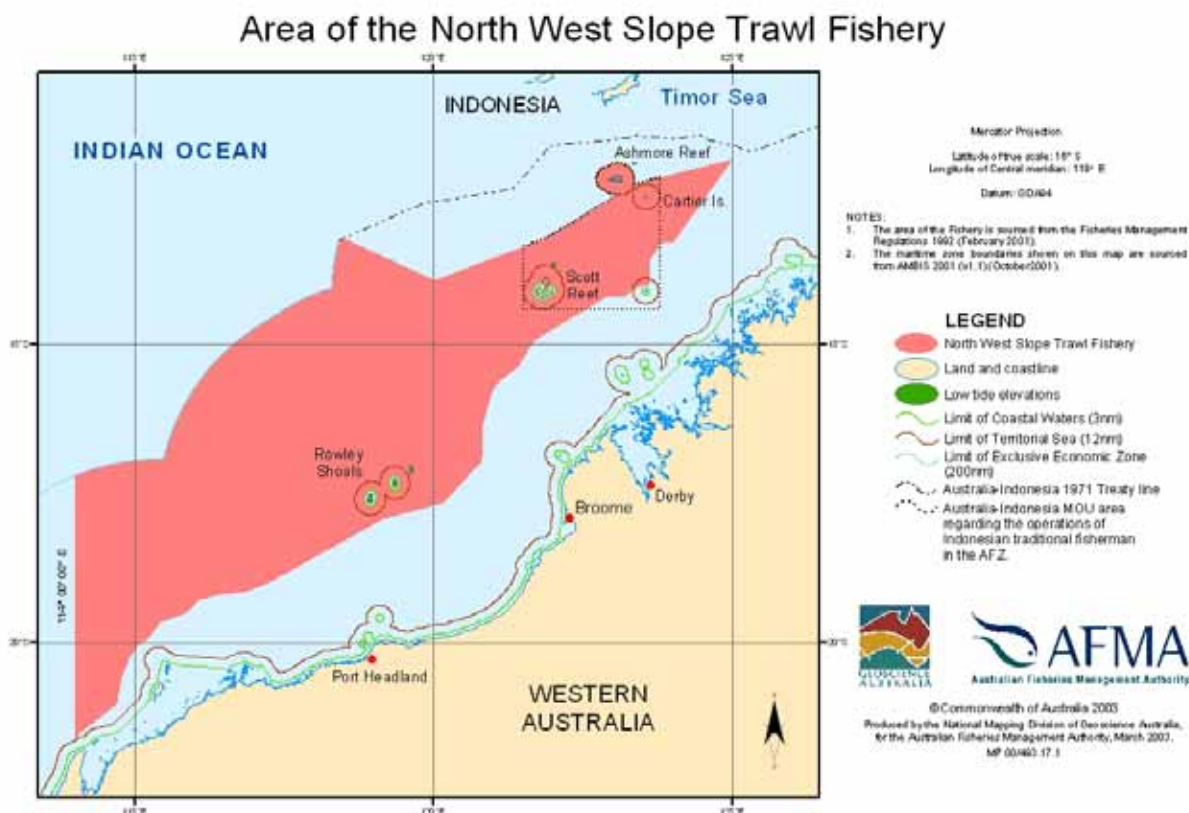


Figure 1. Area of the North West Slope Trawl Fishery (Source: National Mapping Division, Geoscience Australia, 2003).

The WDWTF is located in deep water off Western Australia, from the 200m isobath to the edge of the AFZ. Its northern most point is the boundary of the AFZ to longitude 114° E and southern most point at the boundary of the AFZ to longitude 115° 08'E. The Ningaloo Marine Park extends into the area of the fishery and the northern part of the fishery is also an area of high oil and gas productivity.

Area of the Western Deepwater Trawl Fishery

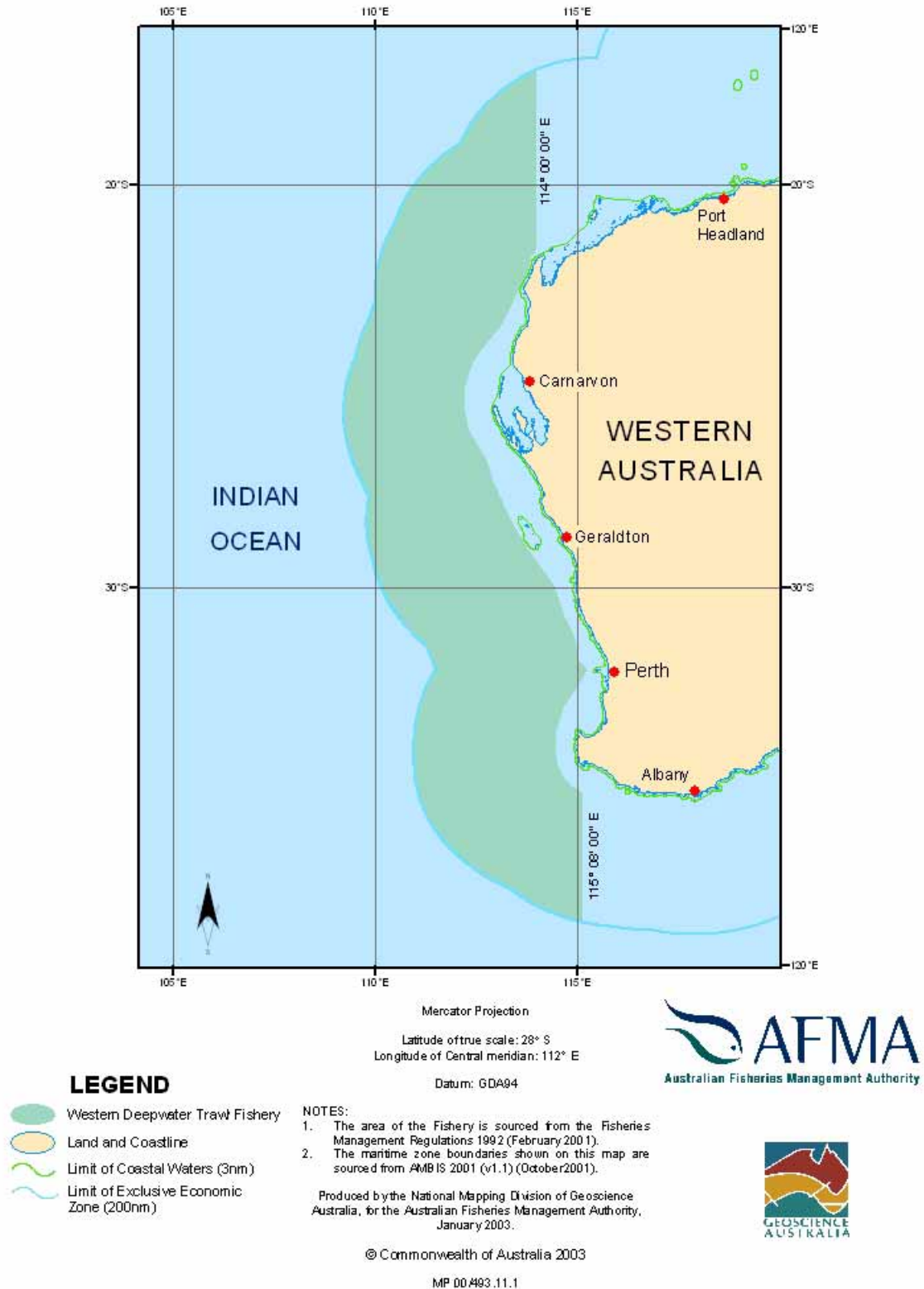


Figure 2. Area of the Western Deepwater Trawl Fishery (Source: National Mapping Division, Geoscience Australia, 2003).

1.3 Management arrangements

The NWSTF is managed through limited entry in addition to conditions imposed on the fishing permits. The fishery is restricted to seven fishing permits that are renewed every five years. Permit conditions place cod end mesh-size restrictions and ensures that the North West Slope Daily Fish Log (NWS03) is completed for every day of trawl fishing. The permit also defines the area of the fishery within which trawling is endorsed and enforces the carriage of observers and associated collection of scientific data and samples if requested by AFMA. The use of a vessel monitoring system (VMS) was also made mandatory from the 1 July 2004. In July 2007 100kg trip limits for goldband snapper and red emperor were implemented.

Similarly, the WDWTF is also managed through limited entry and conditions imposed on the fishing permits. The WDWTF is restricted to eleven fishing permits that are renewed every five years. Permit conditions enforce the completion of a daily log for every day of trawl fishing within the fisheries boundaries. In line with the NWSTF, the permit also defines the area of the fishery within which trawling is endorsed and enforces the carriage of observers and associated collection of scientific data and samples upon request by AFMA. Additionally, vessels operating in the WDWTF must also have a VMS installed and operational while deployed in the fishery.

AFMA has an adaptable management framework with the ability to amend permit conditions. In response to changing fishery dynamics and available knowledge, AFMA may implement amendments to improve management efficiency. Permit amendments may include imposing changes to the area of operation, gear restrictions and/or catch limits. For example, significant changes in catch composition or species specific protection can be regulated through permit condition amendments.

There are no output controls specific to either the NWSTF or WDWTF. Under the *Fisheries Management Act 1991* the take of blue and black marlin (*Makaira mazara*, *M. indica*) and black cod (*Epinephelus daemeli*) is prohibited.

Within the defined area of the fisheries there are no spatial controls. However, fishing within any of the marine parks and reserves within the confines of the NWSTF or WDWTF is prohibited. Fishing effort is indirectly regulated by participation of operators in adjacent fisheries and restrictive weather conditions (most vessels are under 25 meters in length). The only management arrangement specifically designed to regulate bycatch and byproduct catches is the mesh size regulation imposed in the NWSTF. A maximum cod end mesh size of 50mm is designed to limit targeting of finfish.

1.4 Fishing methods (gear types)

With the exception of two purpose built boats that worked throughout the year during the early 1990s (based on traditional NPF design but with modifications built in during construction), the remaining vessels are mostly NPF trawlers that access the fishery on a part time or opportunistic basis, predominantly during closures in the NPF. Consequently, the fleet are all-steel construction 20 – 25 m prawn trawlers modified for deepwater trawling. Modification of demersal prawn trawling gear for deepwater trawling includes large capacity winches, stern-towed twin or triple nets and product handling equipment (hoppers) capable of rapidly processing large volumes of fragile deepwater species (Evans, 1992). Most vessels operating in the NWSTF freeze catch on board and typically have the capacity to store 30 – 50 tonnes of product. Fishing duration is usually four to five weeks and is limited by freezer space, fuel and freshwater reserves (Evans, 1992).

No restriction on net headrope length exists in the NWSTF, however a maximum mesh size does apply in order to discourage any targeting of demersal finfish. Generally 'Florida flyer' type nets are standard for both scampi and deepwater prawn fishing (Evans, 1992). These nets are based on NPF banana prawn nets with extended wing panels and slightly different seaming (Evans,

1992). Vessels tow nets in either dual or triple arrays giving a total headrope length of between 47 and 75 metres depending on vessel power (Evans, 1992). Wing mesh size is typically 60 mm for prawns and 90 mm for scampi with codends generally a heavier gauge 45 mm mesh regardless of the target species (Evans, 1992).

The nets are typically towed at 3 knots along relatively flat mud or silt substrates. Hard bottom areas or rocky outcrops are avoided as these areas are not ideal scampi habitat and also lead to snaring and damage of nets. Shot duration is typically 3-5 hours with a combined shoot-away and haul-up time of around one hour at 500 m (Evans, 1992). In order to minimise product damage, shot duration is reduced when targeting deepwater prawns due to their more fragile nature (Evans, 1992).

The WDWTF is open to fishing the entire year however, operators have generally chosen to access the fishery on a part time or opportunistic basis. Such a diverse range of vessels have operated in the fishery since its inception that it is impossible to characterise vessels, trawl types or fishing methods for the WDWTF (Evans, 1992). Vessels have ranged from 18 m converted tuna boats to 85-90 m factory ships, and include NPF, Shark Bay Scallop and South East Fishery trawlers (Evans, 1992). A wide variety of nets, targeting techniques and processing methods have also been employed. Either demersal fish trawls or crustacean trawls are typically utilised.

The net is towed behind the vessel by long wires, the warps, and is deployed and retrieved from the stern of the vessel by winches. The net opening, or mouth, is spread horizontally by the outward hydrodynamic forces acting on the otter boards as they are towed through the water. The bottom of the net opening, the footrope, is weighted bringing the mouth close to the bottom and has ground gear attached, principally bobbins, to enable the gear to be towed across the substrate with minimal hook-ups. The top of the mouth, the headline, is lifted vertically by floats.

Demersal fish trawling relies on herding fish inward toward the path of the oncoming net mouth. As the fish swim away from the sweeps and the net wings, they are enclosed and fall back towards the tapered body of the net. Wing meshes in the WDWTF can vary from 200 mm to 1.6 m or more (Evans, 1992). As the gear is hauled up toward the vessel, the fish are contained in the end section of the net, the codend, which is fastened with a rope to release the catch on the vessel deck. WDWTF vessels generally employ codend meshes of 55 - 110 mm. No mesh size limits are currently regulated. Some operators have reduced sweeps while targeting bugs as the herding effect does not work on bugs. This change will likely reduce bycatch.

1.5 Allocation between sectors

N/A

1.6 Governing legislation/fishing authority

The WTFs are managed by AFMA in accordance with the *Fisheries Management Act 1991*, the *Fisheries Management Regulations 1992*, and the *Western Trawl Fisheries Management Arrangements 2004*.

1.7 Status of export approval/accreditation under the *Environment Protection and Biodiversity Act 1999*

The WTF was granted Wildlife Trade Operation (WTO) accreditation and exemption from export restrictions under the *Environmental Protection and Biodiversity Conservation Act 1999* in 2004; this expires in November 2007.

2 Management

2.1 Changes to management arrangements

Recent trip limits of 100kg for red emperor (*Lutjanus sebae*) and goldband snapper (*Pristipomoides multidens* and related *Pristipomoides* species) were implemented in the NWSTF as information was provided to AFMA that these species were overfished in the Western Australia Kimberley Trap and Line Fishery and effort in that fishery had been reduced. It was therefore not considered sustainable to allow Commonwealth operators to apply further fishing pressure. In further pursuit of the objective of sustainability, AFMA is currently in the process of implementing a partial closure in the north east corner of the NWSTF in depths of less than 200m.

Additionally, a number of alternative management arrangements will be considered following the completion of the ERA and inclusion of verified observer data. Additionally, harvest strategies for both the WDWTF and the NWSTF are currently being developed by AFMA and CSIRO. These harvest strategies will incorporate existing and new management arrangements for each fishery. Possible management arrangements to be evaluated include, but are not limited to:

1/ Spatial management: A number of species targeted in the WTFs occur over a wide geographical range. However, distinct areas of high productivity are fished. Rotational closures may be an efficient method of protecting critical stock biomass. Particularly in the WDWTF where snapper spawning aggregations may be targeted, spatial closures could significantly protect spawning stocks.

2/ Gear restrictions: Gear restrictions may be applicable for regulating capture of bycatch species or important size classes of target species.

3/ Quotas: Preliminary information indicates that a number of species exploited in the WTFs have a low production potential. Based on accurate research, catch could be identified as a necessary management tool to preclude overfishing and facilitate long term sustainability, though due to existing minimal effort in the fishery, lack of research capability and paucity of biological information on the target and byproduct species this is not felt to be a viable management tool.

4/ Effort: Potentially effort could be used as a management tool. The fishery could adapt an effort based management arrangement with each permit being allocated individual transferable effort units which would constitute a total allowable effort (TAE) for the fishery.

5/ Triggers: A precautionary trigger will be established for orange roughy in the WDWTF. If this trigger is exceeded then management measures to cease all orange roughy catches will be implemented. The trigger level is currently under consideration and will be implemented by the end of 2007.

2.2 Performance of the fishery against objectives, performance indicators and performance measures

Statements of the performance of the WTFs against the planned achievements are reported each year in AFMA's Annual Report.

Table 1. AFMA's performance against the planned achievements for the WTFs (AFMA, 2006).

Planned achievements	Performance against targets
Manage the WDWTF and the NWSTF in accordance with management arrangements and permit conditions	Both fisheries are managed under a Statement of Management arrangements (finalised in Feb 2005) and fishery-specific permit conditions. Recent management actions include setting a 5 t per annum reference point for deepwater dogfish species,

	developing a harvest strategy and developing a code of practice. Recent trip limits on goldband snapper and red emperor have also been imposed to protect overfished stocks also exploited by the WA trap and line fishery.
Update strategic assessment plans and have data acquisition by 12 December 2006	The process was finalised on 8 February 2005.
Implement an observer program	An observer program has been implemented in the WTFs with 1 trip carried out in the WDWTF in 2005-06 and 2 trips carried out in the NWSTF in 2005-06. Two trips in the NWSTF have been done in 2007 so far.

2.3 Compliance risks present in the fishery and actions taken to reduce these risks

The *Fisheries Management Act 1991*, the *Fisheries Management Regulations 1992*, the *Western Trawl Fisheries Statement of Management Arrangements 2004* outline the legislative measures taken to ensure there is a high level of compliance with the management arrangements for the fishery.

AFMA bases its fishery's compliance budget on the expected level of activity in the fishery (which is currently relatively low). AFMA relies on contractual arrangements with state fisheries agencies to deliver field compliance. Vessel activity is also monitored in the WTFs through compulsory fitting of a VMS. AFMA has not conducted a compliance risk assessment for WTFs. Compliance risk assessments have been initiated for those fisheries with a high level of activity and correspondingly higher levels of compliance risks. There is no immediate plan to conduct a compliance risk assessment for the WTFs.

2.4 Consultation processes

The Western Trawl Fisheries Management Committee (WestMAC) is a group of ten members consisting of industry, research, environmental and conservation and state and Commonwealth government representatives. WestMAC meet at least annually and are actively involved in the development and implementation of management arrangements in the WTFs. There are no specific Resource Assessment Groups for the WTFs.

2.5 Description of cross-jurisdictional management arrangements

The Western Tuna and Billfish Fishery (WTBF) is the only Commonwealth fishery that has an operational area that overlaps with the NWSTF. The WTBF fishery operates pelagically using longlines, whereas the NWSTF operates demersally and thus there is no conflict over resource sharing. Interaction between gears is minimal and therefore has no economic impact on either fishery.

The WTBF overlaps the entire area of the WDWTF; WTBF's most productive fishing grounds and zones of medium and high relative fishing intensity fall within the area of the WDWTF. While some demersal species such as boarfish and dogfish species are occasionally captured on pelagic long lines, there has been no significant interaction recorded between the two fisheries. The capacity for demersal trawls to interact with and capture pelagic species is negligible and thus resource sharing is not an issue.

Zone B of the Small Pelagic Fishery (SPF) overlaps with the southern region of the WDWTF south of latitude 31°S. The SPF principally takes greenback, yellowtail and Peruvian jack mackerels, blue or slimy mackerel and redbait using purse seine and mid-water trawling. The level of fishing effort exerted in the fishery is low with approximately 20 vessels operating annually under the 50 fishing permits for the fishery. There is a low effort applied by the SPF in the waters that overlap with the WDWTF with the majority of effort applied in other zones. As there is no overlap in the principal species targeted and low levels of effort exerted by both fisheries, there are no known interactions or economic implications between the fisheries.

There are a number of Western Australian Fisheries that have the *potential* to overlap with the waters of the NWSTF. Under negotiated OCS agreements, Western Australia has responsibility for all fishing methods other than trawling and long lining out to the edge of the AFZ. Within the area of the NWSTF there are a number of state managed line and trap operators that target demersal finfish (Northern Demersal Scalefish Fishery, Pilbara trap fishery, Pilbara line fishery). These fisheries have a history of utilising demersal finfish species. To date, fishing effort by these fisheries outside the 200 m isobath has been minimal with little success in this zone (WA Fisheries Status report 2006). The potential for future conflict is minimal, but may arise from interaction between trawls and traps while both fisheries are targeting demersal resources.

The West Coast Deep Sea Crab Fishery (WCDSCF) is a state managed crustacean fishery that overlaps in jurisdiction with the NWSTF & WDWTF. The WCDSCF primarily targets snow crabs (*Chaceon bicolor*), champagne crabs (*Hyphalassia acerba*) and giant crabs (*Pseudocarcinus gigas*). These species are targeted in depths between 600 to 1200m with the fishery operating from the 150 metre isobath out to the edge of the AFZ between 129°E longitude (WA/NT border) and 34°24'S latitude (Cape Leeuwin). There are seven licence holders that deploy up to 700 pots each, generally in plots of 50 to 100 pots attached to a mainline.

The potential for interaction exists between the NWSTF and the WCDSCF due to the overlap in the grounds of the two fisheries and the fact that the target species are benthic and hence susceptible to capture by the trawl gear used by NWSTF operators. To date, interactions between these fisheries have been minimal. This is due to the inefficiency of targeting the crabs using trawl gear and the fact that the WCDSCF is a live market fishery. Specimens retained using trawl gear are typically damaged or dead and not economically valuable. Furthermore, the WCDSCF zone that overlaps with the NWSTF is currently only undergoing exploratory fishing for deep sea crabs.

The WCDSCF also overlaps with the WDWTF. Given the benthic nature of the crabs and the overlap in the grounds fished by the two fisheries, the potential for interactions with the same species exists. However, WDWTF operators do not target deep sea crabs, as it is not economically viable to do so using trawl gear. The WCDSCF targets a live export market and the damaged and dead crabs incidentally taken by trawl gear in the WDWTF collect poor prices.

The Shark Bay Snapper Managed Fishery, managed by WA Fisheries, has the potential for future resource sharing conflict with the WDWTF. The snapper fishery has 48 licensed operators in the waters of the Indian Ocean between latitudes 23°34'S and 26°30'S (Moran, 2002). Mechanised handlines form the main fishing method of the snapper fishery. WA Fisheries manages the fishery through total allowable catches (TACs) and individually transferable quotas (ITQs). The fishery has been identified as fully exploited. At this stage it has not been ascertained if the deepwater snapper stocks targeted by the WDWTF share the same stock origins as the inshore stocks managed by WA Fisheries.

2.6 Compliance with threat abatement plans, recovery plans, domestic and international agreements

There are currently no threat abatement plans, recovery plans or domestic or international agreements relating to the WTF (barring a Memorandum of Understanding (MOU) with Indonesia).

AFMA undertakes a range of measures to ensure the WTFs are managed in accordance with the principles of ecologically sustainable development. These include the consideration of impacts of fishing on ecosystems, rather than focussing solely on target species. AFMA enforce the reporting of any interactions with threatened and protected species.

AFMA are finalising an Ecological Risk Assessment (ERA) for the WTF. This ERA assesses the risks that fishing poses to the ecological sustainability of the marine environment and direct actions to ensure any identified risks are minimised. This information, along with AFMA's management response, will form the basis of future management in the fishery.

3 Research and Monitoring

3.1 Results of any research completed relevant to the fishery, including how results will be incorporated into management of the fishery

An honours student from the University of Western Australia, Ben Ford, conducted his honour research using the catch data from a vessel in the NWSTF and WDWTF. AFMA is currently waiting for his report to be filed and possible incorporation into management of the fishery will be determined at that point. Below is an abstract from his thesis.

Community ecology of Demersal fishes of the Western Australian continental slope

The purpose of this study was to investigate the community ecology of the demersal ichthyofauna of the Western Australian continental slope. In particular, the nature of change in the assemblages with respect to changes in depth and latitude was of interest. This study contributes to the knowledge of the Western Australian continental slope, a region with very little scientific investigations regarding ichthyofauna, and extends upon a previous study by Williams et al. (2001), who examined the demersal fish assemblages of the western slope (20° - 35°S), by continuing into the North West Slope. Diversity was found to decrease with latitude and depth, while biomass decreased with depth and increased with latitude. Zonation of the assemblages with respect to depth was detected at 400m and 800m, the latter possessing a greater separation of the assemblages. Zonation of assemblages with latitude, or region was more distinct than that of depth. Three distinct latitudinal assemblages were found, with faunal breaks observed at 26° - 28°S and 21° - 23°S, the North West Slope appears to be relatively homogeneous with respect to the assemblages.

3.2 Description of monitoring programs used to gather information on the fishery (such as observer programs, long term monitoring programs etc) and results of these

Observer coverage is limited in the WTFs as the effort is generally low. The position of all vessels in the WTFs is monitored by VMS installed on each boat. These units allow AFMA to monitor the intensity, location and timing of fishing activity and ensure that fishing does not occur within areas closed to fishing activity. Operators record catch and discard in logbooks that provide information to AFMA. There have been a number of recent observer trips in both the WDWTF and NWSTF. The results from these trips will be used for assessing the residual risk of the ERA high risk species and habitats and for input into the Harvest Strategy and MPA process. An appropriate level of observer coverage will be continued.

Data summaries for these fisheries were produced for the first time in 2007 and will continue to be produced at least every three years, providing data on catch and effort trends.

3.3 Results of any collaborative research undertaken for the fishery

Research results are described above in Section 3.1. There are no additional results to report at this time.

4 Catch data

4.1 Total catch of target species

Total catch in the WTFs has declined over recent years mainly as a result of reduced effort. Additionally, the target species have shifted over time. The NWSTF remains primarily a scampi fishery, although finfish are sometimes taken. The WDWTF began as a finfish fishery, then shifted to target primarily bugs, and has recently shifted back towards finfish again. Catches of target species for the two fisheries are reported in the Data Summaries (2006) which are available at:

http://www.afma.gov.au/information/publications/fishery/data_summ/docs/nws_2006.pdf

http://www.afma.gov.au/information/publications/fishery/data_summ/docs/wdtf_2006.pdf

4.2 Total catch of target species taken in other fisheries (if applicable)

There is some overlap with the catch of target species with other fisheries (see section 2.5). However, as the WTFs are deepwater fisheries, the overlap is minimal. In addition, as the effort in the WTFs is low, any impact they had on other fisheries would be also be minimal.

4.3 Catch of byproduct species

There are minimal byproduct species for the WTFs as the NWSTF primarily targets and captures scampi and the WDWTF does not have specific target species and these species can change over time. The main byproduct species of the WDWTF are sharks and rays (chondrichthyan species). These species are generally taken in low numbers, especially with the minimal effort occurring in the fishery currently. However, some shark species have been determined by the ERA to be high risk (see section 6 on the ERA results).

4.4 Total catch of bycatch species (reported by species if possible)

Information on bycatch taken in the WTFs is collected primarily through logbooks with some observer coverage. Bycatch in the fisheries is low, with only a total of ~204 t for the NWSTF and ~430 t for the WDWTF estimated from 2000-2006 (Moore et al., 2007a,b). For more information including a breakdown of the bycatch, see the Data Summaries using the links noted in section 3.1.

4.5 Harvest by each sector (i.e. commercial, recreational, indigenous and illegal)

No recreational, indigenous or illegal fishing has any impact on the WTFs. There is an MOU (1972) between Australia and Indonesia, but interaction between the fisheries is negligible.

4.6 Effort data including information on any trends

Catches in the WTFs have declined in the past several years, as has effort. This is a result of the economic expense associated with fishing these fisheries versus the expected return. Currently,

effort in the WDWTF is zero and only 1-2 boats are fishing in the NWSTF. GVP has dropped in both fisheries accordingly. For further information see the Data Summaries for the WDWTF and the NWSTF 2006 (links given in section 3.1).

4.7 Spatial issues/trends

Despite the low effort in the WTFs, there are some spatial trends apparent in the data. These trends are displayed in the spatial effort and catch maps of the data summaries. The links to these summaries are given above in 3.1.

5 Status of target stock

5.1 Resource concerns

The Bureau of Rural Sciences *Fisheries Status Reports 2006* (McLoughlin, 2006) reported the status of both WTFs as uncertain. This conclusion stems from a lack of data on the target species and the low effort in the fisheries. However, as noted previously, the effort and catch in the WTFs is very low so it is unlikely that there is an immediate threat to the fisheries.

5.2 Results of stock assessments

There have been no recent stock assessments pertaining to the WTFs, although there have been previous assessments for scampi and ruby snapper (Dichmont et al., 2002, Lynch & Garvey, 2005).

5.3 Results of stock recovery strategies

There are no stock recovery strategies for the WTFs as no stocks are considered overfished.

6 Interactions with protected species

6.1 Frequency and nature of interactions

Interactions with protected species in the WTFs are minimal. The ERA results indicated there were no threatened, endangered or protected (TEP) species listed for either fishery. See Section 7 for a discussion of the ERA results.

6.2 Management action taken to reduce interactions

An update on the achievements against the recommendations on the ecologically sustainable management of the WTFs can be viewed in attachment 1.

7 Impacts of the fishery on the ecosystem

7.1 Results of Ecological Risk Assessments

Ecological Risk Assessments begin with a comprehensive, but largely qualitative, analysis of risk at Level One, before conducting a more focused and semi-quantitative approach at Level Two. A highly focused and fully quantitative “model-based” approach may then be conducted (Level Three).

A Level Two ERA has been completed for the WTFs. This was finalised in July 2007.

Some target species, bycatch/byproduct species, habitats and communities were assessed to have risk scores requiring additional analysis or management response.

For the NWSTF, scarlet prawn was the only species assessed to be at high risk. It was noted that given the low effort in the fishery this species is unlikely to be at risk. Of the 76 habitat types assessed, 22 were assessed to be at high risk. Again, given the low effort in the fishing and the actual amount of trawling that is occurring it is unlikely that these habitats are currently at high risk.

For the WDWTF, 16 chondrichthyan species, eight finfish species and one invertebrate were assessed as high risk. Of the 48 habitat types assessed 20 were deemed to be at high risk. Again, the virtually zero effort in the fishery suggests these species and habitats are not currently at high risk.

The residual risk process has yet to be undertaken. This will assess each high risk species individually to determine why they have been deemed high risk (lack of data, susceptible to fishing, etc) and if that designation is appropriate. This process may re-categorise some species from high risk to a lower level. The process will be undertaken over the next several months. Once this process is completed then strategies to address the high risk species will be undertaken.

7.2 Nature of impacts on the ecosystem

There has been extensive study on the effects of trawling and fishing on benthic communities and on the fate of discarded non-target species by researchers both within Australia and internationally (Wassenberg & Hill 1993; Kaiser & Spencer 1995; Thrush et al. 1995, 1998; Ramsay & Kaiser 1998; Freese *et al.* 1999, Hill et al. 1999; Veale *et al.* 2000, Jenkins et al. 2001). This research is applicable to the WTFs.

Research indicates that trawling removes species sensitive to physical disturbance, damages and reduces epifaunal species such as sponges and ascidians, may lead to a general decrease in numbers of individuals and species diversity, may increase the relative abundance of scavengers, predators and small, opportunistic species and increase the degree of species dominance within a community. The extent of these changes increases as fishing effort increases.

7.3 Management action taken to reduce impacts, and results

Given the low effort in the WTFs, it is unlikely that the fishery has a major impact on the ecosystem. Additionally, only small areas of the fisheries are targeted, leaving the rest of the fishery intact. Fishers sometimes utilise mid-water trawls, which would not impact benthic communities. Once the ERA results are fully assessed then management actions to reduce impacts can be more thoroughly developed and implemented. These will be developed in conjunction with the SW and NW regional marine planning process being implemented by DEW. This process will determine and allocate marine protected areas in the region of the fisheries.

8 Progress in implementing recommendation and conditions

A description of the progress in implementing each recommendation and condition resulting from the Department of the Environment and Water Resource's previous accreditation of the fishery can be found in Attachment 1.

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Conditions and Recommendations to the Australian Fisheries Management Authority (AFMA) on the ecologically sustainable management of the Western Trawl Fisheries (WTFs)

Wildlife Trade Operation – 20 November 2004 to 19 November 2007

Proposed Conditions	Level of Achievement as at 30 June 2007	Deadline
1. Operation of the fishery will be carried out in accordance with the Western Trawl Fisheries (WTF) Statement of Management Arrangements 2004	Completed and ongoing	Ongoing
2. AFMA will inform DEWR of any proposed amendment to the management regime for the WTF to enable DEWR to evaluate any impacts on the ecological sustainability of the fishery.	Documented in section 2.1	Completed.
<p>3. Reports to be produced and presented to DEWR annually, and to include:</p> <ul style="list-style-type: none"> • Information sufficient to allow assessment of the progress of AFMA in implementing the recommendations made in the DEWR Assessment of the WTF 2004; • Information regarding the status of each of the WTF; • a statement of the performance of each of the WTF against objectives, performance measures and triggers once developed; and • Research undertaken or completed relevant to each of the WTF. 	Information contained in AFMA's Annual Report or contained in this document (see sections 2.2, 3.1 and referenced Data Summaries)	Completed

Performance Criteria	Level of Achievement as at 30 June 2007	Deadline
4. 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.	Yes. No changes have been made. When changes are developed AFMA will inform DEW.	As required.
5. AFMA to actively pursue representation of conservation interests on the Western Trawl Fisheries Management Advisory Committee (WESTMAC) by July 2005.	Yes. WESTMAC now has an environment/conservation member from WWF.	Completed.
6. 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.	Yes. There has been no additional observer coverage since April 2006 due to minimal fishing in either fishery. An observer program is in place for the WTFs for ongoing observer coverage. Some observer coverage is expected in July 2007. This will assist in meeting requirements under the Ministerial Direction.	19 November 2007.
7. 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.	Underway. Some preliminary work on research data collection has been completed in the Western Trawl Observer Project Plan. This issue was further refined in light of strategic assessment and harvest strategy recommendations at WESTMAC 13 (October 2006).	19 November 2007.

Performance Criteria	Level of Achievement as at 30 June 2007	Deadline
<p>8. 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.</p>	<p>Underway. WESTMAC discussed minimising bycatch, interactions with protected species and ecological impacts of fishing activities in view of AFMA's Guide to Addressing Bycatch in Commonwealth Fisheries and the results of the Level 2 analysis of the Ecological Risk Assessment (ERA).</p> <p>In addition, at WestMAC 13 (October 2006), progress was made on implementing harvest strategies into the fishery. These will be further developed after the final release of the fishery ERA results (June 2007) and the project report on Harvest strategies for small fisheries' in July 2007.</p>	December 2006
<p>9. 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.</p>	<p>Underway. AFMA as a member of the Northern Australian Fisheries Managers Forum is involved in a strategic risk assessment of shared northern stocks. This is ongoing. AFMA, with DAFF, are also reviewing the current OCS arrangements with WA.</p>	19 November 2007
<p>10. 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.</p>	<p>Underway. AFMA, in line with the Ministerial Direction, is developing harvest strategies for all Commonwealth fisheries.</p> <p>The foundations of a harvest strategy for the fishery were developed in October 2006 and will be further refined in August 2007 pending the results of the CSIRO 'harvest strategy for small fisheries' and the results of the CSIRO ERA project.</p>	19 November 2007.
<p>11. By December 2005, AFMA to implement a system for the ongoing monitoring of catches of</p>	<p>Yes. Logbooks amended to facilitate collection of this data. Data summaries will be</p>	December 2005. Completed.

Performance Criteria	Level of Achievement as at 30 June 2007	Deadline
<p>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.</p>	<p>developed and analysed. This data will be provided to relevant authorities. Permit conditions were amended in May 2005 to ensure whole sharks are retained. Trip limits have been implemented for both fisheries. A sampling program has been developed for species identification, but minimal effort in the fishery is hampering sample collection.</p> <p>A fishery data summary will be completed by July 2007.</p>	
<p>12. 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.</p>	<p>Underway. AFMA, in line with the Ministerial Direction, is developing harvest strategies for all Commonwealth fisheries.</p> <p>The foundations of a harvest strategy for the fishery were developed in October 2006 and will be further refined in August 2007 pending the results of the CSIRO 'harvest strategy for small fisheries' project.</p>	<p>19 November 2007.</p>
<p>13. 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.</p>	<p>No. This will be implemented upon completion of the ERA, expected to be July 2007.</p>	<p>TBA</p>

Summary: The Western Trawl Fisheries have dealt with the most immediate recommendations relating to obtaining an Environment Member for WESTMAC and instituting an ongoing observer program. A number of other recommendations are underway, in particular the fishery addressing requirements of the Ministerial Direction and Harvest Strategy policy.