



Australian Government

Australian Fisheries Management Authority



Harvest Strategy

**FOR THE WESTERN DEEPWATER TRAWL FISHERY AND NORTH WEST SLOPE
TRAWL FISHERY**

2011

Background

Western Deepwater Trawl Fishery

The Western Deepwater Trawl Fishery (WDTF) began in 1987 as an extension of the North West Slope Trawl Fishery (NWSTF) as operators extended their exploratory fishing for scampi and deepwater prawns. Following poor crustacean catches, the fishery evolved into a finfish trawl fishery of considerable species diversity (>50 species; Moore *et al.* 2007a). It is best classified as a byproduct/mixed fish species fishery due to the wide range of species taken in low volumes. In recent years, bugs have been targeted and now form the majority of the catch. According to logbooks, between a third and a half of the total catch is discarded. Of the discards, about a quarter is unidentified. The fishery is characterised by two distinct areas: north and south of 27°S (Moore *et al.* 2007a).

The WDTF is open all year but operators generally have chosen to access the fishery on a part-time or opportunistic basis as an adjunct to other Commonwealth and State fisheries, particularly the Northern Prawn Fishery (NPF), and the Great Australian Bight Sector (GABTS) of the Southern and Eastern Scalefish and Shark Fishery (SESSF). The Gross Value of Production (GVP) peaked at \$2.5 million in 2002/03 but has since declined dramatically in line with decreasing effort. The 2008/09 catch was from one fishing vessel and comprised only 28 t of ruby snapper and little else; the 2008/09 GVP was not disclosed because it was derived from less than five vessels (Wilson *et al.* 2010).

The 2009 Bureau of Rural Science (BRS) Fishery Status Report (Wilson *et al.* 2010) for the WDTF highlighted no overfishing on deepwater bugs, orange roughy or ruby snapper but rated as “uncertain” whether stocks were overfished. Many of the demersal species are thought to be long-lived and slow to mature, warranting a precautionary approach to management.

Current Management

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. There is no formal Management Plan; the fishery is informally managed via limited entry (11 permits with a five year duration subject to conditions, although few vessels have operated in recent years).

Main information sources for the fishery have been the AFMA WDTF logbooks and some State logbooks. A stock assessment has been undertaken only for ruby snapper (Hunter *et al.* 2002) and an Honours thesis examined the community ecology of demersal ichthyofauna (Ford 2006). There is limited information regarding the biological dynamics of the WDTF resources. Further research is needed to determine the stock status of target species. A strategic data plan to identify gaps in knowledge, improve logbook data collection and gather basic biological information on target species is also a priority. The low GVP of the fishery, however, limits the extent of research that can be undertaken.

For both the WDTF and NWSTF there is an ongoing observer program budgeted for when fishing occurs. This will collect biological data as well as catch and effort, but there are restricted research funds with which to process or analyse the data.

North West Slope Trawl Fishery

The NWSTF was initially a deepwater prawn fishery, but prawns are now taken as a byproduct of primarily targeting scampi. Commercial interest began following confirmation of promising scampi and deepwater prawn stocks by research cruises conducted in 1978, 1982 and 1984, and by an independent industry survey in 1983. The total catch in 2006 was 27 t, of which mixed scampi comprised 71% and Australian scampi comprised 23%. The 2005/06 GVP was \$679,000, down from \$1.7 million in 2004/05. The 2008/09 catch was only 33.7 t of scampi from two active fishing vessels; the 2008/09 GVP was not disclosed because it was derived from less than five vessels (Wilson *et al.* 2010).

The change in relative catch composition was attributed to seasonal variation in abundance, variation in number of vessels actively fishing between years, market demands, and a decrease in abundance as exploitation has reduced standing stocks (McLoughlin 2006). Between a third and a half of the total catch is discarded. Historically, the composition of the bycatch has not been identified to species level, but may have been identified using informal groupings (such as “mixed fish”). AFMA Scientific Observer Program currently collects species specific data on bycatch composition.

The 2009 BRS Fishery Status Report (Wilson *et al.* 2010) for the NWSTF highlighted that the two major target species, deepwater prawn and scampi, were not overfish nor subject to overfishing. Scampi, however, appear to have a low carrying capacity and low resilience to exploitation and distribution trends of deepwater prawns indicate a susceptibility to localised depletion through efficient targeting (Furlani *et al.* 2006b).

Current Management

There is no formal Management Plan for the NWSTF; the fishery is informally managed via permit conditions. Permit holders generally access the fishery on a part time or opportunistic basis as an adjunct to other Commonwealth fisheries.

The fishery is managed via limited entry (seven permits with a five year duration) and controls on codend mesh size (maximum mesh size of 50 mm). Only one vessel can operate under each permit at any one time but are fully transferable between vessels. There are no other input controls (including no restrictions on headrope length).

Stock assessments were undertaken for the scampi fishery in 1992, 1998, 2000 and 2004 (Lynch and Garvey 2005), but adjustments need to be made for changes in fishing impact if estimates of stock status are to be robust. Shot-by-shot catch and effort logbooks were introduced at the beginning of the fishery. There is little data from infrequent fishery-independent surveys.

Bycatch and Discards

The NWSTF and WDWTF Bycatch and Discarding Work Plans were developed in 2008. The objective of the work plans was to develop strategies that will:

- Respond to high ecological risks assessed through AFMA’s Ecological Risk Assessment (ERA) process;
- Avoid interactions with species listed under the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act);
- Reduce discarding of target species to as close to zero as practically possible; and

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- Minimise overall bycatch in the fishery over the long-term.

The work plans focus on developing management measures to reduce and monitor interactions with high risk and protected species and discarding of key target species. Work plans are reviewed annually to assess any specified milestones, incorporation of new bycatch information or need for new research or increased monitoring. Copies of the NWSTF and WDTF Bycatch and Discarding Work Plans can be found on the AFMA website: www.afma.gov.au

Harvest Strategy

The Commonwealth Harvest Strategy Policy

The WDTF and NWSTF harvest strategy was developed in line with the Commonwealth Fisheries Harvest Strategy Policy (HSP, 2007), which in turn sits under the Ministerial Direction (2005). The objective of the HSP is the sustainable and profitable utilisation of Australia's Commonwealth fisheries in perpetuity through the implementation of harvest strategies that maintain key commercial stocks at ecologically sustainable levels and within this context, maximise the economic returns to the Australian community.

A harvest strategy sets out the management actions necessary to achieve defined biological and economic objectives and must contain a process for monitoring and conducting assessments to the conditions of the fishery, and rules that control the intensity of fishing activity (control rules).

To meet the objective of the HSP, harvest strategies aim to pursue an exploitation rate that keeps fish stocks at a level equal to maximum economic yield (MEY) and ensure stocks remain above a limit biomass level (B_{LIM}) at least 90% of the time.

The HSP provides for the use of proxy settings for reference points to cater for unique fishery circumstances. This balance between prescription and flexibility is expected to encourage the development of innovation and cost effective strategies to meet key policy objectives. Proxies must ensure stock conservation and economic performance as envisaged by the HSP. Such proxies, including those that exceed these minimum standards must be clearly justified.

With a harvest strategy in place, fishery managers and industry are able to operate with greater confidence, management decisions are more transparent, and there will be fewer unanticipated outcomes necessitating hasty management responses. Further detail on how to use harvest strategies is provided in the Guidelines to the Harvest Strategy Policy (Commonwealth Fisheries Harvest Strategy Policy Guidelines 2007).

There is a requirement that fisheries harvest strategies are regularly updated to ensure they continue to be relevant to current practices and achieve the goals of the HSP. The 2011 harvest strategy for the WDTF and NWSTF has been modified from the 2009 harvest strategy based on consultation with Commonwealth fishers, researchers, managers and representatives from the Western Australian Department of Fisheries.

WDTF and NWSTF Harvest Strategy

Both the WDTF and NWSTF are characterised by spatially extensive fishing grounds in remote areas that encompass a range of marine bioregions and ecosystems. To reflect this, each fishery has been divided up into Ecological Management Zones within which the harvest strategy operates. They are both multispecies, multi-gear trawl fisheries targeting a range of invertebrate

and teleost species; they also have relatively high levels of bycatch. As demersal trawl fisheries, a key aspect of the harvest strategy is that significant areas of each Ecological Management Zone are closed to trawling, thereby providing a precaution against benthic habitat degradation as well as a measure against over-exploitation.

Fishing effort in both these fisheries is generally of a low level and often opportunistic; based around operators' activities in other State and Commonwealth fisheries. As a result, these fisheries have very low GVPs with little or no research funding available and therefore little information for quantitative stock assessments. This issue is recognised in the staged approach to research and assessment outlined below, and is similar to the harvest strategy approach developed for the GABTS (Moore and Knuckey 2007; AFMA 2007).

The final important aspect to be considered is that both of these fisheries are generally considered to be underutilised. Reflecting this, the harvest strategy has been designed to allow for the sustainable development and exploitation of underutilised teleost and invertebrate resources whilst mitigating against any potential for overfishing from uncontrolled activation of latent effort. To this end, catch and Catch per Unit Effort (CPUE) reference points and triggers have been developed to control fishing effort for the key commercial species and limit potential negative impacts on Ecological Risk Assessment (ERA) high-risk species. These triggers provide for controlled expansion and exploration of the fisheries from the current low exploitation levels as long as CPUE indicator trends are above a minimum target level and remain above the limit reference point. Also, these triggers are designed so they do not impose restrictive and costly data collection and research requirements on operators when there is only light exploitation. As higher catch triggers are reached, the data and analysis requirements become progressively more extensive and detailed, so that ultimately some species for which there are historically high catches may move to management under more sophisticated stock assessment techniques (e.g. assessments based on size/age data).

In addition to the above, the harvest strategy includes data collection and monitoring of all Western Australian "Indicator species" relevant to each Ecological Management Zone. This enables complementary management arrangements to be developed and monitored for resources shared between Western Australia and the Commonwealth under the Offshore Constitutional Settlement (OCS) arrangements. For shared resources where formal quantitative stock assessments have provided estimates of sustainable catch limits for species (or species groups), restrictive catch limits will be set to ensure overfishing does not occur.

Ecological Management Zones

- Due to the large spatial extent of both fisheries, they encompass multiple ecosystems delineated at a broad scale by the marine bioregions and at a smaller scale by the provincial bioregions.
- The fisheries have been divided into Ecological Management Zones which broadly coincide with those established by Western Australian Fisheries.
- The Ecological Management Zones do not necessarily coincide with stock boundaries, but assist with targeting management arrangements suitable for the different bioregions.
- The WDTF has two Ecological Management Zones: the "Gascoyne" zone to the north of 26.5°S; and, the "West" Zone to the south of 26.5°S.
- The NWSTF has two Ecological Management Zones: the "Pilbara" to the west of 120° E; and, the "Kimberley" Zone to the east of 120° E.

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- Each of the management arrangements, reference points, indicators and decision rules outlined below is applied within each Ecological Management Zone.

Spatial Closures

There are growing concerns about the impacts of demersal trawling on structured benthic habitats. There is evidence that recovery from these impacts is slow in deepwater temperate habitats (e.g. Kaiser *et al.* 2006; Løkkeborg 2005; Watling and Norse 1998; Williams *et al.* 2010), but can be relatively short term in tropical shallow-water habitats (e.g. Haywood *et al.* 2005; Bustamante *et al.* 2010). There is therefore a need to ensure that some proportion of the benthic habitats is protected via permanent closures. Although it is unlikely that extensive fine-scale spatial information on benthic habitats in each Ecological Management Zone will be obtained in the near future, these closures will provide a safety net for the fisheries from both real and perceived threats of demersal trawling.

- Permanent spatial closures will encompass significant areas of each of the Ecological Management Zones highlighted above.
- Spatial closures are being implemented through the Marine Protected Areas (MPAs) established as part of the Marine Ecological Planning Process.
- As part of the Southwest Regional Marine Bioregional Planning process, proposed MPAs in the WDTF West Zone are:
 - i) Abrolhos MPA
 - ii) Perth Canyon MPA
 - iii) Capes MPA
- As part of the Northwest Regional Marine Bioregional Planning process, a proposed closure in the WDTF Gascoyne Zone is:
 - i) A closure in the Gascoyne “area for further assessment” (AFA) that includes areas in the Northwest Province and the Central Western Transition provincial bioregions.
- As part of the Northwest Regional Marine Bioregional Planning process, proposed closures in the NWSTF Zone are:
 - i) A northern closure area around 16°S in the Timor provincial bioregion as part of the Kimberley AFA.
 - ii) A southern closure around 20°S in the Northwest Transition provincial bioregion as part of the Pilbara North AFA.

Following final roll-out of the Marine Bioregional Planning process and establishment of the network of representative MPAs, the necessity for any further closures within each of the Bioregional Management Zones to meet any fisheries-related issues will be considered. Maps of the WDTF and NWSTF and the marine bioregions are shown in Attachment 1.

Management controls for Key Commercial Species

As multi-species trawl fisheries, it is difficult and costly to develop harvest strategies for every species. It is difficult to set meaningful reference points and triggers for every species captured in multi-species trawl fisheries, particularly where fishing is opportunistic and species composition is highly variable. Moreover, this characteristic of the fisheries render them difficult to manage using

the standard “Tier 4” (Tuck 2011) target and limit reference points based on having an extensive time-series of catch and effort data.

The harvest strategy focuses on managing the key commercial species captured in the fisheries as well as any species identified as high risk in an ERA. In taking this approach, it is assumed that controls on the subset of key commercial species will indirectly control the level of fishing pressure on other low value byproduct and bycatch species. Regular reviews of the catch composition from the fisheries will be undertaken to underpin this assumption.

For both fisheries, catch and CPUE reference points and indicators have been developed to control the catch of key commercial species. Catch controls are used in preference to effort controls because they can be more feasibly and directly monitored and enforced, and they are more appropriate for the spatial and temporal variability within the fishery. They also allow for the operator’s ability to target a range of different species. The HSP states that where only moderate or poor information is available, as is the case here, scientifically defensible proxies for reference points and corresponding control rules to achieve the intent of the policy will need to be specified. Such proxies and control rules are used for the NWSTF and WDTF harvest strategy.

In each Ecological Management Zone, the key commercial species have the following limit and target reference points and control rules:

Limit Reference Point

The Limit Reference Point (LRP) is based on a CPUE indicator derived from the average annual nominal CPUE for the period 2000-2010 inclusive. This assumes that because there has been negligible or low fishing pressure during many years over this period, the average CPUE represents a proxy for an unfished biomass. The LRP should correspond to a level of stock depletion at which the risk to the stock is unacceptably high. Under the HSP a stock size corresponding to 20% of unfished biomass is a suitable proxy for the LRP.

Trigger

- In line with the HSP, the LRP for key commercial species in the WDTF and NWSTF is an annual CPUE \leq 20% of the average CPUE for the period 2000-2010 inclusive.
- Because in some years there is almost no effort in the fishery, the annual CPUE can only be used as an indicator against this reference point if \geq 10 vessel days has occurred in the Ecological Management Zone.
- The low fishing effort and opportunistic nature of the fishery together with their spatial and temporal variability can result in $> 100\%$ changes in nominal CPUE from year to year. The limit control rule should ensure that the stock stays above the LRP at least 90% of the time (i.e. a one in ten year risk that stocks will fall below). Acknowledging the above, the management response will only be implemented when the CPUE indicator breaches the LRP for two consecutive years.

Management response

- Targeted fishing of the species will cease, facilitated if necessary, by specific fishery closures for a period of 12 months during which a review of all available data will occur.
- A standardised CPUE analysis must be undertaken for that species.
- Review the LRP based on the results of the CPUE standardisation.

Target Reference Point

The Target Reference Point (TRP) is designed to ensure that stocks are maintained (on average), at a size which produces the maximum economic yield from the fishery. In opportunistic data-poor fisheries such as the WDTF and NWSTF, there is a high degree of uncertainty about how to define such a reference point. Instead, two catch triggers have been implemented at which point further data analysis and reporting is required. These triggers aim to minimise risk associated with expansion and development of the fishery by detecting and responding to development of the fishery at an early stage and, through relatively low-cost analyses, to identify the reasons behind these changes without immediately placing limitations on the fishery.

The following triggers and management responses apply to each Ecological Management Zone:

Trigger 1

- Total annual catch of a key commercial species is greater than the highest historical catch of that species during the period 2000-2010 for two consecutive years.

Response

- A standardised CPUE analysis must be undertaken for that species.
- Consult experts and review TRP based on the results of the CPUE standardisation.

Trigger 2a

- Total annual catch of a key commercial species is greater than two times the highest historical catch of that species during the period 2000-2010.
- AND annual CPUE is greater than or equal to the average CPUE for the period 2000-2010.

Response

- Undertake a standardised CPUE analysis for that species.
- Consult experts to refine the limit and target reference point based on the results of the CPUE standardisation.
- Continue to monitor the fishery

Trigger 2b

- Total annual catch of a species is greater than two times the highest historical catch of that species during the period 2000-2010.
- AND annual CPUE is less than the average CPUE for the period 2000-2010.

Response

- Reduce maximum annual catch limit to two times the highest historical catch for the next fishing year.
- Undertake a standardised CPUE analysis for that species.
- Conduct a quantitative assessment of the stock: either a biomass-dynamic models (as per Hunter *et al.* (2002) for ruby snapper), or an age- or length-based yield per recruit assessment (as per Klaer *et al.* 2008) which uses population age structure to calculate the

impact on the population of the current fishing mortality of recent catches to calculate F-values that will result in a biomass of 48% (F48) of the unexploited level.

- Based on assessment results, assign an appropriate catch limit for the next following fishing year.
- Consult experts and review target and limit reference points based on the results of the CPUE standardisation and yield per recruit assessment.

The values for all of these triggers are provided in Table 1. Note that although the catch trigger of two times the historical highest may seem high, historically there has only been relatively low exploitation of these fisheries and, expansion in catches can only continue above this level as long as the CPUE indicator remains above the average CPUE of the reference period. The addition of this CPUE restriction is precautionary if stocks have only undergone light exploitation during the 2000-2010 reference period. Under the HSP, a stock size corresponding to 48% of unfished biomass is a suitable proxy for the TRP. The average CPUE, as a proxy for an unfished biomass, is double this level. A visual representation of the triggers for the key commercial species is provided in Figure 1.

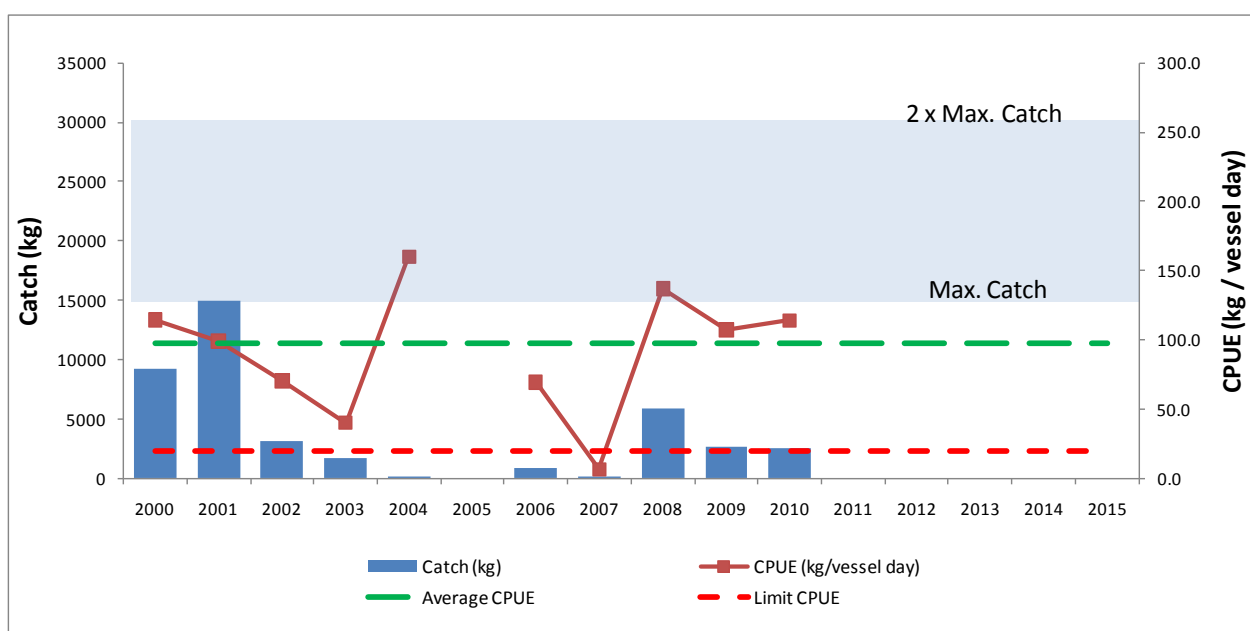


Figure 1 Visual representation of the triggers for management of key commercial species.

Table 1. Key commercial species in the WDTF and NWSTF showing values for the Trigger 1 and Trigger 2 catch limits and the Limit CPUE and Trigger 2 CPUE. These values are based on averages of the 2000-2010 periods inclusive

Fishery - Zone	Species	Max. Catch	2 x Max. Catch	CPUE (kg / vessel day)		
				Av. CPUE	Min. CPUE	Limit CPUE
NWSTF – Kimberly region						
	Australian scampi	20	40	121.3	96.6	24.3
	Boschma's scampi	10	20	232.3	204.3	46.5
	Velvet scampi	15	30	137.0	107.2	27.4
	Scampi (mixed)	25	50	138.7	114.5	27.7
	Total Scampi	70	140	165.4	101.4	33.1
	Redspot Emperor	35	70	506.0	506.0	101.2
	Saddletail Snapper	15	30	338.0	338.0	67.6
NWSTF – Pilbara region						
	Australian scampi	30	60	159.7	71.7	31.9
	Boschma's scampi	10	20	126.9	9	25.4
	Velvet scampi	15	30	105.8	75.2	21.2
	Scampi (mixed)	30	60	152.5	80.9	30.5
	Total Scampi	85	170	195.0	103.4	39.0
	Giant scarlet prawn #	5	10	32.1	10.7	6.4
	Red carid	5	10	34.0	20.7	6.8
	Red prawn	5	10	57.4	21.7	11.5
	Red striped prawn	5	10	29.4	16.7	5.9
	Royal red prawn	30	60	82.4	14.8	16.5
	Total Deepwater Prawns	50	100	91.2	15	18.2
WDTF – Gascoyne region						
	Scampi	10	20	118.4	63.9	23.7
	Bugs	100	200	518.9	135.7	103.8
	Boarfish (all Spp)	5	10	31.3	10.8	6.3
	Tang Snapper #	15	30	97.0	39.8	19.4
	Ruby Snapper	55	110	403.0	108.6	80.6
	Longtail Ruby Snapper	10	20	128.2	54.3	25.6
WDTF – West region						
	Scampi	10	20	72.0	35	14.4
	Bugs	90	180	390.0	107	78.0
	Deepwater Flathead	40	80	468.0	90	93.6
	Boarfish (all Spp)	10	20	113.4	22.6	22.7
	Gemfish #	10	20	93.0	14	18.6
	Mirror Dory #	5	10	68.2	38.5	13.6
	Smooth Dory	5	10	194.1	20.3	38.8

Also a High risk species

Management Controls for Key Indicator Species

There are a few exceptions from the generic management controls for key commercial species highlighted above. In the past, some Orange Roughy stocks in eastern Australia have been overfished and this species is currently listed as “Conservation Dependent” under the EPBC Act. For a highly aggregating species that can be easily targeted during spawning events, CPUE is not likely to be an appropriate measure of abundance. As such, it is not precautionary to have the potential to more than double historical catches that have occurred in the WDTF West Zone without further assessment or information. Consequently, a maximum annual catch limit of 100 t has been set for Orange Roughy in the WDTF West Zone.

The other exceptions are where key commercial species form shared stocks between Western Australia and the Commonwealth. In some cases, formal quantitative stock assessments have been undertaken for these species and estimates of an acceptable catch range have been developed. Goldband Snapper (*Pristipomoides* spp.) and Red Emperor (*Lutjanus sebae*) are two such species in the NWSTF Kimberley Zone. The most recent model-based assessment estimates (based on data up to 2007) indicated that there was a high probability that the spawning stocks of these indicator species were both above their respective threshold levels and that catches were within the acceptable ranges. F-based assessments indicated that the fishing levels were either lower than the target level or between target and threshold levels (DoF 2010). However, catches of Goldband Snapper and Red Emperor taken in the NWSTF were not included in these assessments. Until this is done and a revised assessment is undertaken (2013), an annual catch limit of 44 t of Goldband Snapper and 12 t of Red Emperor has been implemented for the NWSTF Kimberley Zone. These limits are loosely based on the relative geographic area of overlap (9.4%) between the NWSTF and Fishing Area 2 Zone B of the WA Northern Demersal Scalefish Fishery for which the assessment was conducted. Catches of Goldband Snapper and Red Emperor taken in Zone B during 2009 were 462 t and 122 t respectively. The exact position of these catches within Fishing Area 2 Zone B is not clear.

The limit reference point for Key Indicator Species is the same as that described under *Management Controls for Key Commercial Species* (see Table 2, below).

Table 2. Key indicator species in the WDTF and NWSTF showing values for the annual catch limits (t) and Limit CPUE trigger. These values are based on averages of the 2000-2010 periods inclusive.

Fishery - Zone	Species	Annual catch limit (t)	Limit CPUE (kg / vessel day)
NWSTF – Kimberly region			
	Goldband snappers	44	168.8
	Red Emperor	12	24.6
WDTF – West region			
	Orange Roughy	100	374.6

Management controls for ERA Level 2 high-risk species

While the management controls for the key commercial species will largely determine the catch and amount of and effort expended in the fishery, care needs to be taken to ensure that any vulnerable bycatch or byproduct species are not put at risk. Quantitative ERAs have been undertaken for both the WDTF (Wayte 2007a, AFMA 2010a,c) and the NWSTF (Wayte 2007b,

AFMA 2010b,d). Table 3 identifies the priority species for consideration in managing the ecological effects of fishing for the WDTF (AFMA 2010a) and the NWSTF (AFMA2010b). This list was compiled from the highest level of assessment undertaken for species within each fishery. By taking into account the effort and management arrangements of these fisheries, Table 4 is a subset of the Level 2 ERA high-risk species identified for the WDTF (Wayte *et al.* 2007a) and the NWSTF (Wayte *et al.* 2007b).

Table 3 Priority species for consideration in managing the ecological effects of fishing for the WDTF and the NWSTF (AFMA 2010 b and d respectively).

Fishery	Taxonomic group	Common name	Scientific name
WDTF	Teleost	Gemfish	<i>Rexea solandri</i>
WDTF	Teleost	Mirror Dory	<i>Zenopsis nebulosus</i>
WDTF	Teleost	Big-spined boarfish	<i>Pentaceros decacanthus</i>
WDTF	Teleost	Tang snapper	<i>Lipocheilus carnolabrum</i>
WDTF	Invertebrate	Champagne crab	<i>Hyphalassia acerba</i>
NWSTF	Invertebrate	Scarlet prawn	<i>Aristaeopsis edwardsiana</i>

Species in **bold** are managed as “Key Commercial Species”

Table 4 High-risk species identified from the Level 2 Ecological Risk Assessments for the WDTF and the NWSTF (Wayte et al. 2007a and b respectively).

Fishery	Taxonomic group	Common name	Scientific name
WDTF	Shark	Platypus shark	<i>Deania quadrispinosa</i>
WDTF	Shark	Dusky shark	<i>Carcharhinus obscurus</i>
WDTF	Shark	Brier shark	<i>Deania calcea</i>
WDTF	Shark	Bight ghost shark	<i>Hydrolagus lemmings</i>
WDTF	Shark	School shark, Tope shark	<i>Galeorhinus galeus</i>
WDTF	Shark	Ornate angel shark	<i>Squatina tergocellata</i>
WDTF	Shark	Green-eyed dogfish	<i>Squalus mitsukurii</i>
WDTF	Shark	Piked dogfish	<i>Squalus megalops</i>
WDTF	Shark	Endeavour dogfish	<i>Centrophorus moluccensis</i>
WDTF	Chimaera	Longspine chimaera	Chimaera sp. C [Last & Stevens, 1994]
WDTF	Chimaera	Whitefin chimaera	Chimaera sp. E [Last & Stevens, 1994]
WDTF	Teleost	Australian Tusk	<i>Dannevigia tusca</i>
WDTF	Teleost	Chinaman/Leatherjacket	<i>Nelusetta ayraudi</i>
WDTF	Teleost	Gemfish	<i>Rexea solandri</i>
WDTF	Teleost	Jackass Morwong	<i>Nemadactylus macropterus</i>
WDTF	Teleost	Mirror Dory	<i>Zenopsis nebulosus</i>
WDTF	Teleost	Yellow-spotted boarfish	<i>Paristiopterus gallipavo</i>
WDTF	Teleost	Big-spined boarfish	<i>Pentaceros decacanthus</i>
WDTF	Teleost	Yellowback bream	<i>Dentex tumifrons</i>
WDTF	Teleost	Tang snapper	<i>Lipocheilus carnolabrum</i>
WDTF	Teleost	Bigscale rubyfish	<i>Plagiogeneion macrolepis</i>
WDTF	Invertebrate	Champagne crab	<i>Hyphalassia acerba</i>
NWSTF	Invertebrate	Scarlet prawn	<i>Aristaeopsis edwardsiana</i>

Species in **bold** are managed as “Key Commercial Species”

It is important to note that quantitative Level 3 assessments of the impacts of each fishery identified no species at any high risk category under the current level of fishing effort (AFMA 2010c, d). As a developing fishery, however, it is recognised that there is potential for effort levels to increase future years. As such, unless they are managed as “Key Commercial Species” the Level 2 ERA high-risk species shown in Table 4 are managed under the following control rules.

Trigger 1

- Catch of 2 t for any ERA Level 2 high-risk species.

Response

- Investigate spatial distribution of the catches to attempt to determine why the trigger has been reached.
- If catches are spatially or temporally aggregated, impose a spatial and/or seasonal closure.
- If the trigger has been reached because a market has opened up for that species, add the species to the list of “key commercial species” and establish revised control rules.

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- If the catch is spatially and/or temporally patchy or random, consult with experts and if there are no concerns, report as such.
 - Reconsider the trigger limit value in light of the outcomes above.

Trigger 2

- Catch of 4 t for any ERA Level 2 high-risk species

Response

- No targeted fishing permitted on that species.
- Investigate spatial distribution of the catches to attempt to determine why the trigger has been reached.
- If catches are spatially or temporally aggregated, impose a spatial and/or seasonal closure.

Deepwater dogfish

The impact of commercial fishing on deepwater dogfish species is of particular concern for fisheries management around Australia and a number of these species were classified as “high risk” in the Level 2 ERA for the WDTF. Control rules associated with triggers for dogfish (including *Deania*, *Squalus* and *Centrophorus*) are now a condition on the WDTF and NWSTF fishing permits. The fishing permit holder must not take deepwater dogfishes of the following species: Harrissons Dogfish (*Centrophorus harrissoni*), Endeavour Dogfish (*C. moluccensis*), Southern Dogfish (*C. zeehaani*) and Greeneye Spurdog (*Squalus chloroculus*) - unless:

- (a) for trips under six days the combined amount of these species taken does not exceed 15 kg whole weight per day; or
- (b) for trips over six days the combined amount of these species taken does not exceed 90 kg whole weight per trip.
- In this condition, one day is a 24 hour period that commences at 00.01 hours UTC + 10; and the weights in clauses (a) and (b) apply to all deepwater dogfish of the species specified, including those returned to the water whether alive or dead. Deepwater dogfishes of the species specified in this condition that are taken alive, must be returned to the water carefully and quickly.

Monitoring and Research Needs

Data collection

It is important that detailed catch and effort logbook data are collected on a shot-by-shot basis by all operators. AFMA has completed an extensive summary of the available logbook data to date (Moore *et al.* 2007a and 2007b), which is valuable in the ongoing refinement of the harvest strategy. It provides standard information on season, position and depth of catches and the species composition of retained and discarded catch.

AFMA has an observer program in place through which information independent of logbook data is collected on a minimum of 6% of fishing operations. The AFMA observer data collection protocol should sit alongside the harvest strategy, to facilitate the collection of this biological information.

Baseline biological data (e.g. otoliths, length, sex sampling) will be collected by onboard observers on all key commercial species as a high-priority, ongoing requirement. Note that, for the NWSTF, some logbooks already contain gross size information, which may be useful when designing the sampling protocol for the NWSTF.

Analysis

At this point, there may be no need to analyse the above data, so the cost to the industry should be minimal. By collecting this information from the outset and simply archiving it, however, a time series of critical information on the population biology of the key commercial species can be established. These samples and data can be analysed when required under the above triggers. This approach to data collection allows relevant information to be collected cost-effectively without pre-supposing which species may need to be assessed.

Initial analyses of biological data collected for the key commercial species should be undertaken as a priority.

Standardisation of CPUE will need to be conducted if either of the triggers for key commercial species is met.

The above information would provide the baseline information on the size- and age-structure of the catch from which more robust assessments of stock status could be determined. It also allows the trigger points associated with these species to be set in a more quantitative manner than being based purely on historical catch and effort information.

Annual analysis of the catch and effort data should be undertaken for each calendar year.

With respect to the WDTF and NWSTF harvest strategy, a formal harvest strategy evaluation needs to be conducted at some stage.

Reporting

The level of reporting of catch information in the NWSTF and WDTF will be subject to AFMA's Information Disclosure Policy.

Review and Amendments

Review

The review process should ideally include some form of data collection and initial analyses of key species in order for more appropriate/robust trigger points to be set.

The list of key species should be subject to periodic review to ensure they are appropriate against current catch patterns.

Spatial and seasonal catch distribution should be periodically reviewed to ensure that the Ecological Management Zones are appropriate.

Permanent spatial closures will be reviewed once the bioregional marine planning and MPA processes are completed.

Management options for the highly vulnerable shark, dogfish and chimaera species will need to be refined and regularly reviewed as taxonomic issues are resolved.

The nature of stock assessments that may be undertaken in response to level 2 / level 3 trigger limits being reached should be explicitly defined.

Algorithms for CPUE standardisation should be developed and tested.

Amendments

Under certain circumstances, it may be necessary to amend harvest strategies in between reviews. These circumstances are if:

- There is new information that substantially changes the status of a fishery, leading to improved estimates of indicators relative to reference points; or
- Drivers external to management of the fishery increase the risk to fish stock/s; or
- It is clear the strategy is not working effectively and the intent of the Commonwealth Harvest Strategy Policy 2007 (HSP) is not being met.

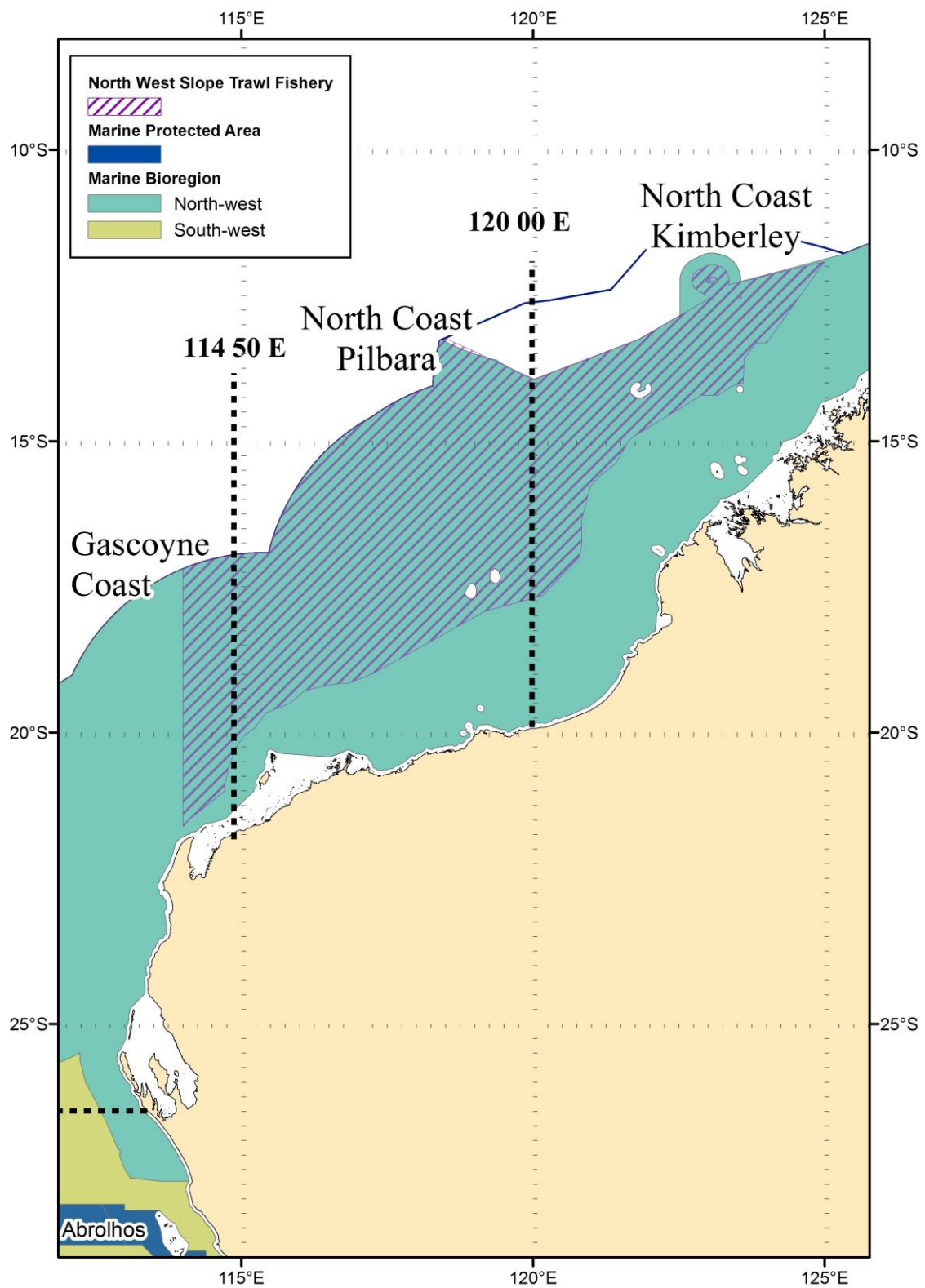
Further explanation can be found in Section 15 of the HSP Guidelines. The consultative and technical processes for amending harvest strategies are set out in the HSP Guidelines in Section 2.5.

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NWSTF Bioregional Management Zones



WDWTF Bioregional Management Zones

