

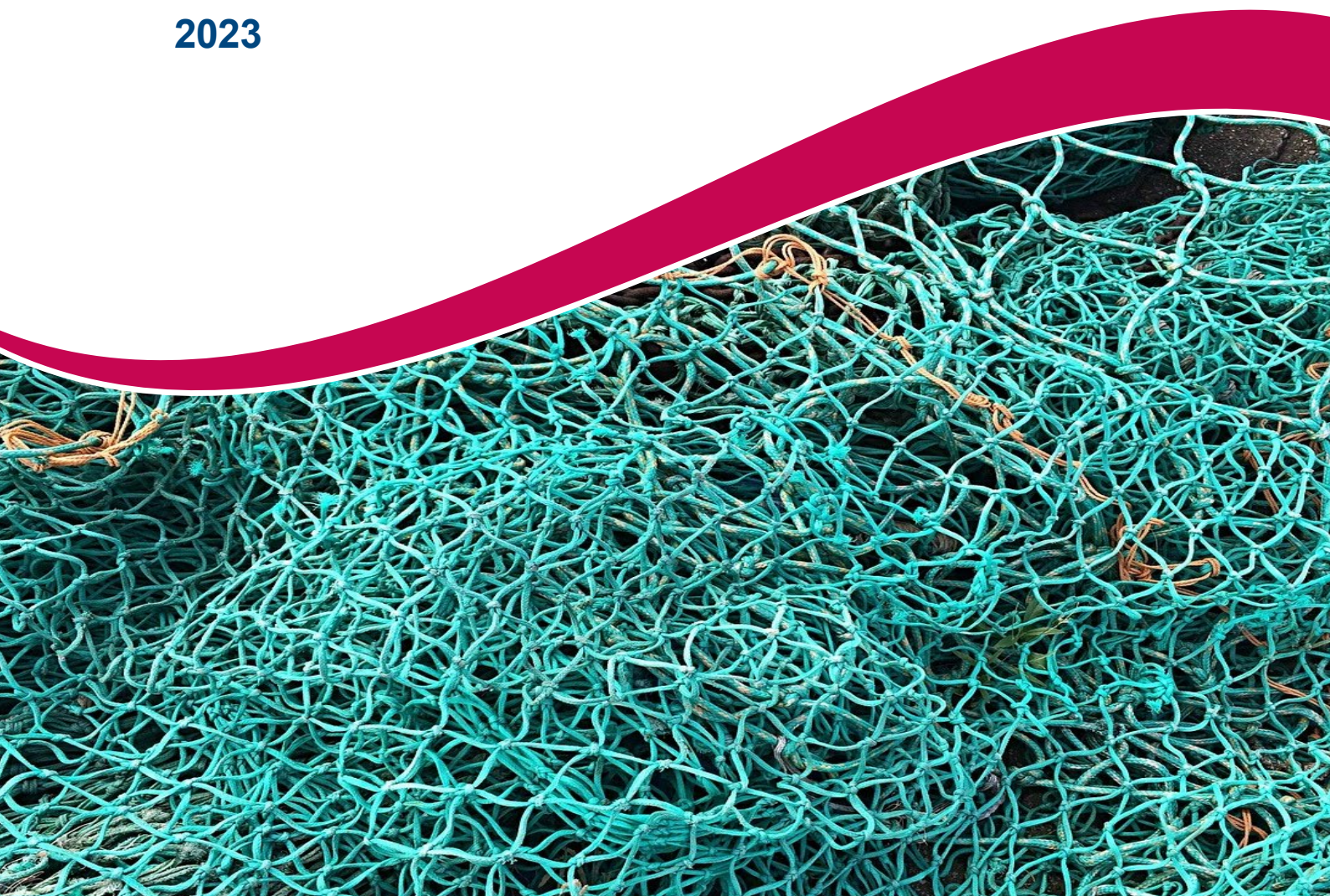


Australian Government

Australian Fisheries Management Authority

Harvest Strategy for the Western Deepwater Trawl Fishery and North West Slope Trawl Fishery

2023



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Glossary

Acronym	Term
ABARES	Australian Bureau of Agricultural and Resource Economics and Science
AFZ	Australian Fishing Zone
CPUE	Catch per unit effort
DCCEEW	Departments of Climate Change, Energy, the Environment and Water
EPBC Act	<i>Environment Protection and Biodiversity Conservation Act 1999</i>
ERA	Ecological Risk Assessment for the Effects of Fishing
FRDC	Fisheries Research and Development Corporation
GABTS	Great Australian Bight Sector
GVP	Gross value of production
HSF	Harvest Strategy Framework
HSP	Commonwealth Fisheries Harvest Strategy Policy 2018
MSY	Maximum sustainable yield
NPF	Northern Prawn Fishery
NWSTF	North West Slope Trawl Fishery
SAFS	Status of Australian Fish Stocks Reports
SESSF	Southern and Eastern Scalefish and Shark Fishery
WDTF	Western Deepwater Trawl Fishery
WTO	Wildlife Trade Organisation

Purpose of a harvest strategy

A harvest strategy is a decision-making framework used to manage commercial fish stocks in a given fishery. It is a set of pre-agreed rules that use an evidence-based, precautionary, and transparent approach to achieve ecological and economic objectives of the fishery.

The harvest strategy describes the performance indicators used for monitoring the condition of the stock and the rules applied to determine the recommended biological catch and/or the total allowable catch each fishing season. The harvest strategy sets out rules (triggers) which control the intensity of fishing activity, with a set of associated management actions to achieve defined biological and economic objectives.

The Commonwealth Fisheries Harvest Strategy Policy 2018 (HSP) provides for the use of proxy settings for reference points to cater for different levels of information available and unique fishery circumstances. The HSP states the development of harvest strategies and the selection of reference points within those harvest strategies need to be realistic with respect to the scale or nature of the fishery and the resources available to manage it. This balance between prescription and flexibility encourages the development of innovative and cost-effective strategies to meet key policy objectives. Proxies, including those that exceed the minimum standards, must be demonstrated to be compliant with the HSP objective. With a harvest strategy in place, fishery managers and stakeholders can operate with pre-defined rules. Management decisions are more transparent and there are likely fewer unanticipated outcomes necessitating hasty management responses.

Overview of the fisheries

The Western Deepwater Trawl and North West Slope Trawl fisheries are collectively managed as the 'Western Trawl Fisheries' and are included under the same harvest strategy.

Western Deepwater Trawl Fishery

Background

The Western Deepwater Trawl Fishery (WDTF) operates in Commonwealth waters off the coast of Western Australia from the 200-metre isobath, extending westward to the limit of the Australian Fishing Zone (AFZ). It is bounded by the Southern and Eastern Scalefish and Shark Fishery (SESSF) in the south (115°08'E) and the North West Slope Trawl Fishery (NWSTF) in the north (114°E) (Patterson et al., 2022). The WDTF began in 1987 as an extension of the NWSTF as operators extended their exploratory fishing for scampi and deepwater prawns. Initially, the fishery made substantial catches of bugs (shovel-nosed and slipper lobsters (Scyllaridae)), however, as bug catches declined, the fishery evolved into a largely finfish trawl fishery. The fishery is a mixed species, opportunistic fishery with considerable species diversity (> 160 species, > 50 species with retained catches > 1 t over 2000 - 2022; Penney 2022), with occasional catches of bugs. It is now

largely a snapper-targeted fishery with a mixed catch of many byproduct fish species taken in low volumes. According to logbooks, between 2000-2002, between a third and a half of the total catch, mostly mixed fish, was discarded in earlier years, however since 2007 reported discards have been < 5% of retained catches.

The fishery operates in two areas: from 23°S – 27°S, and around 31°S. Targeting analysis shows that operators in this fishery can target either bugs or snappers on different trips, fishing different depth ranges and using different trawl gear for these two species groups. The WDTF is open all year but operators generally have chosen to access the fishery on a part-time or opportunistic basis. The gross value of production (GVP) peaked at \$2.5 million in 2002/03 but has since declined dramatically in line with decreasing effort. Retained catches average ~180 t/year over 2000 – 2004 but have since averaged <15 t in most years, although with higher catches of 100 t in 2008 and 150 t in 2018.

There have been substantial and frequent changes in the vessels participating in the WDTF. After averaging five vessels/year (maximum 7 vessels) over 2000 – 2004, participation has decreased to average 1.6 vessels/year (maximum three) since 2005, with few vessels remaining in the fishery for more than two years. In many years only one vessel has operated, with no participation in 2015 and 2017. These vessels generally use single otter-board trawl nets, crustacean trawl when targeting bugs and fish trawl when targeting fish.

Spatial closures apply within the WDTF under the North-west Marine Parks Network Management Plan 2018 and the South-west Marine Parks Network Management Plan 2018. More details on closures can be found on the Australian Marine Parks website at <https://parksaustralia.gov.au/marine/>.

Current management

There is no management plan; the fishery is managed via permit conditions. Permit holders generally access the fishery on a part time or opportunistic basis as an adjunct to other Commonwealth and State fisheries.

The fishery is managed via limited entry (11 permits with a five-year duration). Only one vessel can operate under each permit at any one time but are transferable between vessels. There are no other input controls.

Status of stocks

Main data sources for the fishery have been the AFMA WDTF logbooks and some state logbooks. At the time of the initial harvest strategy (2011), a stock assessment had been undertaken for ruby snapper (Hunter *et al.* 2002) and an Honours thesis examined the community ecology of demersal ichthyofauna (Ford 2006). The status of an increasing number of Western Australian stocks has been reported in the *Status of Australian Fish Stocks Reports* (SAFS) by the Fisheries Research and Development Corporation (FRDC). The 2020 version (Pidcocke *et al.*, 2021) reports status for 13 stocks shared by the Commonwealth western trawl fisheries and the Western Australia State Fisheries, based on state assessment reports and a summary of evidence using stock status indicators. The only stock for which the WDTF takes a similar quantity to the Western Australian fisheries is the ruby snappers group (*Etelis* spp.), which is classified in SAFS 2020 as sustainable.

The WDTF currently takes minor catches (< 1 t/year) of crimson snapper, goldband snapper, saddletail snapper, bight redfish, silver trevallies, hapuku, Spanish mackerel and yellowtail kingfish, primarily caught in the State Fisheries. These stocks are all classified in SAFS 2020 as being sustainable. The only shared stock of concern is the west coast snapper (*Chrysophrys auratus*) stock, which was overfished prior to 2008 and is now classified as recovering.

The 2022 *Fishery status reports*, conducted by the Australian Bureau of Agricultural and Resource Economics and Science (ABARES) (Patterson et al., 2022) provide assessments only for Commonwealth targeted stocks, and concurs that ruby snapper is not overfished, nor subject to overfishing. For deepwater bugs (*Ibacus* spp.), which are reported in SAFS 2020 as negligible for Western Australian State Fisheries, the Fishery status reports indicates that the stock is not subject to overfishing but is uncertain regarding biomass status. Recent nominal catch per unit effort (CPUE) analyses were conducted by Penney (2022) for ruby snapper (*Etelis* spp.), combined snappers (all Families) and for bugs (species group). CPUE for these groups has been inter-annually highly variable. However, recent three-year average standardised CPUE was slightly above the long-term average CPUE level for these species/groups.

There remains limited information regarding the biological dynamics of the WDTF resources, particularly stock structure. Further research is needed to determine the stock structure and status of some target species. 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

Background

The NWSTF operates in Commonwealth waters off the north-west coast of Western Australian from the 200-metre isobath, extending to the limit of the AFZ (Patterson et al., 2022). It is bounded by the WDTF in the south-west (114°E) and extends east to 125°E. In the north-east, the NWSTF encompasses a large portion of the Australian-Indonesia Memorandum of Understanding (MOU 74 Box) where Indonesian fishers may operate using traditional methods.

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. Targeting analysis (Penney A.J., 2022) confirms that the NWSTF has always been a scampi-targeted fishery, catching various deep-water prawns as bycatch. Scampi catches (all species) peaked at 107 t in 2001 and declined to a low of 17 t in 2012. Over 2000 – 2007, about half of the scampi were reported as ‘mixed scampi’. Since then, scampi catches have been reported by species, with total catches increasing steadily to average over 60 t/yr over 2019 – 2021. While catches have always been dominated by Australian scampi, there has been a fairly steady contribution by velvet scampi and Boschma’s scampi, contributing an average 30% of the scampi catch since 2010. The quantity of prawn species landed exceeded 40 t in 2002, declined to around 1 t over 2004 – 2008 and has since increased steadily to average around 15 t over 2017 – 2021. Small quantities (1 – 5 t) of lings, crimson snapper, redfish and stargazers have been landed since 2010.

Between a third and a half of the total catch was discarded over 2001 – 2005 but there has been little reporting of discards since 2007. Historically, the composition of the bycatch has not been identified to species level but was reported using non-specific groupings (such as “mixed fish”). AFMA’s Scientific Observer Program currently collects species specific data on bycatch composition.

Vessel participation in the NWSTF has changed substantially over the years, declining from an average of 8 vessels/year over 2000 – 2007 to 1 – 2 vessels/year over 2008 – 2015, increasing again to 4 vessels/year over 2017 - 2021. Since 2008 few vessels have operated in the fishery for more than two years, and only one vessel has fished consistently since 2008 (Penney 2022). Early changes in participation were attributed to seasonal variation in abundance, market demands, and a decrease in abundance as exploitation has reduced standing stocks (McLoughlin 2006).

Spatial closures apply within the NWSTF under the North-west Marine Parks Network Management Plan 2018. More details on closures can be found on the Australian Marine Parks website at <https://parksaustralia.gov.au/marine/>.

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 and State 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 transferable between vessels. There are no other input controls.

Status of stocks

Scampi are considered 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.* 2006).

Stock assessments undertaken for the scampi fishery in 1992, 1998, 2000 and 2004 (Lynch and Garvey 2005) concluded that changes in technology and fishing power at that time likely resulted in biased catch rates and unreliable assessments. In 2010, a multispecies scampi stock assessment by ABARES suggested that scampi biomass was probably between 65 to 85 per cent of unfished biomass as of the end of 2008 (Woodhams *et al.*, 2011). The Commonwealth *Fishery status reports* report on only one ‘stock’ for the NWSTF, reporting the stock status of scampi species fished in the NWSTF as a species group. In 2022 these reports classified scampi as not being overfished, and not being subject to overfishing (Patterson *et al.*, 2022). Scampi are not caught in the Western Australian State Fisheries and are not assessed in the *Status of Australian Fish Stocks Reports*.

Recent standardised CPUE analyses were conducted by Penney (2022) for Australian scampi and for the combined scampi species group in the NWSTF. From these analyses, the period 2008 – 2015 was identified as a reference period over which CPUE has been stable, with average CPUE over this period potentially representing an MSY (~0.4B₀) target proxy, and half this level

representing a proxy limit reference level. Recent three-year average (2019 – 2021) standardised CPUE was slightly below the target reference level, but well above the limit reference level, at 97% of the target for Australian scampi and for combined scampi.

Bycatch and discards

The NWSTF and WDTF Bycatch and Discarding Work Plans were developed in 2010. The objective of the work plans was to develop strategies that will:

- Respond to high ecological risks assessed through AFMA's [Ecological Risk Assessment for the Effects of Fishing \(ERA\)](#);
- 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
- 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 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: [Western Deepwater Trawl Fishery Bycatch and Discard Workplan.pdf \(afma.gov.au\)](#).

General description of the harvest strategy

The 2011 combined harvest strategy for the WDTF and NWSTF harvest strategy was developed as the initial harvest strategy for both fisheries, using available catch data from 2000-2010, implementing triggers that were, at minimum, two times the highest historical catch. Given the low level of effort, variable catch composition and lack of data, the triggers were deemed appropriately precautionary while allowing for expansion of the fishery. The triggers and management actions served as a first-step harvest strategy for management of the Western Fisheries. Since the implementation of the initial harvest strategy in 2011, with ongoing data collection and fishery monitoring, the suite of available data has doubled, expanding the reference period to 2020.

In December 2020 the Western Trawl Fisheries were declared an approved Wildlife Trade Operation (WTO) under Part 13A of the EPBC Act, with the approval set to expire on 30 November 2023. The approval consists of several conditions, including the implementation of an updated harvest strategy by 30 June 2023 (condition 5 (b)). This requirement, along with an increased suite of data, has prompted a review and update of the Western Trawl Fisheries Harvest Strategy. With greater fishery understanding, the triggers and management actions have been revised to provide a more robust fishery management tool that remains appropriately precautionary while allowing for expansion of the fishery.

This harvest strategy has been developed by AFMA in consultation with independent harvest strategy consultant Andrew Penney, Commonwealth fishers, the Department of Climate Change,

Energy, the Environment and Water (DCCEEW) and the Western Australian Department of Primary Industries and Regional Development.

The Commonwealth Harvest Strategy Policy

The WDTF and NWSTF harvest strategy was developed in line with the *Commonwealth Fisheries Harvest Strategy Policy 2018 (HSP)*. The objective of the HSP is the ecologically sustainable and profitable utilisation of Australia's Commonwealth fisheries resources (where ecological sustainability takes priority)—through implementation of harvest strategies. 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.

Further detail on the HSP is provided in the Guidelines to the Harvest Strategy Policy ([Commonwealth Fisheries Harvest Strategy Policy Guidelines 2018](#)).

Fisheries issues and justification for approach

It is not possible to set meaningful reference points and triggers for every species captured in multi-species trawl fisheries without additional information and further research, particularly where fishing is opportunistic and species composition is highly variable. This renders these fisheries difficult to manage using the standardised CPUE “Tier 4” assessments (Tuck 2011), which require target and limit reference points based on having an extensive and representative time-series of catch and effort data for each species.

In the absence of biomass estimates from survey or stock assessment, in place of target and limit reference points, suites of precautionary catch and CPUE trigger limits were defined based on catch history over a reference period from 2000-2020. The trigger levels represent average catch over the reference period, plus the 95% confidence interval, rounded to the nearest 1 tonne above.

Provided CPUE is calculated using the appropriate measure of effort and uses tows with an expectation of catching the species of interest, it can provide an index that can be used to evaluate changes in stock abundance, either independently (in a standardised CPUE trend analysis), or as an index of abundance in an integrated stock assessment. CPUE by itself is not a stock assessment, and low CPUE does not necessarily mean there is a risk to the stock, however, this information, when used appropriately, can be used to effectively manage catch. The catch rate can provide an index of the availability or abundance (density estimate) of that species in the targeted area at that point in time.

The triggers are set such that yearly trigger monitoring reports will highlight any notable changes in the fishery. The triggers are accompanied by a suite of management actions that serve to invoke monitoring and/or analyses of the fishery when these triggers are exceeded. As trigger monitoring better informs management of the fishery dynamics, they also serve to potentially develop more robust triggers in light of improved fishery understanding.

Western Fisheries 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. They are both multispecies, multi-gear trawl fisheries targeting a range of invertebrate and teleost species.

Fishing effort in both these fisheries is generally low and often opportunistic; depending on 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 little information for quantitative stock assessments, other than logbook reported catch and effort data.

Management controls for key commercial species

This harvest strategy focuses on detecting significant changes in the performance of fishery that may indicate an increase in fishery impact and risk to a stock. Emphasis is placed on performance measures and triggers for key commercial species captured in the individual fisheries, as well as any species identified as high risk in an ERA. By taking this approach, it is assumed that any 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 performance measures and triggers have been developed to control the catch of key commercial species. Catch controls are used in preference to effort controls because they can be directly monitored and enforced, as well as being more appropriate for 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 Western Trawl Fisheries Harvest Strategy.

Level 1 catch triggers

Level 1 catch triggers are implemented for key commercial species in the WDTF and NWSTF.

Table 1 Average annual catches for key commercial species in the WDTF and NWSTF over the reference period 2000 – 2020, with Level 1 catch triggers set at the upper 50% confidence interval of these average catches (rounded up to the nearest 1 t above).

Western Deepwater Trawl Fishery		
Species/ Group	Average catch (t)	Catch trigger (t)
Bugs (all species)	23	114
Scampi (all species)	2	8
Deepwater Flathead	7	33
Boarfish (all species)	1	4
Gemfish #	1	5
Mirror Dory #	2	5
Ruby Snapper	12	47
Tang's Snapper #	3	11
Snappers (all species)	18	69

North West Slope Trawl Fishery		
Species/ Group	Average catch (t)	Catch trigger (t)
Australian Scampi	24	45
Velvet Scampi	7	16
Boschma's Scampi	5	12
Scampi (all species)	46	88
Royal Red Prawn	4	16
Red Carid	2	6

North West Slope Trawl Fishery		
Pink Striped Prawn	2	4
Red Prawn	1	4
Giant Scarlet Prawn #	1	1
Prawns (all species)	9	25
Squids (all species)	5	13

high risk species in 2007 ERA

Level 2 CPUE triggers

Table 2 Average annual CPUE (kg/tow) over chosen reference periods* for bugs and snapper species in the WDTF and for scampi species in the NWSTF with limit CPUE triggers set at half the reference period averages. Also shown are the recent 3-year averages of CPUE, for comparison with limit levels. (* Target reference periods: scampi 2008 - 2015; bugs 2002 - 2019; snappers 2000 - 2020)

Western Deepwater Trawl Fishery			
Species/ Group	Average CPUE (kg/tow)	Limit CPUE (kg/tow)	Recent 3 yr average CPUE
Bugs (all species)	167	83	181
Ruby Snapper	115	57	134
Snappers (all species)	174	87	181

North West Slope Trawl Fishery			
Species/ Group	Average CPUE (kg/tow)	Limit CPUE (kg/tow)	Recent 3 yr average CPUE

North West Slope Trawl Fishery			
Australian Scampi	53	26	54
Scampi (all species)	77	39	80

Management actions

The management actions listed below are to be taken in response to the exceeding of the Level 1 catch or Level 2 CPUE triggers. The response to triggers being exceeded is a two-year stepped process. The first response to the exceeding of a trigger is to notify industry. This includes indicating which circumstances have changed and initiating consultation and further analysis to understand the cause of the trigger being exceeded and whether this indicates an increased risk to any stock. If the trigger is exceeded in the first year, fisheries managers will initiate consultation with industry and increase monitoring of the fishery. Once the trigger has been exceeded the first year, additional analysis will inform the process if the trigger is exceeded the second year. Management actions are typically called for after, and based on, the results of further analyses (Penney 2022).

Level 1 catch triggers

Exceed in first year

- Inform industry that the trigger has been exceeded and initiate consultation to obtain additional information to help understand reasons for the catch increase. Such additional information could include increased interest or participation in the fishery, improvements in vessel or gear efficiency, or market factors driving increased demand for certain species.
- Inform industry of additional analysis requirements should the trigger be exceeded for a second consecutive year. Identify possible additional data requirements to improve understanding of the reason for the catch increase and facilitate possible further analysis.
- Continue monitoring, while collecting any additional data identified as required.

Exceed in second year

- Analyse any additional data collected in response to the trigger being exceeded in the 1st year (such as market information) to help understand reasons for the catch increase.
- If catches continue to exceed the catch trigger for a second year, conduct nominal CPUE analysis to evaluate whether catch increases are associated with CPUE decreases. If nominal CPUE is declining, consider conducting a standardised CPUE analysis, if the available data allow for this. Alternatively, conduct an appropriate low-information assessment for the stocks.

- If results of the additional analyses provide cause for concern at increased catch levels possibly being unsustainable, implement precautionary catch limits for those stocks. This may require analysis to identify boundaries for stocks to which the catch limits would apply.
- If indicated, revise the catch trigger, taking account of new information.

Level 2 CPUE triggers

Exceeding of CPUE triggers should be determined by comparing the average of the recent 3-year (only years in which fishing occurs) nominal CPUE (total catch / species group targeted effort, number of tows) with the CPUE limits for each species. Responses to exceeding of CPUE triggers would be a two-year stepped process.

Exceed in first year

- Inform industry that the trigger has been exceeded and initiate consultation to obtain additional information to help understand reasons for the decrease in catch rates. Such additional information could include market factors driving decreased demand for certain species or shifts in targeting to other species or areas.
- Consider conducting a standardised CPUE analysis if the available data allow for this. This may require analysis to identify boundaries for stocks for which the CPUE analysis would be conducted. If standardised CPUE analysis is not feasible using available data, consider applying an alternative low-information stock assessment appropriate for the available data.
- Inform industry of additional analysis requirements and the possibility of catch limits should the trigger be exceeded for a second consecutive year. Identify possible additional data requirements to improve understanding of the reason for the catch rate decrease and facilitate possible further analysis.
- If, after initial consultation and consideration of additional information, there remains concern for the state of the stock, consider implementing a precautionary catch limit to prevent catch increases while further analysis is conducted.
- Continue monitoring, while collecting any additional data identified as required for further analysis

Exceed in second year

- Update 3-year average nominal CPUE. If the updated average CPUE continues to exceed the limit, review and update results of any standardised CPUE analysis or low information stock assessment conducted in response to the trigger being exceeded in the 1st year. Update analyses using any additional data collected to help understand the catch rate decrease.
- If the results of the standardised CPUE analysis or low-information stock assessment provide cause for concern regarding status, implement appropriate catch limits for the stocks concerned.
- If indicated, update CPUE triggers taking account of additional information.

- Schedule a periodic update of the CPUE of stock assessment analysis to inform future revision of catch limits.

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 effort expended in the fishery, care needs to be taken to ensure that any vulnerable bycatch or byproduct species are not put at risk. *The Guidelines for the Implementation of the Commonwealth Fisheries Bycatch Policy* (the Guidelines) requires that reference points for high-risk species be established that ensure that stocks are not subject to unacceptable level of risk (Department of Agriculture and Water Resources 2018). The management controls below for high-risk species in the WDWTF and NWSTF have been developed in accordance with the Guidelines. 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).

WDTF and NWSTF priority species for management			
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's 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).

WDTF and NWSTF high-rsk species			
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 lemures</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 and NWSTF high-rsk species			
WDTF	Teleost	Big-spined boarfish	<i>Pentaceros decacanthus</i>
WDTF	Teleost	Yellowback bream	<i>Dentex tumifrons</i>
WDTF	Teleost	Tang's 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. Consistent with the Guidelines the triggers below are appropriate species data collected in the Fisheries.

Level 1 catch trigger

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

Management 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 controls.
- 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.

Level 2 catch trigger

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

Management 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 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 they are taken in accordance with the conditions on WDTF and NWSTF fishing permits.

*in a calendar year

Monitoring and Research needs

Data Collection

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, 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.

Data is also collected via the AFMA Observer Program. This provides fisheries managers, research organisations, environmental agencies, the fishing industry and the wider community with independent, reliable, verified and accurate information on the fishing catch, effort and practice of the boats operating within the fishery. More information on the AFMA Observer Program can be found at <https://www.afma.gov.au/monitoring-enforcement/observer-program>.

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

Analysis

Data analysis may not always be required, therefore cost to industry should be minimal. By collecting this information from the outset and archiving it, 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.

AFMA will review total catch and effort data against the triggers in this harvest strategy at the end of each season. As per the management actions for each trigger, the stated actions will be taken where necessary when the triggers are exceeded.

Review and Amendments

Harvest strategies are to be reviewed every five years. However, it may be necessary to amend harvest strategies earlier if:

- A marked change in stocks targeted occurs, leading to a change in which stocks are categorised as key commercial
- New information substantially changes understanding of the fishery, leading to revised estimates of indicators relative to reference points
- External drivers have unexpectedly increased the risk to a fishery and fish stocks, including environmental or climate drivers that have substantially altered the productivity characteristics (growth or recruitment) of the stock
- Performance indicators show that harvest strategies are not working effectively, and that the intent of the Harvest Strategy Policy is not being met.

Further explanation can be found in Chapter 9 of the HSP Guidelines.

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