3 Assessment of the mid-water trawl activity

3.1 Introduction

The assessment of the mid-water trawl activity (MTA) differs from the panel's assessment of the declared commercial fishing activity in the first declaration (DCFA1) in relation to the available storage capacity and the unspecified length of the vessel.

The MTA involves a fishing vessel with a storage capacity of more than 1600 tonnes (t) whereas DCFA1 related to a fishing vessel with a storage capacity of more than 2000 t. In each case the panel assumed that the upper limit of capacity is 4500 t, based on that of the *FV Abel Tasman*. The MTA differs from the first declaration in that its storage capacity is reduced by 400 t in comparison to the minimum of the first declaration. The panel's assessment of the MTA focused on assessing how, if at all, this reduced storage capacity might alter the outcomes of its assessment of the first declaration.

In its first declaration report, the panel noted that "the length of a vessel was, in itself, less likely to be of specific relevance to the assessment, since length is essentially a function of the presence and scale of the fish processing facility and the storage and freezer capacity on the vessel" (Expert Panel on a Declared Commercial Fishing Activity 2014). The panel remains of the view that it is the storage capacity rather than the length of the vessel that is relevant to its assessment and has therefore not made any assumption about the length of the vessel involved in the MTA.

In conducting its assessment of the MTA the panel assumed that Condition 1 specified in the Schedule to the accreditation of the SPF made by the Environment Minister on 3 September 2012, in relation to the operations of 'large-scale mid-water trawl operations' in the SPF applies to the MTA. Condition 1 is as follows:

Large-scale mid-water trawl operations must:

(a) "Prior to fishing, have in place demonstrably effective and scientifically proven mitigation approaches and devices to the satisfaction of AFMA [the Australian Fisheries Management Authority] to minimise interactions with dolphins, seals and seabirds, including gear handling and net setting rules. These mitigation devices must, as a minimum, include best practice seal excluder devices with top opening escape hatches or equivalent mechanisms

(b) In the event of one or more dolphin mortalities as a result of the mid-water trawl fishing activities:

  i. suspend fishing;

  ii. consult with any AFMA observer onboard and review the effectiveness of mitigation measures; and

  iii. not recommence fishing within 50 nm [nautical miles] of the mortality event.

(c) Prior to fishing, have a seabird management plan in place that has been approved by AFMA in consultation with DSEWPaC [the Department of Sustainability, Environment, Water, Population and Communities]. The seabird management plan must:

  i. contain appropriate physical mitigation measures and requirements to manage offal discharge; and

  ii. be complied with by the vessel operator and crew during all mid-water trawl fishing activities.

(d) Prior to fishing, have a seal[10] management plan in place that has been approved by AFMA in consultation with DSEWPaC. The seal management plan must:

  i. contain gear handling and net setting rules to minimise the level of seal mortalities;

  ii. be complied with by the vessel operator and crew during all mid-water trawl fishing activities;

  iii. in the event of three seal mortalities in any one fishing shot, require the operator to consult with any AFMA observer onboard and review the effectiveness of mitigation measures before recommencing fishing; and

  iv. in the event of:

    A. three or more seal mortalities in each of three consecutive shots; or

    B. more than 10 seal mortalities within a 24 hour period of fishing; or

    C. more than 10 seal mortalities in one shot

10 On advice from the Department of the Environment, the panel interprets this reference to seals to include only fur seals.

require the operator to

D. suspend fishing;

E. consult with any AFMA observer onboard and review the effectiveness of mitigation measures; and

F. not recommence fishing within 50 nm of the mortality event.

(e) Not fish in areas of the SPF on the continental shelf which are in the Australian sea lion closure area. The area of the Australian sea lion closure is the part of the exclusive economic zone adjacent to the coast of Australia bounded by a notional line beginning at the intersection of the meridian of longitude 129°00'E and the coast of southern Australia, and running progressively:

i. south along that meridian to the intersection with the 150 m depth contour of the continental shelf;

ii. generally easterly along the 150 m depth contour to the point of intersection with the meridian of longitude 140°05'E;

iii. north along that meridian to the intersection with the coastline of South Australia; and

iv. generally westerly along the coastline to the point where the line began.

(f) Ensure that there is an on-board observer at all times with 24 hour monitoring of mid-water trawl fishing activities and there is an underwater camera record of the operation of any bycatch excluder device at all times, and reviewed by an observer each day. The requirements under this Condition will apply to 1 November 2013 with monitoring arrangements to apply after this date to be determined following a review by AFMA and the Department.

(g) When fishing, report daily to AFMA on the level of protected species interactions, including mortalities."

Condition 1 was to be applied by AFMA through variations to conditions on Statutory Fishing Rights (Seafish Tasmania Pty Ltd *in litt.* 16 October 2012) and parts (c) and (d) of the condition were to be implemented through seabird, seal and dolphin vessel management plans (VMPs). In addition, it was proposed that a further condition (Condition 2) would apply to AFMA in the event that a vessel such as the *FV Abel Tasman* operated in the fishery. Condition 2 was specified in a 'Draft – Two Year Instrument' sent to AFMA by the Environment Minister on 3 September 2012 and read as follows.

"In order to manage potential impacts on protected species in the Small Pelagic Fishery, by mid-water trawl operators with a large scale, on-board processing facility on their vessel and the capacity to remain fishing at sea for an extended period, AFMA is to:

a. if protected species interactions occur, report the interaction(s) to the Department within 24 hours of AFMA receiving the report from the vessel.

b. make publicly available on a monthly basis summary reports of protected species' interactions, including mortalities, within the first three months of this instrument being made, and on a quarterly basis thereafter.

c. consider further management responses to mitigate protected species interactions as appropriate.

d. in consultation with relevant scientific experts, the Marine Mammal Working Group or other fora as appropriate and community and non-government organisations, review on a quarterly basis the observed interactions with protected species by Large Scale Mid-Water Trawl Operators in the Fishery, and the appropriateness of the management response.

e. drawing on the outcomes of existing or new research as appropriate and in consultation with the Department and relevant experts, assess and take into account any risk of more concentrated fishing activity disrupting the feeding behaviour of dependant predatory species, particularly protected species."

The panel assumed, for the purposes of its assessment, that the provisions of Conditions 1 and 2 above would have been implemented should the MTA have commenced operation in the SPF. These conditions are, therefore, included in the panel's interpretation of the fisheries management arrangements under which the MTA is proposed to operate.

In addition, the panel assumed that the VMPs proposed to apply under DCFA1 would have been applied to the MTA (see Boxes 5.1 and 5.2 in Chapter 5 of the panel's first declaration report).

3.2 Direct interactions

The panel considered that compared to historical fishing operations in the Small Pelagic Fishery (SPF), the MTA would be able to remain at sea for significantly longer periods. However, compared to DCFA1, the reduced storage capacity of the MTA would reduce the time the MTA could stay at sea without unloading. This might reduce the capacity of the MTA to fish more broadly in the SPF compared to DCFA1, with possible implications for the nature and extent of interactions with protected species.

The panel considered that the uncertainties around the pattern of fishing likely to be undertaken by DCFA1 applied equally to the MTA. These uncertainties necessarily constrained the precision with which the panel could assess the impacts of DCFA1 and the MTA. Given this, the panel considered that the nature of its assessment was not sufficiently sensitive to detect any differential impact on the nature and extent of direct interactions with protected species arising from a 400 t reduction in storage capacity. As a result, the panel found that its assessment of DCFA1 was equally applicable to the MTA. Details of the panel's assessment of the nature and extent of the direct interactions of DCFA1 with protected species can be found in Chapter 5 of the panel's first declaration report. A summary of that assessment is repeated here in the context of the MTA.

3.2.1 Pinnipeds

Nature and extent of interactions

Australian fur seals *Arctocephalus pusillus doriferus*, New Zealand fur seals *A. forsteri* and Australian sea lions *Neophoca cinerea* occur throughout the area of the SPF and are highly susceptible to interactions with trawl fisheries. In southern Australia, pinniped interactions with fishing operations have occurred predominantly with demersal trawl wet boats and freezer trawlers using mid-water trawl gear in the Southern and Eastern Scalefish and Shark Fishery (SESSF), and with mid-water trawlers in the SPF. Most mid-water and demersal trawl operations that have occurred in the SPF area have been in the south-east of Australia and most interactions in that area have been with Australian fur seals.

Seals will be attracted to any fishing activity that occurs within their foraging range and the nature of interactions with these activities are likely to include net feeding, entering the trawl net (during shooting/fishing/hauling), habituation to fishing activities and bycatch. The greater the level and frequency of fishing activity and the more predictable the presence and timing of fishing activity in areas where seals forage, the greater the number of seals likely to be attracted to, and interact with, fishing activity. If a pattern of fishing persists and provides nutritional benefits to seals, parts of the population can become habituated to fishing operations and interactions may increase over time.

While it is not possible to quantify the extent of direct interactions between seals and the MTA, the panel considered that such interactions would occur and that some would result in mortalities. Given the broad distribution of fur seals within the SPF, the MTA would inevitably have direct interactions with fur seals, some of which would be fatal. In areas of high fur seal abundance, interactions and mortalities are likely to be common even with current best practice mitigation devices and fishing behaviour. The Australian sea lion occurs in the area of the SPF in waters off South Australia (SA) and Western Australia (WA). If the MTA operated within those waters, direct interactions with and bycatch mortality of this species would be likely.

New Zealand fur seal and Australian sea lion populations off SA and WA have not been exposed to the same level of bycatch mortality from trawl fisheries experienced by Australian fur seals elsewhere in the SPF, so there is uncertainty about the impacts of bycatch on those populations. This is especially important for the threatened Australian sea lion.

Actions to avoid, reduce and mitigate adverse environmental impacts

The panel considered that the following actions could be used to manage the risk of adverse environmental impacts arising from direct interactions between the MTA and pinniped species:

- Use a seal excluder device (SED), only after its operation has been optimised for the vessel, fishery and bycatch species under a scientific permit, with the required level of performance of the SED developed in consultation with experts
  - for example, the panel noted that neither the soft mesh-grid, top-opening SED with hood, nor the auto trawl system proposed to be used by the *FV Abel Tasman* to mitigate pinniped bycatch has undergone trials in the SPF.
- Use underwater video to monitor SED efficacy and cryptic mortality.
- Reduce the daily and per shot trigger limits on fur seals from the proposed limit of up to 10 per day and replace the associated 50 nautical mile (nm) move-on rule with a requirement to move to an area where interactions with seals are less likely, based on available data on estimated at sea density distributions.

- Introduce a bycatch rate trigger limit for fur seals for the fishery or fishing areas, or a total mortality trigger for a fishing season and/or fishing areas.
- Ensure 100 per cent observer coverage of fishing operations and if daily or per shot trigger limits are used in conjunction with move-on rules or with a requirement to review mitigation measures, provide sufficient observer capacity to ensure that underwater video footage is monitored at the end of each shot to maximise response times to mortalities.
- Require 'stickers' to be removed from the net before shooting, noting that this was a requirement of the proposed seabird VMP.
- Prohibit the discard of any biological waste (excluding the release of any protected fauna) noting that this was a requirement of the proposed seabird VMP.
- Implement spatial closures that mitigate bycatch interactions with fur seals, especially in regions adjacent to breeding colonies where there is high transit and foraging activity by central-place foraging lactating adult females.
- Review the proposed Australian sea lion closure area off SA (out to 150 m depth) so as to provide consistency with management arrangements for the Gillnet Hook and Trap Fishery (out to 183 m depth).
- Implement a similarly designed closure for the Australian sea lion colonies occurring within the SPF off WA.

Research and monitoring to reduce uncertainties

The following research and monitoring could reduce uncertainties about the potential for adverse environmental impacts arising from direct interactions between the MTA and protected pinniped species:

- Determine the individual and cumulative fishery-related impacts on pinniped species.
- Establish what levels of fishery-related mortality the pinniped species can sustain.
- Identify regions of critical foraging habitat for the pinniped species where the management of direct interactions with the MTA may be most needed.
- Investigate modifications to fishing gear and fishing behaviour that can reduce the potential for direct interactions by the MTA with pinnipeds.

3.2.2 Cetaceans

Nature and extent of interactions

Nearly all cetaceans recorded to occur in Australian waters have ranges that overlap to some extent with the SPF area. The nature and likelihood of interactions between cetaceans and mid-water trawl fisheries varies substantially among these species. Bottlenose dolphins *Tursiops* spp. and short-beaked common dolphins *Delphinus delphis* are likely to be at higher risk of interaction based on reported interactions with trawls and bycatch mortality in Australia and internationally.

Direct interactions with fishing operations include net feeding, foraging behind trawlers, and feeding on discards and fish escaping from nets. Vessel collisions resulting in injury or death of whales and some other cetaceans are thought to be relatively common in Australian waters but are not well documented. Most severe or fatal injuries to whales from vessel strike are caused by collisions with vessels greater than 80 metres in length, and higher speed increases the risk of serious injury or death.

Fisheries bycatch mortality, including from trawl gear, is the major threat to many smaller cetacean species in Australian waters and internationally. Differences in the type of fishing operations also influence the risk of bycatch, with cetaceans more often caught in mid-water trawls than in bottom trawls, and in trawls of longer duration. The risk of bycatch increases where prey species are also targeted by fisheries and where fishing grounds overlap with important habitats used by cetaceans for aggregating, feeding, breeding and migratory routes. Acoustic disturbance can be important for cetaceans because they have a very highly developed acoustic sense and sounds are vitally important for their ecology and survival. Cetaceans that frequently interact with trawlers and other fisheries can become habituated, leading to increased risk of bycatch.

The lack of information on the distribution and abundance, population trend, genetic structure, and location and timing of use of important habitats for most cetacean species, greatly increases the uncertainties about the likelihood of direct interactions occurring and whether such interactions would result in significant environmental impacts for these protected species.

It is highly likely that there will be some direct interactions between the MTA and cetaceans. The MTA would enable fishing to occur more extensively in the SPF area than has been the case historically, which would increase the range of cetacean species likely to be encountered. The nature and extent of direct interactions by the MTA with cetaceans is uncertain but some cetacean mortality is likely. The panel concluded that species such as bottlenose dolphins and short-beaked common dolphins, that are known to prey on small pelagic fish, and interact extensively with trawl fisheries, are at increased risk of being taken as bycatch by the MTA, whereas some larger whale species may be at higher risk from vessel strike or acoustic disturbance.

Actions to avoid, reduce and mitigate adverse environmental impacts

The panel considered that the following actions could be taken to manage the risk of adverse environmental impacts arising from direct interactions of the MTA with cetaceans:

- Use an excluder device only after its operation has been optimised for the vessel, fishery and for different dolphin species including both bottlenose and short-beaked common dolphins under a scientific permit with the required level of performance developed in consultation with experts, noting that excluder designs tested to date have not been consistently effective in reducing cetacean bycatch in trawls, and at present there is no solution to filter or deter cetaceans from entering the net opening.
- Use underwater video to monitor dolphin behaviour within the net and around the excluder device to determine the efficacy of the excluder device and levels of cryptic mortality.
- Introduce a bycatch rate trigger limit for dolphin species for the fishery or fishing areas, or a total mortality trigger for a fishing season and/or fishing areas on a precautionary rather than evidentiary basis.
- Replace the 50 nm move-on rule, in response to a single dolphin mortality, with a requirement to move to an area where interactions with cetaceans are less likely, based on available data on estimated at sea density distributions.
- Assess the efficacy of acoustic deterrent pingers (with using rigorous controlled trials under a scientific permit with the required level of performance developed in consultation with experts), and temporal and spatial closures, that have been shown elsewhere to have potential to reduce the risk of interactions for some cetacean species, including some dolphins.
- Prohibit the discard of any biological waste (excluding the release of any protected fauna) noting that this was a requirement of the proposed seabird VMP.
- Ensure 100 per cent observer coverage of fishing operations and, if trigger limits are used in conjunction with move-on rules or with a requirement to review mitigation measures, provide sufficient observer capacity to ensure that underwater video footage is monitored at the end of each shot to maximise response times to mortalities.
- In addition to the above actions to mitigate impacts on dolphins, ensure that monitoring and agreed management responses are in place to allow a timely management response if other cetacean species interact with the MTA.

Research and monitoring to reduce uncertainties

The following research and monitoring could reduce uncertainties about the potential for adverse environmental impacts arising from direct interactions between the MTA and protected cetacean species:

- Identify regions in the SPF area that are important habitats for cetaceans where the management of direct interactions with the MTA may be most needed.
- Determine the level of mortality arising from interactions with the MTA that could be sustained by cetacean populations in the SPF area.
- Investigate modifications to the proposed fishing gear and operations of the MTA that could reduce the potential for, or the impacts of, interactions with cetaceans.
- Collect, analyse and publish observer data on all cetacean interactions.

3.2.3 Seabirds

Nature and extent of interactions

The panel concluded that the past rate of interactions of SPF mid-water trawl operations with seabirds was likely to have been low and this could be at least partly explained by the low level of discharge of biological material in the fishery. Nevertheless, interactions have occurred and the SPF is an area that is known to be important to many seabird species.

Direct interactions between trawl vessels and seabirds include collisions with net-monitoring cables, warp cables and paravanes, net entanglements and habituation to fishing operations. Each of these interactions could be expected to occur with the MTA. However, given that the MTA fishing scenario precludes the discard of any biological material, the panel expected that the likelihood of habituation and, as a result, other forms of direct interactions, was likely to be lower than in many other trawl operations.

Since it was not possible to predict with any certainty the location, timing or intensity of fishing by the MTA the panel could not quantify the likely extent of direct interactions with seabirds.

Actions to avoid, reduce and mitigate adverse environmental impacts

The panel considered that the following actions could be taken to manage the risk of adverse environmental impacts arising from direct interactions of the MTA with seabirds:

- The requirements in the proposed seabird VMP regarding discharge of biological material, the removal of stickers and warp maintenance be consistent with or equivalent to the advice of the Agreement on the Conservation of Albatrosses and Petrels (ACAP 2013a, 2013b and 2013c).
- Adopt the ACAP advice regarding net binding, bird scaring lines and the use of a snatch block noting that the use of bird scaring lines and net binding are part of the seabird VMP for Australia's winter blue grenadier fishery.
- If bird bafflers and warp deflectors are to be used, develop and optimise the design under scientific permit and in consultation with experts, noting that seabird captures in the SESSF have been reduced by 75 per cent using 'pinkies'.
- Direct deck lighting inboard and keep to the minimum level necessary for the safety of the crew.
- Develop advice on the correct interpretation of 'interactions' with seabirds in consultation with the Department of the Environment to ensure that it is consistent with the intent of the memorandum of understanding between the Department and AFMA and ensure that MTA operators and crew are familiar with this advice.
- Ensure that the seabird VMP for the MTA meets the requirements of the National Recovery Plan for Threatened Albatrosses and Giant Petrels 2011-2016.
- If unacceptable levels of interactions with protected seabird species occur, suspend fishing immediately and adopt one of the following options
  - time and area closures, noting that these will rely on knowledge of spatial and temporal uses of bird habitats that overlap with the fishery
  - trigger limits and move-on rules.
- Consistent with the measures suggested above for pinnipeds and cetaceans, ensure 100 per cent observer coverage of all fishing activity.

Research and monitoring to reduce uncertainties

The following research and monitoring could reduce uncertainties about the potential for adverse environmental impacts arising from direct interactions between the MTA and protected seabird species:

- Identify ecologically sensitive seabird species, areas and times where spatial management strategies may be appropriate to mitigate direct interactions if required.
- Collect, analyse and publish observer data on all seabird interactions, including on the levels and causes of seabird bycatch, focusing especially on recording of warp interactions and trawl entanglements.
- Use electronic monitoring via video camera(s) to assist in quantifying warp strikes.
- Ensure crews are properly trained in the use of the required seabird mitigation and on reporting requirements.

3.2.4 Summary

The MTA is defined in terms of the fishery in which it operates, the type of fishing gear used and its storage capacity. The fishing scenario developed by the panel assumed that the freezer capacity of the MTA would enable it to stay at sea for longer periods (up to three to four weeks before needing to unload product) and to fish more extensively in the SPF area than has been the case in the past.

To date, mid-water trawling in the fishery has been concentrated around Tasmania. The MTA would most likely focus its fishing effort on the shelf and slope areas of the SPF, where the target species are predominantly distributed, but would likely fish these areas more extensively and might fish in slightly deeper water off the shelf than previous fishing operations in the SPF. Historical fishing patterns and interaction data do not, therefore, necessarily provide a good guide to the likely fishing patterns or protected species interactions of the MTA. Further, it is not possible to predict with certainty the species composition, the spatial/temporal pattern of fishing or the intensity of fishing by the MTA because the fishing plan will be dictated by the prevailing environmental and economic conditions.

The panel concluded that if the MTA operated in areas or at times of the year that have not been fished previously by mid-water trawl vessels, it is reasonable to expect that rates of interaction, the species involved and the risk profile of those species may differ from those of the past. This results in considerable uncertainty about the likely extent of direct interactions by the MTA with protected species. Nevertheless, the panel concluded that it is inevitable that the MTA would interact with species protected under the *Environment Protection and Biodiversity Conservation Act 1999* (Cwlth) (EPBC Act) particularly pinnipeds, cetaceans and seabirds.

There is considerable uncertainty about the level of direct interactions resulting in injury or mortality of protected species that could occur without causing an adverse environmental impact. This level would vary within and among the pinniped, cetacean and seabird groups assessed in accordance with their abundance, population trend and the resilience of the species. Some of the protected species at risk of interacting with the MTA are listed as threatened and/or migratory species under the EPBC Act and are therefore matters of national environmental significance that are afforded a higher level of protection and require assessment of significant impacts against criteria. For example, of the pinniped species assessed, the threatened Australian sea lion, currently listed as Vulnerable under the EPBC Act, can sustain less mortality without risk of adverse environmental impacts than the more plentiful Australian and New Zealand fur seals where populations have undergone recent recovery. Similarly, while many protected seabird species occur within the area of the SPF, some of these are known to have depleted populations and are listed as threatened and/or migratory species.

For many protected species, such as most cetaceans in the SPF area, there is a lack of information about population size and trends, location of important habitats and other biological and ecological characteristics. In the absence of such information it is not possible to establish evidence-based benchmarks for direct interactions by the MTA with protected species that would avoid adverse environmental impacts.

The panel noted the SPF, and generally all fisheries, are managed in similarly uncertain environments. In relation to the MTA, the panel considered that there are actions that could be taken to avoid, reduce and mitigate the risks of adverse environmental impacts occurring and that research and monitoring could be undertaken to reduce the uncertainties.

3.3 Localised depletion

The panel considered that the reduced storage capacity of the MTA may reduce the extent of localised depletion and the risks associated with adverse impacts arising from that. Conversely, the reduced capacity to stay at sea may provide an incentive to stay in a localised area for more extended periods compared to the more wide ranging fishing activity possible under DCFA1. Again, given the uncertainties associated with predicting the fishing pattern of the MTA, the panel considered that it was unlikely that it could detect any meaningful distinction between the likely impact of localised depletion caused by the MTA on target species or central place foragers (CPFs)[11] and that of DCFA1. Details of the panel's assessment of the likely adverse environmental impacts of localised depletion arising from DCFA1 can be found in Chapter 6 of the panel's first declaration report. A summary of that assessment is repeated here in the context of the MTA.

3.3.1 SPF target species

The panel found that SPF target species have some inherent characteristics that make them potentially susceptible to localised depletion; they are susceptible to capture as a result of their aggregating or schooling behaviour and associations with oceanographic features e.g., eddies and temperature and chlorophyll fronts. However, the panel also noted that other characteristics, such as being proficient swimmers, having a schooling behaviour that is dynamic and difficult to predict, and being productive and fecund, are likely to reduce the temporal and spatial extent of any such depletion.

Impacts of localised depletion on target species could result in changes in reproductive capacity and genetic diversity. However the available genetic evidence for jack mackerel *Trachurus declivis* did not suggest that past, apparently high, levels of fishing had significantly affected their reproductive capacity. Similarly, there have been no significant changes in age or size composition of redbait *Emmelichthys nitidus* in recent years that might indicate a potential impact on reproductive capacity. There are too few data available for the Australian sardine *Sardinops sagax* in the Eastern Zone or blue mackerel *Scomber australasicus* to determine if there have been significant changes to age or size structure or reproductive capacity, but the low levels of effort and catch suggest little likelihood that changes have occurred. Further, there is no evidence to suggest that localised depletion has caused any impacts on genetic diversity in the SPF stocks. Additional research into stock structure would be required in order to inform management of the potential risks of localised depletion at the subpopulation level and the appropriate spatial scale at which to manage effort and catch.

11 CPFs are land breeding species of pinnipeds and seabirds (see Section 6.7 of the first declaration report)

Given that the exploitation rates in the SPF are considered to be conservative against international benchmarks for small pelagic fisheries and that concerns about the basis for spawning stock biomass estimates and the SPF Harvest Strategy Policy are being addressed, the panel considered that any localised depletion of SPF target species that might arise from the MTA was unlikely to affect the overall status of stocks of those species in the SPF.

Research and monitoring to reduce uncertainties

Research and monitoring in the following areas could reduce uncertainties associated with stock structure and hence with the adverse impacts of localised depletion arising from the MTA on target species:

- well-designed and targeted research to clarify the extent of sub-structuring of SPF target species within the Eastern and Western Zones specifically, and the SPF more broadly
- ongoing monitoring of the length frequency of catch taken by the MTA at a statistically appropriate sampling intensity.

3.3.2 Central place foragers

The dependency on near-colony prey resources at certain locations and times increases the vulnerability of CPF species to localised depletion of prey. Although CPF species have been shown to be highly responsive to changes in prey availability within their key foraging areas, very few studies have linked reduced foraging and reproductive performance to the impacts of fishing, and even fewer to localised depletion.

The nature and extent of impact of localised depletion will depend on the spatial and temporal scale of the depletion. Short-term impacts may reduce foraging efficiency resulting in longer foraging trips and/or reduced rates of provisioning to offspring (chicks/pups). If these persist they can result in reduced offspring growth rates and fledging/weaning mass and reduced offspring survival and adult breeding success. Longer-term impacts, over years and decades, can affect major demographic factors such as survival, recruitment and reproductive rates that drive population age structure, growth rates and ultimately population size.

There are few examples where the potential impacts on CPF species of localised depletion caused by fishing are actively managed. Only the case study on Peruvian boobies found compelling evidence for localised depletion. In three other case studies, in the North Sea, Benguela and Alaska, where declines in population size and reproductive success in CPFs have been identified, spatial closures have been introduced as a precautionary measure to mitigate potential adverse impacts of localised depletion even though the causes of the declines are uncertain.

CPFs that forage in the SPF, and for which SPF target species comprise or have comprised more than 10 per cent of the diet, are Australian fur seal, New Zealand fur seal, Australasian gannet *Morus serrator*, short-tailed shearwater *Ardenna tenuirostris*, little penguin *Eudyptula minor*, crested tern *Thalasseus bergii* and shy albatross *Thalassarche cauta*. Key foraging areas for these species within the SPF are Bass Strait, Tasmania and SA. However, there remains some uncertainty about the importance of SPF species to other CPFs because diet information is poor or unavailable.

Since the overall catch of the MTA is likely to be higher than that of the current SPF fleet, it is possible that the extent of localised depletion might be greater than for a single wet boat but not necessarily greater than for a fleet of wet boats. The key distinguishing feature between the MTA and current and historical fishing operations in the SPF is that it can stay at sea longer and so fish more broadly in the area of the SPF. While this may mean that the MTA could stay in an area for a protracted time, the need to maintain an economically viable catch rate suggests that it is more likely to move on thereby reducing the potential for localised depletion arising from its operations to have adverse impacts on CPF species.

The panel concluded that the MTA has the potential to have adverse impacts on CPF species through localised depletion. Whether that potential is realised depends on where, when and how intensively the MTA fishes. In addition, the panel noted that there is very limited monitoring of CPF populations and the chance of detecting any indirect fishery related impact on CPFs within the SPF area is extremely low.

Actions to avoid, reduce and mitigate adverse environmental impacts

Spatial closures are the most common form of precautionary management used to mitigate the potential adverse impacts of localised depletion on CPFs; however, the effectiveness of spatial closures for this purpose has not been clearly demonstrated. Their value depends heavily on the ability to determine the scale of spatial closures that would be appropriate for particular species at particular locations and at particular times.

The panel concluded that the risks to the key CPF species identified above from localised depletion caused by the MTA could be addressed proactively by separating the fishing activity from their critical foraging areas. Determining the appropriate temporal or spatial scale of the closures will be challenging but reasonable datasets exist for at least some CPF species in some areas of the SPF. It may be necessary to extrapolate from this information in order to define appropriate spatial closures elsewhere in the SPF. Closures would need to be modified adaptively to reflect new information from fishing or targeted research.

Research and monitoring to reduce uncertainties

Many of the uncertainties that were identified in relation to the panel's ability to assess the extent of localised depletion likely under a MTA reflect the dynamics of fishing operations and the economics of fishing. These types of uncertainties cannot be reduced through monitoring and research. However, research and monitoring that could reduce the uncertainties associated with the adverse impacts of localised depletion arising from the MTA on CPF species include:

- dietary studies to determine which key CPFs or other commercially or ecologically important predators are most reliant on SPF species
- studies to better understand the critical foraging areas, habitats and times for key CPFs
- examination of the biological response of CPFs to changes in prey availability
- investigation of potential ecological performance indicators.

3.3.3 Summary

The panel interpreted localised depletion as a spatial and temporal reduction in the abundance of a targeted fish species that results from fishing. As a result, localised depletion is an inevitable consequence of fishing by the MTA and of any fishing activity. The central issue for the panel's assessment was, therefore, whether the fishing activity of the MTA could be concentrated enough, both spatially and temporally, to cause a localised depletion of target species sufficient to cause adverse environmental impacts to the Commonwealth marine environment.

The panel found no conclusive evidence of historical localised depletion that caused adverse environmental impacts in the SPF. However, the high level of dependence by some predators, particularly CPFs, highlights the need to manage for the risk of such impacts.