UNIVERSITY of TASMANIA | IMAS INSTITUTE FOR MARINE & ANTARCTIC STUDIES

Submission to the Senate Inquiry on the environmental, social and economic impacts of large-capacity fishing vessels commonly known as 'supertrawlers' operating in Australia's marine jurisdiction

Terms of reference:

The environmental, social and economic impacts of large-capacity fishing vessels commonly known as 'supertrawlers' operating in Australia's marine jurisdiction, with particular reference to:

- the effect of large fishing vessels on the marine ecosystem, including
  - impacts on fish stocks and the marine food chain, and
  - bycatch and interactions with protected marine species;
- current research and scientific knowledge;
- social and economic impacts, including effects on other commercial fishing activities and recreational fishing;
- the effectiveness of the current regulatory framework and compliance arrangements;
- any other related matters

The Institute for Marine and Antarctic Studies (IMAS), University of Tasmania has taken an evidence-based approach to addressing the terms of reference (ToR) and, although not explicitly stated in the ToR, this submission is focussed on issues related to the operation of large-capacity vessels in the Commonwealth Small Pelagic Fishery (SPF). This provides a good case study of issues common to these vessels.

Background

In late 2012 the Federal Environment Minister commissioned an Expert Panel to conduct an assessment of the environmental impacts surrounding the use of large mid-water trawl freezer vessels in the SPF. The panel report was published in October 2014 (Expert Panel, 2014) and in late December 2014 the Federal Government implemented a permanent ban on the operation of factory freezer vessels of more than 130 m in Australian waters. In early 2015 a 95 m mid-water trawl freezer vessel was brought into the fishery. Although of similar size to other freezer trawlers that operate in Australian fisheries and substantially smaller than 130 m, many of the environmental and other concerns identified as part of the Expert Panel assessment for the SPF remain as potential issues for the current operation.

Key environmental issues of concern surrounding the use of factory vessels in the SPF include:

- interactions with species protected under the Environment Protection and Biodiversity Conservation Act (EPBC Act), particularly seals and dolphins; and
- potential for localised depletion of target species resulting in adverse impacts on the marine environment, including the target species' predators protected under the EPBC Act.

In addition, there has been considerable public concern about the currency of information on the target fish stocks (including biomass estimates), the role of these species in the ecosystem function, the effectiveness of the management framework, and social and economic impacts of large scale fishing operations on other commercial fishing activities and recreational fishing.

The primary focus of this submission is the scientific information relevant to the SPF, and in particular studies and reviews that have been conducted since the 2012 and of relevance to the inquiry. Relevant scientific information available prior to 2012 was summarised by Buxton *et al*. (2012). Key recent studies include:

- Report of the Expert Panel on a Declared Commercial Fishing Activity: Final (Small Pelagic Fishery) Declaration 2012. (Expert Panel, 2014). Reviewed environmental issues associated with large scale factory freezer trawl operations in the SPF.
- Summer spawning patterns and preliminary daily egg production method survey of Jack mackerel and Australian Sardine off the East Coast. Fisheries Research and Development Corporation (FRDC) Project No. 2013/053 (Ward *et al*., 2014). - Spawning biomass estimates for Jack Mackerel and Australian Sardines for the eastern zone of the SPF.
- Egg distribution, reproductive parameters and spawning biomass of Blue Mackerel, Australian Sardine and Tailor off the East Coast during late winter and early spring. FRDC Project No. 2014/033(Ward *et al*., in review). Spawning biomass estimates for Blue Mackerel and Australian Sardine for the eastern zone of the SPF.
- Small Pelagic Research Coordination Program: Technical workshop to explore options for mitigating marine mammal interactions in the Small Pelagic Fishery. FRDC Project No. 2014/046. (Fitzgerald *et al.*, 2015). Review and recommendations on the management and mitigation of marine mammal interactions in the SPF.
- Review and update of harvest strategy setting for the Commonwealth Small Pelagic Fishery. Single species and ecosystem considerations. FRDC Project No. 2013/028. (Smith *et al*., 2015). Reviewed the SPF Harvest Strategy and provided recommendations on appropriate reference points and exploitation rates for SPF species taking account of their ecological role in the food chain.
- Benchmarking Australia's small pelagic fisheries against world's best practice. FRDC Project No. 2013/063. (Ward *et al*., in review). International workshop primarily focussed on the management and assessment of the South Australian Sardine Fishery but also considered the research and management framework for the SPF.

Management of small pelagic fisheries - impacts on fish stocks and the marine food chain from harvesting including by large-capacity fishing vessels

Key points.

Ecological sustainability of fisheries (including small pelagics) harvested by factory trawlers can be achieved by established management techniques.

Localised depletion may be of concern in some situations and can be effectively controlled by established management procedures, such as "move-on" rules.

Concentration of effort is not necessarily a problem and the basis for concern about localised depletion needs to be defined as part of the management response.

The question of how many fish can be caught (e.g. managed through a total allowable catch) is distinctly different from how the fish are caught (e.g. whether by large capacity vessels or not).

There is general consensus world-wide amongst scientists on how fisheries for small pelagic species (also referred to as forage fish) should be managed to ensure sustainability and to avoid adverse impacts on the food web and ecosystem (Smith *et al.* 2011, Pikitch *et al.* 2012). In the most comprehensive assessment, Pikitch *et al.* (2012) reviewed all of the major marine ecosystems and forage fisheries of the world and provided the following management recommendations which, if implemented, would ensure ecological sustainability in such fisheries. Recommendations include:

- fishing mortality should be no more than half of conventional rate usually considered to maximise sustainable yield;
- the average abundance of the forage fish is maintained at more than double the level usually considered to maximise the sustainable yield in most other fisheries; and
- fishing should be spread out so as to avoid localised depletions where there are local ecological 'hotspots' with particularly strong local dependency between predators and prey (e.g. central place foragers).

In the context of other large-capacity vessels, it's important to have a rationale for any concern around "localised depletion" as concentration of effort can sometimes be desirable. For example, some types of fishing effort (but not that focussed on small pelagic species) impact on the seabed and it's typically better to concentrate this impact rather than distribute broadly.

Management of the Small Pelagic Fishery

Key points.

Management is based on output controls which mean the scale of the catch is unaffected by the vessel size.

Management of the SPF and other fisheries with large-capacity vessels use harvest strategies, which define the acceptable levels of stock and also the response that must occur if a problem arises.

The harvest strategies includes a system for reducing catch where there is less certainty about data, for example, if biomass estimates have not been collected recently.

Harvest rates in the SPF are more conservative than recommended best practice in terms of preventing ecosystem impact.

The SPF is managed by the Commonwealth through the Australian Fisheries Management Authority (AFMA), a Statutory Authority responsible for the day-to-day management of fisheries under Commonwealth jurisdiction. AFMA uses an extensive advisory structure and encourages the participation of stakeholders (scientists, industry, conservation NGOs, recreational fishers, and State and Commonwealth government departments) in these advisory processes. Decision making is by the AFMA Commission.

A fishery management plan was enacted for the SPF in 2009 with Statutory Fishing Rights issued in early 2012 (https://www.comlaw.gov.au/Details/F2014C01077). Management is based on output controls – that is the fishery is managed by annually set Total Allowable Catches (TACs).

In the SPF, Total Allowable Catches are defined by species and management sub-area, namely Eastern and Western zones (the split occurring through the centre of Tasmania). Target species for which quotas are allocated are Jack Mackerel (Eastern and Western), Redbait (Eastern and Western), Blue Mackerel (Eastern and Western) and Australian Sardine (Eastern).

In fisheries, harvest strategies are used to set out the management actions that are needed to achieve defined biological and economic objectives. This includes specifying 'control rules' that regulate the level of fishing activity and the monitoring and assessment processes to inform both setting and progress of the harvest strategy objectives. The SPF Harvest Strategy represents the operationalisation of the over-arching Commonwealth Government's Harvest Strategy Policy (HSP) (http://www.daff.gov.au/__data/assets/pdf_file/0004/397264/HSP-and-Guidelines.pdf).

The SPF Harvest Strategy includes decision rules on how the scientifically based Recommended Biological Catch (RBC) is calculated. The RBC is used by the AFMA Commission to determine the TACs for each of the key fish stocks. The use of decision rules ensures that the TAC decisions are based on specific evidence about stock status. Also decision rules can be tested scientifically to determine that they can achieve management

objectives. The SPF Harvest Strategy uses a tiered approach that recognises the ecological importance of the small pelagic species and takes an explicitly conservative approach to setting harvest levels (i.e. proportion of spawning biomass) and hence TACs. The tiered approach recognises that harvest rates must be more precautionary when there is limited information available on the status of the stocks but can be increased as improved information becomes available.

The SPF Harvest Strategy was updated in 2015 following a comprehensive review of reference points and exploitation rates, taking account of the specific characteristics of each of the main target species and the ecological role of the small pelagic species in maintaining ecosystem function and health (Smith *et al*., 2015). The revised harvest strategy incorporates all of the recommendations and, in some aspects, has adopted an even more precautionary stance on harvest rates than recommended (for instance harvest rates adopted for Blue Mackerel and Australian Sardine are lower than proposed in Smith *et al*., 2015) (http://www.afma.gov.au/wp-content/uploads/2014/11/SPF-Harvest-Strategy-20152.pdf). Thus, even though currently only a small fraction of the TAC is typically caught, catching the full amount of the TAC is likely to pose low risk for the status of the SPF stocks.

Maximum harvest rates and target and limit reference points applied in the SPF meet the recommended scientific standards regarded as best practice for forage fisheries (e.g. Pikitch *et al*., 2012; Smith *et al*., 2015).

Stock assessment in the SPF

Key points.

Catch in all Australian fisheries with large-capacity vessels is set based on information on the size of the stock (the biomass).

In the SPF, stock size is generally estimated by the daily egg production technique, with account made of cases where this data has not been collected recently.

Spawning stock size biomass estimates were updated for key eastern zone species in 2014, recent biomass estimates are not available for western zone species. Biomass surveys for the western zone represent a high priority.

Fishery independent spawning biomass surveys (using an internationally accepted survey method known as the Daily Egg Production Method) conducted in 2014 provide up to date biomass assessment for three of the four main target stocks in the Eastern zone (i.e. Jack Mackerel, Blue Mackerel and Australian Sardine) (Ward *et al*., 2015; in review).

Stock status information for the remaining SPF stocks (Redbait east, Redbait west, Jack Mackerel west and Blue Mackerel west) is either over 10 years old or unassessed using the DEPM approach and thus less certain. For these stocks a more conservative approach to recommending catch limits is taken (at least half the maximum recommended harvest rate). Biomass surveys for the western zone stocks represent a high research priority for the SPF.

Environmental impacts of the SPF

Key points.

Ecosystem interactions in fisheries with large capacity vessels tend to be well researched, this is especially the case with the SPF.

Impacts through harvesting in the SPF on the ecosystem, including larger predators such as tuna that are important for recreational and commercial fishing, has been assessed as minor.

Risks can be further reduced through spatial controls on fishing effort.

Ecosystem modelling indicates that within the SPF Harvest Strategy framework, fishing would have minor impacts on the pelagic ecosystem and that the food web in southern and eastern Australia is not highly dependent on SPF species. Furthermore, none of the higher trophic level predators have a high dietary dependency on these species (Smith *et al*., 2015). These findings are relevant from both ecosystem and stock perspectives indicating that impacts on target fish stocks and marine food chain at the catch levels proposed under the SPF Harvest Strategy will be minor and sustainable.

Small pelagics tend to have very low value compared to higher level predators such as tuna and billfish (to both commercial and recreational fishers). This means that ecosystem impacts are of both conservation and economic interest. Ecosystem modelling of the pelagic ecosystem off southern and south-eastern Australia showed that harvesting in the SPF will have minimal (negligible) impact on the species that support these related commercial and recreational fisheries.

However, in order to minimise the risks of fishing impacts such as localised depletion, additional measures have been applied to factory trawl operations that restrict the size of catches that can be taken from limited areas (grids) over specific timeframes. In summary the SPF has been divided into 120 catch grid cells and seven management zones, and catches in any one of the catch grid cells must not exceed 2000 tonnes within a 30 day period. These measures have also been introduced to distribute effort and catch across the fishery and avoid the concentration of effort in limited areas. Details of catch area and timeframe catch restrictions are detailed in the vessel management plan for the only factory freezer vessel operating in the SPF (http://www.afma.gov.au/wp-content/uploads/2015/09/Vessel-Management-Plan1.5.pdf).

Economic impact of Individual Transferable Quota (ITQ) management systems

Key points.

All of Australia's large fisheries are managed with ITQ systems, including those with large-capacity vessels.

ITQ systems are intended to shift catch towards a small number of efficient operators and represent a market-based mechanism to reduce labour and the number of vessels.

Royalty payments for access to public resources are commonly applied to industries that rely on public resources but only rarely with ITQ fisheries, and not to any large-capacity vessels in Australia.

Community benefit from Australian ITQ fisheries may be low, especially where the product is consumed overseas and the beneficiaries of the economic rent are foreign owners of quota.

The output controlled system applied to the SPF and other fisheries with large-capacity vessels is based on resource economic theory - the TAC is divided and allocated to quota owners according to their holdings of Individual Transferable Quota (ITQ) units. ITQ units, with their catch entitlements, can be bought, sold or leased among fishers. This trading or transfer of quota between operators is promoted in ITQ fisheries because it tends to shift catch to a small number of efficient operators, thus raising the overall technical efficiency of the fleet. This process reduces costs in the fishery because fewer vessels, less fuel, and less labour is required to take the catch. It is an economic approach applied to all of Australia's largest fisheries.

In the context of large capacity fishing vessels, management with ITQs can encourage quota holdings of numerous small operators to be amalgamated by a single large operator. Improvements in efficiency from concentration of catch into a small number of operators is considered desirable in Australia because productivity of labour increases. This point is important because some of the public commentary around large-capacity vessels has involved the claim that it would be better for society to have several small vessels harvesting the TAC rather than a small number (or one) large vessel. Such an approach would conflict with the objective of the ITQ systems used in all of Australia's largest fisheries and also with objectives of fisheries legislation in most jurisdictions, including the Commonwealth, which specifically aim to increase efficiency.

Efficient fisheries with limited access and catch typically generate economic rents. The beneficiaries of these economic rents vary between jurisdictions, as per the treatment of other renewable public assets such as forestry and water. All, or a portion, of the economic rent may be collected as royalty payments, which provides a transparent flow of benefits to the public. For example, many Pacific Island countries rely heavily on economic rent from their fisheries to fund Government activity. Public benefit from commercial harvesting of fish stocks is ambiguous in Australia where royalty payments are not collected, product is exported, and employment is minimised by policies that promote efficiency. Most higher-value Australian fisheries, including those operated by large-capacity vessels, have trends of

increasing foreign ownership so that the economic rent from fishery is private and flows out of Australia.

It is also vital that a modern fishery optimises its economic return. A major challenge with the SPF is that species with high oil content (e.g. mackerel) spoil quickly and are not fit for human consumption. For this reason, in the Australian fishery where boats do not currently have the capacity to process their catch on board, by the time the fish are returned to land-based processing they are fit only for production of fish meal or pet food, both of which have low economic value. It is a much better economic (and environmental) outcome to process the SPF species immediately after they are caught in ship-based factories so that this high quality protein can be consumed by humans and attract a relatively high price.

An additional economic consideration is concerned with the country of registration and ownership of the vessels and whether economic activity and profit from access to an Australian resource remains in Australia to benefit the Australian economy. It is self evident that it is in Australia's interests to ensure that fish caught in Australian waters are sold by Australian companies for Australian benefit.

Fish bycatch

Key points.

Bycatch (i.e. proportion of the catch that is discarded) occurs in virtually all fisheries and needs to be measured and managed.

Information collection on bycatch from large capacity vessels tends to be to a high standard because the low number of operators facilitates high observer coverage.

The management response to bycatch can be defined by thresholds, such as a certain tonnage of bycatch that triggers an area closure.

Monitoring and assessment of bycatch, including effectiveness of fishing practices is a high priority for the SPF.

Bycatch, that part of the catch that is released or discarded, is a feature of virtually all commercial and recreational fisheries. Bycatch can include non-target and target species, in the latter case target species may be released or discarded due to regulation (e.g. size or trip limits) or other factors (e.g. poor quality or market limitations).

In order to manage this issue a bycatch and discard work plan applies for the SPF (AFMA, 2014). This plan defines the level of observer coverage, use of exclusion devices and need for an approved vessel management plan (VMP) for seabird and marine mammals interactions and to minimise and avoid discharge of biological material. A key objective of the plan is to reduce discarding of target species and minimise overall bycatch as well as to avoid interactions with species listed under the EPBC Act.

Mid-water trawl operations in the SPF are highly targeted and monitoring of previous mid-water trawl operations by IMAS staff indicated that fish bycatch represented a minor

component of the total catch (< 1% by weight). However, even small proportions of large quantities can be significant in absolute terms.

Although bycatch of the factory trawl operations is expected to be relatively low due to the ability to selectively fish the target species, the large scale of the operation makes it essential that catches are closely monitored. Furthermore, the large capacity vessel is capable of operating throughout the entire SPF, including areas where mid-water trawling has not been conducted previously, and thus the composition and level of bycatch are uncertain. Recognising this, AFMA has committed to use on board observers to monitor mid-water trawl operations (including bycatch) on at least the first ten trips (and a minimum of 20% trips thereafter). In addition the freezer trawler must have an AFMA approved e-monitoring system (sensors, cameras and recording unit) operating during all fishing activity. These measures will provide reliable information on the nature and scale of bycatch in the fishery but until such information is available and formally evaluated, it is not possible to speculate whether further management responses or modifications to gear or operating procedures will be required.

For the present, special trigger limits have been imposed by AFMA to cover the bycatch of Australian Sardines taken off Western Australia and South Australia. A 100 tonne cumulative bycatch trigger applies for waters extending from the coastline to the 130 m depth contour adjacent to each state. If these limits are breached within a fishing year (May to April) then the affected zone will be closed to fishing for the remainder of the fishing season. There are no other explicit conditions relating to fish bycatch covered in the VMP. This management response to bycatch is unusual in Australian fisheries as fixed responses to bycatch including limit reference points are rarely implemented to this degree.

Interactions with protected species

Key points.

Protected species interactions occur in most Australian fisheries, in both commercial and recreational sectors.

Data on interactions in most fisheries relies on voluntary reporting.

Large capacity vessels tend to have higher level reporting because of the small number of vessels and thus greater ability for high levels of observer coverage.

Interactions with protected species are unavoidable in the SPF.

A range of measures including bycatch trigger limits (dolphins and Australian sea lions), gear and fishing practices modifications and mitigation measures have been implemented along with high level observer coverage to reduce and monitor protected species bycatch.

Formal evaluation of the effectiveness of the various mitigation strategies is not feasible in the current operating environment.

The ability to reduce the bycatch of protected species to levels deemed acceptable represents a major challenge for the operation of large-scale mid-water trawling.

Some level of interactions between fishing operations and protected species (seabirds, marine mammals, marine reptiles, seahorses/sea dragons / pipefish) occur in most Australian commercial and recreational fisheries including the SPF.

The level of fishery interactions that result in adverse population impacts will vary between species in accordance with their abundance, population trend and resilience. Internationally the issue of marine mammal bycatch is managed in some fisheries through the application of Potential Biological Removals (PBR), this is the maximum level of fishery induced mortality that still ensures that population viability is not compromised. This approach requires estimates of marine mammal population sizes and an assessment of biologically sustainable levels of fishing mortality. Some level of bycatch is allowed but only as long as the PBR level is not exceeded before there is a management response. In such assessments it is critical that the cumulative impacts of fishing (i.e. all fisheries) on the protected species are considered in assessing the population impacts, a principle highlighted by the Expert Panel (Expert Panel, 2014) and by a technical workshop (Fitzgerald *et al*., 2015). Despite some level of marine mammal and seabird bycatch occurring in many Australian fisheries (including shark attack prevention programs), acceptance of explicit PBRs or their equivalent is likely to meet resistance from the general public.

In the SPF interactions with protected species occur because of overlaps between the fishery and feeding grounds and because species are attracted to fishing operations, feeding on the catch from the net as well as discarded catch and offal. While many such interactions do not result in harm to the protected species, lethal interactions with mid-water trawling have occurred in the past (Lyle *et al*., 2015) and since factory trawl operations commenced in early 2015. Between April and June 2015 nine common dolphin, twelve seal and two shy albatross

mortalities were reported in the SPF (http://www.afma.gov.au/sustainability-environment/protected-species-management/protected-species-interaction-reports/).

Minimising lethal interactions with protected represents a major challenge for the SPF. A range of management, gear and operational measures are being used to minimise interactions and improve the outcomes for the animals should interactions occur. In addition, a high level of observer coverage (initially 100% coverage of the first ten trips) has been implemented to monitor the bycatch of protected species and adherence to mandated operating procedures.

Management measures include closed areas, bycatch triggers, and mandated mitigation measures. Mitigation measures include the use of tori line or bird bafflers to reduce seabird interactions, surveying for the presence of marine mammals prior to deploying gear and not fishing in areas where dolphins are present, and the deployment of an AFMA approved exclusion device or barrier net. The operators of the factory vessel have voluntarily modified fishing practices in an effort to reduce interactions. These modifications include binding the centre of the trawl to ensure it remains closed whilst being set (restricting the entry of marine mammals during a high risk period, Lyle *et al*., 2015), rapid descent of the gear to below 50 m, fishing at depths greater than about 100 m, no turns whilst trawling, and rapid retrieval of the net http://frdc.com.au/research/Final_Reports/Gerry%20Geen%20GS%20operational%20aspects%20rev.pdf). In addition the operators are reportedly trialling pingers (Dolphin Dissuasive Device) as a means of deterring dolphins from interacting with the trawls.

In addition to the above conditions designed to reduce the impact of factory trawl operations on protected species, an AFMA imposed trigger of at least one dolphin mortality results in fishing being prohibited from the relevant zone for a minimum of six months. Furthermore, if at least one an ASL is caught (dead or incapacitated in the net), then fishing operations will cease immediately and the entire management zone will be closed subject to AFMA review. Depending on the outcome of the review the zone could remain closed for up to 18 months.

Interactions with protected species can also be 'biological', where there is competition between the protected species and the fishery for prey resources. The most vulnerable species are those that have limited foraging ranges, referred to as central place foragers, and/or populations are declining in size. Limiting or prohibiting fishing activity in critical foraging areas represents a key management strategy that has been adopted in the SPF, with closures around all known Australian Sea Lion (ASL) breeding colonies in WA and SA and the Coorong Dolphin Closure in SA where dolphins are known to feed and aggregate.

A formal evaluation of the effectiveness of the various strategies to reduce interactions with marine mammals in the SPF is not, however, feasible at the present time because there is no capacity to allow for experimentation. Any relaxation or modification of the strategies could result in a mortality event and closure of the fishery.

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