Scientific opinion on matters related to the management and sustainability of the Commonwealth Small Pelagic Fishery

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Small pelagic fish, often called 'forage fish', are low in the food web. In many marine ecosystems they provide a key link in the food web between primary production from the sun and the organisms high in the food chain - such as predatory fish, seabirds and marine mammals – as well as being directly exploited by fisheries. An ecologically sustainable fishery for small pelagic fish must protect the dependent predators and the overall health of the food-web and ecosystem as well as the populations of small pelagic fish. The public insistence and focus on ensuring that Australian fisheries, and small pelagic fisheries in particular, are ecologically sustainable is very welcome. That is what is needed to ensure continued enjoyment of our oceans and seafood for future generations. But along with the genuine concerns and legitimate desire to ensure that this particular fishery is ecologically sustainable there are many misunderstandings, errors and partial truths in the public discussion to date. I hope this summary of the scientific basis for the fishery and its management will help better inform the discussion.

Scientific requirements for sustainable fisheries on small pelagic fish species

Several groups of scientists worldwide have recently examined the effects of fisheries on small pelagic fisheries and how they should be managed so as to avoid undesirable flow-on effects of these fisheries on the food web and ecosystem. There is now clear and widely agreed understanding about how these fisheries should be managed, and this understanding has a very strong scientific basis. The latest and most comprehensive study and guidance comes from the Lenfest Forage Fish Task Force (http://www.oceanconservationscience.org/foragefish/). This was supported by the Lenfest Ocean Program, a US conservation foundation, and brought together 13 eminent marine scientists including world experts in marine science, conservation science (e.g. specialists in penguins, seabirds, marine mammals and marine conservation) and fisheries science. Over 4y they reviewed all the major marine ecosystems and major forage fisheries in the world. They examined where undesirable impacts had occurred in the past and they used both direct observations and modern ecosystem models to identify what was required of fishery management to protect the food web and ecosystem. Their requirements were designed so that, if followed, they would have protected all of the known food webs and ecosystems in the world, including some ecosystems in which there are very high levels of dependency between top predators and a very small number of forage fish species (which is not the Australian situation). Their recommendations in overall were that:

- the fishing mortality is no more than half of the level that is usually considered to maximise the sustainable yield for an individual species;
- the average abundance of the forage fish is more than double the level usually considered to maximise the sustainable yield for an individual species, and

- fishing should be spread out so as to avoid localised depletions, especially in relation to any local ecological 'hotspots' where there is particularly strong local dependency between predators and prey (e.g. in the vicinity of some seabird rookeries).

The Task Force further expanded these requirements to take account of differences in the certainty of scientific understanding available about the quantity and dynamics of the forage fish species and about the food web and ecosystem. They provide rules so that fishery management is more conservative if there is less certainty in the scientific understanding. This more conservative management is necessary to protect the food web and ecosystems from the errors that could be made because of poor scientific understanding about the details of the particular fish species and ecosystem, and again the Task Force selected these rules so that they would be sufficient to protect all of the food webs and ecosystems known.

The recommendations of the Task Force have been widely accepted, including by NGO groups such as Pew Foundation and conservation scientists such as Professor Daniel Pauly who are often very critical of fishery management. The Marine Stewardship Council, the leading international ecolabel for sustainable seafood, has adopted equivalent requirements into its standard. And next week (9-13 July) the peak governance body of the UN Fisheries and Agricultural Organisation will be urged to support the recommendations for fishery management world-wide.

In summary there is a very strong scientific basis and understanding of what is required of fishery management to protect the food-web and broader ecosystem - and dependent fish, bird and marine mammal populations in particular – when conducting a fishery that targets the forage fish in that ecosystem. These requirements are made more stringent and conservative in situations where there is more scientific uncertainty about the forage fish or the food web.

How do the management of the Commonwealth Small Pelagic Fishery compare with these scientific requirements?

The key scientific requirements identified by the Lenfest Task Force, and other scientific groups, for an ecologically sustainable fishery on forage fish species have already been adopted in this fishery. Specifically:

- The method of determining the catch limit for the fishery is more conservative than the Lenfest Task Force scientific requirements for an ecologically sustainable fishery on forage fish.
- The fishing mortality is considerably lower than the scientific requirements for an ecologically sustainable fishery on forage fish.
- The reduction in forage fish biomass caused by the fishery will be much less than the scientific requirements for an ecologically sustainable fishery on forage fish.
- There is broad spatial zoning of the catches to ensure that the catches are spread out on that scale, and there are mechanisms that the management agency can use (and has used in other fisheries) to protect against localised depletion at finer space scales.
- By-catch excluder devices for marine mammals will be used, and there are mechanisms that the management agency can use (and has used in other fisheries) to address any seabird interactions if they arise.

The food web and predator dependencies in this marine ecosystem have been the subject of a considerable number of studies by CSIRO and University of Tasmania, and the scientific knowledge of these matches the 'middle category' of understanding and reliability identified by the Lenfest Task Force. Similarly the scientific understanding and assessment of the forage fish stocks (i.e. jack mackerel, redbait etc.) matches the middle category of understanding and reliability identified by the Lenfest Task Force. This uncertainty is acknowledged in the methods for determining the catch limit for the fishery and additional precaution is built into the catch limit decision. The extent of this additional precaution is greater than that identified by the Lenfest Task Force for the middle category of scientific certainty as being required for an ecologically sustainable fishery on forage fish.

There has been specific and extensive modelling of this marine ecosystem by CSIRO using a model that is recognised internationally as 'state of the art'. This, along with the direct ecological studies of the food web, show that this ecosystem has a diverse range of species and food-web pathways between the primary production from the sun and the organisms high in the food chain. There are a diverse range of fish and other species that form the base of the food web, and none is overwhelmingly dominant. There are clearly food web dependencies in this ecosystem but they are not as strong or as easily disrupted as for some other marine ecosystems world-wide. Consequently the Lenfest Task Force requirements, designed to be safe world-wide, are particularly safe when applied to this ecosystem.

In addition to the controls on catch the scientific requirements for an ecologically sustainable fishery on forage fish species also specify that the management measures are reliably implemented and that monitoring adequately supports ongoing management decision making. For this fishery monitoring and enforcement includes the use of on-board observers and satellite monitoring of the vessel. By-catch will be monitored, and while this type of fishing is not expected to result in large amounts of by-catch all species will be subject to an ecological risk assessment and risk management program.

Other matters that have been raised or are relevant

<u>The state of the forage fish stocks and past fishing.</u>
The forage fish species are not overfished. This is determined independently by the Australian Bureau of Agricultural and Resource Economics and Sciences.

The jack mackerel do not surface school as they used to several decades ago. The scientific literature shows that this (and some related changes in the abundance and behaviour of redbait) is due to changes in the plankton that accompanied the about 2 degree Centigrade increase in average seawater off eastern Tasmania in the past about 40y – and most directly to the reduced frequency of surface schools of a temperate krill species which is a common prey for jack mackerel. This change in jack mackerel behaviour is not scientifically interpreted as being due to overfishing at any point in the history of the fishery.

The arrangements and management requirements for the current fishery are very different now compared to what was in place some decades ago. The jurisdictional arrangements are now much clearer and the management requirements are much more stringent.

Subsidies

There are no subsidies in Australian Commonwealth managed fisheries, including this fishery. Quite the opposite – management costs are recovered from the fishery in accordance with Government policy.

Human consumption vs fish meal

Worldwide there is recognition that more human food is produced if the catch is used for direct human consumption rather than for production of fish meal (mostly used in agriculture and aquaculture production with a considerable loss in the quantity of human food produced). The use of at-sea factory processing is what gives the improved product quality to allow direct human consumption of the catch in this fishery; this at-sea processing ability is what requires a large vessel and allows the catch to be spread over a larger area than would be possible using smaller vessels with restricted range from port and processing facilities. The change from fish meal production to direct human consumption of the catch is a significant improvement in the economic value and human consumption value of any catch. This change is generally favoured world-wide.

Experience with similar Australian fisheries

The sardine fishery off the southern coast of Australia, mainly operating from South Australia, has operated for over 10y. It has applied a method of determining and managing the catch that is similarly conservative to the approach used in this Commonwealth managed Small Pelagic Fishery. Ongoing research and monitoring by SARDI has found no adverse food-web impacts on top predators. The region of the fishery is also a 'hot spot' for the Southern Bluefin Tuna (SBT) but commercial and recreational SBT catch rates have increased in the region and the tuna continues its recovery from international overfishing.

Conclusion

I have no doubt that this fishery is an example of world's best practice and it meets or exceeds the most rigorous scientific requirements for an ecologically sustainable fishery on forage fish. These requirements are designed to be ecologically safe, especially in relation to dependent predators in the food web, for all the known food webs in the world. This includes food webs that are much more fragile than those in SE Australia and so these scientific requirements provide additional precaution when applied here. Ecological consequences from large to medium space-scale depletion is not likely because of the diverse forage base in this ecosystem, the mobility of both the predators and prey in this ecosystem, the spatial zoning of catches, and the experience world-wide with harvest rates as low as those being applied here. However the possibility of some effect at some very local scale cannot be totally excluded and requires monitoring. It is critical that the regulations and monitoring be implemented as intended, and implementation should be scrutinised to ensure this.