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Review of best practice mitigation for endangered, threatened and protected species bycatch

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Introduction

Incidental mortality, or bycatch, in fisheries has been demonstrated to be a serious threat to a range of endangered, threatened and protected (ETP) species (Alverson et al. 1996). The need to implement measures to reduce the bycatch of a wide range of ETP species is recognised in the resolution on sustainable fisheries of the Oceans and the Law of the Sea in the General Assembly of the United Nations (Resolution Resolution A/RES/67/79), and a range of relevant fisheries management technical guidelines and international plans of action have been developed by the Food and Agriculture Organization of the United Nations.

In the context of the SPRFMO area, ETP species include seabirds, marine mammals and reptiles. A number of fish species may also be considered in this definition, for example the elasmobranch species listed by the Convention on the Conservation of Migratory Species of Wild Animals (also known as CMS or Bonn Convention)[1] and the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)[2]. This definition excludes endangered, threatened or protected invertebrate species.

A number of ETP taxa are distributed across the SPRFMO area. Baird et al (2012) investigated the potential impact of fishing activity in the SPRFMO area to seabirds. As few data were available on bycatch, the study used spatial distribution information for 22 seabird species and fishing effort data in the SPRFMO area to identify the fisheries with the greatest overlap. This study showed that seabird spatial distribution does overlap with various SPRFMO fisheries, illustrating a potential risk for bycatch, although the temporal component of both seabird and fishing effort distribution were not considered.

There is little information on the extent or risk of incidental catch of other ETP species in SPRFMO fisheries, except that reported by scientific observers from bottom fishing vessels.

This paper reviews mitigation options for pelagic and demersal fishing methods relevant to SPRFMO fisheries, with a focus on trawl, demersal longline and purse

[1] Currently three elasmobranch species are listed on Appendix I (*Cetorhinus maximus*, *Carcharodon carcharias* and *Manta birostris*), with additional species listed on Appendix II.
[2] Currently three elasmobranch species are listed on Appendix II (*Cetorhinus maximus, Carcharodon carcharias and Rhincodon typus*), with the listing of a number of further species coming into effect in 2014.

seine methods, as these methods have been subject to the most extensive mitigation research.

Mitigation options

Seabirds

There is a wealth of scientific literature and information on practices to mitigate the bycatch of seabirds in trawl and longline fisheries. The Agreement on the Conservation of Albatrosses and Petrels (ACAP) is the lead international body on fisheries interactions with seabirds. The development of effective, safe and practical mitigation is a field of continuing improvement, and ACAP provides regularly updated reviews and summary advice on best practice mitigation for these fisheries. The most recent review was made at the Fifth Meeting of the Seabird Bycatch Working Group, La Rochelle, France, 1-3 May 2013. The research presented at this meeting reinforced the existing best practice mitigation for trawl and demersal longline fisheries, providing stability of advice, with the addition of some further detailed specifications.

The summary documents produced by ACAP (ACAP 2013a, b) provide internationally accepted best practice mitigation advice for reducing the impacts of these fisheries on seabirds, and are intended for widespread use.

Demersal longline fisheries: based on ACAP advice, the most effective measures to reduce incidental take of seabirds in demersal longline fisheries are:

- use of an appropriate line weighting regime to maximise hook sink rates close to the vessel to reduce the availability of baits to seabirds (this could also be achieved by stipulating a minimum sink rate).
- actively deter birds from baited hooks by means of bird scaring lines, and
- set fishing gear during night-time.

Further measures include:

- bird deterrent curtains at the hauling bay.
- responsible offal management
- avoidance of peak areas and periods of seabird foraging activity.

Pelagic and demersal trawl fisheries: ACAP advice recommends a number of measures to mitigate mortalities.

Offal and discard management:

- avoid any discharge of offal or discards during shooting and hauling;
- were possible and appropriate, convert offal into fish meal and retain all waste material with any discharge restricted to liquid discharge / sump water to reduce the number of birds attracted to vessels to a minimum; and
- where meal production from offal and full retention are not feasible, batching waste (preferably for two hours or longer) has been shown to reduce seabird attendance at the stern of the vessel. Mincing of waste has also been shown to reduce the attendance of large albatross species.

Cable (warp and third wire) strike:

- deploy bird scaring lines while fishing to deter birds away from warp cables and net monitoring cable.
- install a snatch block (Melvin et al. 2010) at the stern of a vessel to draw the net monitoring cable close to the water to reduce its aerial extent.

Net entanglement:

- clean nets after every shot to remove entangled fish ("stickers") and benthic material to discourage bird attendance during gear shooting;
- minimise the time the net is on the water surface during hauling through proper maintenance of winches and good deck practices; and
- for pelagic trawl gear, apply net binding to large meshes in the wings (120–800 mm), together with a minimum of 400-kg weight incorporated into the net belly prior to setting.

For both trawl and demersal longline methods, the ACAP reviews contain detailed suggestions on minimum standards, caveats and implementation monitoring.

Marine Mammals

Purse seine fisheries: there is an extensive literature relating to the incidental catch of dolphins by purse seine fisheries targeting tuna (Perrin 2004). Less information is available on dolphin bycatch and mitigation options in purse seine fisheries targeting other fish stocks, although high rates of dolphin captures were observed in a sardine purse seine fishery, leading to the development of measurement, management and mitigation options (Hamer et al 2007). Mitigation options for purse seine primarily rely on early detection and avoidance of dolphins before the set. As a secondary measure, fishers can employ techniques or net modifications that allow safe and rapid release of dolphins once the net has been set.

Trawl fisheries: pinniped bycatch in trawl fisheries has lead to the development of exclusion devices and operating procedures to mitigate bycatch (e.g. Cleal et al 2007, Lyle & Wilcox 2008). In a SPRFMO area context however, most pinniped distribution is likely to be within the exclusive economic zones of relevant range states for these taxa.

Turtles

The Food and Agriculture Organisation (FAO, 2009) have reviewed information on incidental turtle capture and mitigation options.

Purse seine fisheries: turtles are known to be captured in purse seine fisheries targeting tuna in the Pacific Ocean, particularly when using fish-aggregating devices (FADs). Therefore, purse seine fisheries for other target species where FADs are not used may pose less risk (though this is not the case for some other taxa, such as manta rays: Jones & Francis 2012).

Demersal longline fisheries: information on bycatch in demersal longline fisheries is sparse. Bycatch mitigation options have been developed for pelagic longline fisheries and some of these may also be suitable for demersal longline fisheries where there is risk of bycatch (e.g. using wider circle shaped hooks with fish bait instead of narrow J hooks with squid bait), though further research may be required (FAO, 2009). More information is required to assess whether demersal longline fisheries pose risks to turtles.

Pelagic and demersal trawl fisheries: coastal trawl fisheries pose a recognised risk to turtles, and mitigation options have been developed (FAO, 2009), but these may have limited relevance to SPRFMO trawl fisheries due to the difference in vessel size and operations, and limited spatial overlap of the fisheries with turtle distribution. This area would benefit from further research.

Elasmobranchs

Purse seine fisheries: Bycatch mitigation options for Mobulidae rays in tuna purse seine fisheries were reviewed by Jones & Francis (2012), with some recent mitigation options for these species having been developed (Poisson et al 2012). Mitigation options have not been described for purse seine fisheries targeting other fish stocks.

Pelagic and demersal trawl fisheries: no mitigation options are readily available for trawl fisheries, though this is an area of planned investigation (Department of Conservation 2013).

Mitigation resources

A range of fact sheet resources have been developed by Birdlife International in association with ACAP (Birdlife International 2012). These are designed to help decision-makers, both at the management level as well as onboard fishing vessels, choose the most appropriate seabird bycatch mitigation measures for their longline and trawl fisheries. These resources are available on the ACAP website in English, Portuguese, Spanish, French, and Mandarin.

The Western & Central Pacific Fisheries Commission Bycatch Mitigation Information System (BMIS; http://bmis.wcpfc.int/) has been developed to manage and facilitate access to information covering bycatch and bycatch mitigation in the western and central Pacific Ocean. A number of mitigation strategies relevant to WCPFC fisheries would also be relevant to some SPRFMO fisheries. This resource is publicly available and kept up to date.

To assist with accurate identification of ETP species, species identification guides are also available for most groups of ETP species in a number of languages including English, Korean and Spanish. For example, a sea bird identification guide is being developed by ACAP and the Japanese National Research Institute of Far Seas Fisheries (Beck & Inoue, 2013).

Other RFMOs

All five tuna commissions have established seabird bycatch mitigation requirements for longline vessels in most areas overlapping with albatross and petrel distribution, although with some variation in the required mitigation measures. All tuna RFMO seabird bycatch measures have provisions for review of the effectiveness of these measures.

An intersessional group was established at the last meeting of the ACAP Seabird Bycatch Working Group with the aim of identifying minimum elements to review the effectiveness of seabird bycatch mitigation regulations in tuna RFMOs, and to seek harmonisation in data collection and reporting. Preliminary recommendations were presented to the CCSBT ERSWG meeting in August 2013, and included a recommendation for:

- assessment of whether the current tuna RFMO bycatch measures reflect best practice (bycatch mitigation requirements and their technical specifications)

- assessment of the spatial and temporal application of the bycatch mitigation requirements
- assessment of the range of vessels to which the bycatch mitigation requirements applies

A similar process would also be equally appropriate for SPRFMO fisheries where seabird bycatch mitigation is applied.

Conclusion

A range of seabird species are known to spatially overlap SPRFMO fisheries, and are at risk of incidental capture. There is internationally recognised seabird bycatch mitigation best practice tailored to both trawl and demersal longline fishing methods. Adequate information and supporting resources exist to support the implementation of these mitigation options in SPRFMO trawl and demersal longline fisheries. Therefore we make the following recommendations:

Recommendation 1: the Science Committee recognise that best practice seabird mitigation for demersal longline and trawl fisheries has been developed by working groups of the Agreement on the Conservation of Albatrosses and Petrels, and that a range of resources exist to support the implementation of these bycatch measures.

Recommendation 2: the Science Committee recommend to the Commission that a Conservation Management Measure to mitigate seabird bycatch in SPRFMO demersal longline and trawl fisheries be developed with reference to best practice mitigation.

For other ETP taxa (i.e. marine mammals, reptiles, turtles and certain elasmobranchs) and seabird bycatch in purse seine fisheries, internationally recognised and widely applied mitigation devices or strategies are not so readily available. Mitigation strategies for these taxa are more often developed on a case by case basis based on known bycatch issues. The level of risk posed by SPRFMO fisheries in these cases is also less clear. In the context of SPRFMO, collecting adequate information to identify any such bycatch issues is important.

Recommendation 3: the Science Committee agrees that in order to better understand any potential bycatch of non-seabird taxa in SPRFMO fisheries, and seabird bycatch in SPRFMO purse seine fisheries, further robust ETP species data collection and reporting is necessary.

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