Agreement on the Conservation of Albatrosses and Petrels

Fifth Meeting of Advisory Committee
Mar del Plata, Argentina, 13 – 17 April 2010

Title: Report of the Third Meeting of the Seabird Bycatch Working Group, Mar del Plata, Argentina, 8-9 April 2010

Author: Seabird Bycatch Working Group

1. PURPOSE

This paper reports on discussions and recommendations of the Third Meeting of the Seabird Bycatch Working Group (SBWG), together with progress achieved in implementing the Working Group's Work Programme.

2. INTRODUCTION, WELCOME, MEMBERSHIP AND APOLOGIES

The SBWG Convenor, Barry Baker, welcomed all working group members and observers (Annex 1). Apologies were noted from Elisa Goya (Peru), Ed Melvin (USA), Kim Rivera (USA), Rob Crawford (South Africa) and Cleo Small (BirdLife International).

The Chair noted that there were a large number of observers present, and invited all attendees to contribute fully to the meeting. He also noted that the Agenda (Annex 2) had been determined prior to the meeting and no new items would be able to be considered. Those scheduled to lead on agenda items agreed to provide a written report on those items, with contributory text being drafted by participants who made presentations, as well as by several others.

3. MEMBERSHIP

Current membership of the SBWG is listed in Annex 1. It should be noted that not all Parties are officially represented on the Working Group. Nominations of working group members by Brazil, Chile, Ecuador, France, New Zealand (nomination pending following departure of Johanna Pierre), Norway and further interested Range States would be very welcome.

4. MITIGATION RESEARCH UPDATES

Agenda Item 1 focused on information sharing and included presentations highlighting initiatives specific to seabird conservation in longline and trawl fisheries. Workshop participants and invitees provided brief summaries of their presentations, which are included below. These include updates on progress in the development of hook pods and the underwater setting capsule for the pelagic longline gear, and reports on research on bird scaring lines and line weighting. The Working Group greeted with acclamation news of the finalisation of Argentina's NPOA-Seabirds.

Update on underwater setting capsule (Graham Robertson)

SBWG-3 Doc 06 provided an update on the research and development of the underwater bait setting capsule for pelagic longline fisheries. The device is being developed in Australia by Amerro Engineering and the Australian Antarctic Division in collaboration with the fishing industry. Underwater setting has the potential to greatly reduce, or eliminate, seabird mortality. In late 2009 a MK1 version of the underwater setter was successfully tested in production fishing operations in the Australian tuna fishery. In 2010 a "proof of concept" experiment will be conducted in Uruguay in collaboration with Direccion Nacional de Recursos Acuaticos (DINARA) and the Uruguayan fishing industry. The experiment will compare the seabird deterrent capability of underwater setting with seabird mortality associated with the conventional method of setting baited hooks at the surface. That experiment is scheduled to take place between July and September 2010.

Update on Japanese collaboration on tori lines for pelagic longline (Nicole le Boeuf, on behalf of Ed Melvin)

Information on a rigorous experimental trial of light-weight streamers conducted in the South African pelagic longline fishery was provided to the Working Group (SBWG-3 Doc 13 Rev1). The study was conducted aboard two Japanese tuna longliners under worst case scenario conditions when seabirds would be most abundant and most aggressive. The study compared the performance of a light streamer line (all short streamers) with that of a "hybrid" design which contained both short and long streamers. The experiment also compared hook sink rates. Key findings reaffirmed that night setting can be effective at reducing seabird interactions with longline fisheries and that primary attacks by diving birds, such as white-chinned petrels, can facilitate bycatch of albatrosses beyond the aerial extent of the tori lines. There was no statistical difference between attack rates between the two bird scaring line streamer designs, although the hybrid design pushed the mean distance of attacks further astern for both diving and surface feeding birds. In conclusion, the study found that in a white-chinned petrel dominated system, the use of either streamer line design was important for deterring birds within 100 metres of the vessel, but beyond that distance effective branchline weighting was necessary to ensure baits sink to a depth beyond the reach of birds.

Nicole LeBoeuf reported that Ed Melvin of Washington Sea Grant has made significant progress with the Government of Japan and within the Japanese fishing industry in furthering rigorous, experimental research on different styles of tori lines. He recently met with Japanese officials in their fisheries agency regarding the results of his study, and they have asked for his experimental design to trial in an effort to replicate his results in South Africa, but also possibly in Japanese coastal fisheries. He would like to continue his work in South African waters and is seeking final approvals from South African fishing interests and other key players.

Bait pod and safe leads for pelagic fishing (Ben Sullivan)

BirdLife International reported good progress from recent ACAP funded at-sea trials conducted in Australia to test the operational effectiveness of the hook pod (formerly named the bait pod) for pelagic longline fisheries. Fishtek (UK) is undertaking further onshore development with more extensive at-sea trials planned for Brazil in the second half of 2010.

BirdLife International updated the WG on successful at-sea and on-shore trials to further quantify the effectiveness of Safe Leads. Safe Leads have been demonstrated to be an effective and safe alternative to traditional weighted swivels and are starting to gain good acceptance from industry.

Overview of Albatross Task Force mitigation research programme (Oli Yates/ Esteban Frere)

A summary of seven mitigation research projects that BirdLife International's Albatross Task Force (ATF) carried out in 2009 was presented (SBWG-3 Doc 12). A description of team objectives, mitigation measure developments and provisional results was provided for projects that were set up to investigate:

— Bird Scaring Line (BSL) design, and target species catch rates related to line weighting regimes, for pelagic longline fisheries (ATF teams in Brazil / Chile / South Africa / Uruguay); and

— BSL design for demersal trawl fisheries (ATF teams in Argentina / South Africa / Namibia).

More detailed discussions of the results of the ATF work was conducted under Agenda Items 2 and 3. The Working Group thanked the ATF for the significant advances made in mitigation research in 2009, and looked forward to further progress reports at SBWG 4.

BirdLife reported on the proposed mitigation research programme for the ATF in 2010 (SBWG 3-Doc 11), and the WG noted that their on-going research to further understand the relationship between line weighting and tori line performance bird scaring lines would make an important contribution to refining best practice advise developed by SBWG.

Observations on seabird bycatch on Japanese tuna longliners operating in the Uruguayan EEZ (Andres Domingo)

During the year 2009 an exploratory fishery for the big-eye tuna (*Thunnus obesus*) commenced within the Economic Exclusive Zone of Uruguay by a Japanese company. Observers from DINARA covered 100% of the fishing effort, thereby gathering overall data related to seabird mortality. Bird bycatch in the fishery was high. Vessels used standard Japanese bird scaring lines during their first fishing trips but subsequently used Uruguayan style BSLs (see SBWG-3 DOC 12; pp. 23). Changing BSLs resulted in a 50% reduction in seabird bycatch.

Progress in seabird bycatch assessment and mitigation in Argentinean fisheries (Corina Lehmann and Marco Favero)

Argentina provided an update on the progress achieved regarding seabird bycatch assessment in longline and trawl fisheries, the recent adoption of a binding national measure for the use of mitigation devices in bottom longline fisheries, and the development of a National Plan of Action-Seabirds for Argentina, which is expected to be formally adopted by the Government in the near future (SBWG-3 Doc 32). Argentina has also commenced a process to monitor and oversee the future implementation of the NPOA-S.

International Seabird Mitigation Expert Panel (Rebecca Bird)

Southern Seabird Solutions (SSS) is establishing an International Expert Panel to provide feedback and advice to inventors on their mitigation ideas. The panel will provide guidance on the potential of mitigation ideas, the development and testing phases that will be needed, advice on potential collaborators or funders, and other ongoing support. Panel members are currently being sought, with invitations being extended to experts in the fields of fishing techniques, strategies, seabird behaviour and mitigation research. A web based, step-by-step guide has already been developed, and a number of SBWG members have generously contributed to this (Graham Robertson, Barry Baker, Ed Melvin).

5. PELAGIC LONGLINE BYCATCH MITIGATION

Review of current mitigation for pelagic longline gear

A major product of previous SBWG meetings has been a review of information on current mitigation research for pelagic long-line fisheries and the identification of knowledge gaps (AC3 Doc 14 Rev 4, Appendix 4, Table 2; AC4 Doc 14 Rev 4, Annex 5). The advice embodied in the table has been distributed to some of the tuna RFMOs, where it has been well received.

At this year's meeting the Working Group reviewed and updated the information in this table, following presentation of a number of papers which dealt comprehensively with design of Bird Scaring Lines, and the impact on line sink rates of line shooters, bait life-status, placement and amount of weight in relation to the hook, and bait thaw status (SBWG-3 Doc 5, 7, 8, 11, 12, 13 Rev1 and 31). The results of this review are attached as Annex 3. As before, it is recommended that the Advisory Committee endorse this advice and encourage Parties to use this information to guide the development of policy and practice within the fisheries under their jurisdiction.

These papers highlighted a number of issues relevant to mitigation of seabird bycatch in pelagic longline fisheries and provided, for the first time, information on the effectiveness of mitigation measures that have been advocated for many years, without appropriate empirical evidence. This information is summarised below:

— *Bird Scaring Lines*, of either conventional or 'light' design, and used in either single or double configuration, are inadequate for reducing seabird bycatch when used without other mitigation measures. To be effective they must be used with branchline weighting and/or night setting.

— *Weighting regime and sink rates.* Adding weight to lines to expedite gear sink rates is the most effective method of reducing seabird mortality in longline fisheries. The influence of line weighting on seabird mortality is only partially understood. Research on line weighting is still in progress and head-to-head comparisons of the effectiveness of line weighting regimes (and associated sink rates) as seabird deterrent are encouraged, together with further studies on the economics of fishing under prescribed weighting regimes.

  When considering sink rates to target depths it is necessary to recognise the importance of the "initial" (e.g., 0-2 m) and "final" (e.g., 4-6 m, or thereabouts) sink rates. A fast initial sink rate reduces visual cues in the critical shallow depths and a fast final rate maximizes the rate at which baited hooks sink deeper in the water column. Both considerations are likely to be important to seabirds that seize baits at or near the surface (e.g., albatrosses) and seabirds that hunt deeper in the water column (e.g., Procellaria spp. petrels and Puffinus spp. shearwaters).

  In general, the closer the weight is to the hook the faster the initial sink rate. Additionally, the heavier the weight the faster the final sink rate. Thus, a heavy weight placed close to the hook will best reduce seabird by-catch. The initial sink rate varies mainly as a function of branch line leader length When a baited hook lands in the water the bait sinks very slowly while the swivel free falls in the water column. Once the slack in the leader length is taken up and the load of the weighted swivel acts upon the baited hook, the 'final stage' of the sink profile commences. This is where heavier swivels become more important. Weighted swivels placed at or close (e.g. < 1 m) to the hook eliminate the lag in the initial sink profile attendant with long leaders. This reduces the availability of baits at the surface, which is highly desirable.

— *Best practice line weighting* will maximize sink rates at the surface without overly compromising sink rates in the second stage of the sink profile (which would be the case if light swivels were used close to hooks). The 60-75 g swivels ± 4 m from hooks commonly preferred by industry are unlikely to deter seabirds (used with an effective streamer line) in all circumstances. 120 g ≤ 2 m from hooks should be the next step in comparative research. The alternative approach is to use smaller amounts of weight (e.g., 40 g) located at the hook.

— *Mainline tension and line shooters*. Mainlines should be set in the 'surface set tight' configuration. Baited hooks connected to mainline set tight sink faster in surface waters than hooks attached to mainline set loose, as in deep setting. Mainline can be set tight either off the drum holding the mainline or with a line shooter. Enough gear should be set at the start of lines to prevent hooks dragging towards the vessel and being pulled up the water column where they are more accessible to seabirds.

— *Bait life status.* Avoid the use of live bait. Use dead bait only. Many individual live baits remain near the water surface for lengthy periods after deployment. The use of live bait increases the likelihood that seabirds will be caught.

— *Bait species and size.* Use small species of fish bait (and small individuals) in preference to squid bait. Common fish baits are pilchards, sardines and various species of mackerel (Japanese, blue, yellow-tail). The difference in sink rates between large and small fish baits of the same species is minor. The important point is that larger squid bait sinks considerably slower than small fish bait.

— *Bait thaw status.* Baits need only be thawed to the 'fisherman's thawed' state (i.e., to the point where individual baits can be separated from others in blocks of bait and hooks can be inserted by hand without undue effort). Bait thaw status has either no effect on sink rates (gear with leaded swivels) or an effect that is very minor (gear without leaded swivels). In practical terms the thaw status of baits has no effect on the sink rate of baited hooks.

— *Bait hooking position.* To ensure fast sink rates, hook baits in either the head (fish) or tail (fish and squid), not in the middle of the back or top of the mantle (squid).

The Working Group acknowledged that, as the phrase implies, best practice reflects the state of knowledge at any given time and is subject to periodic revision. The information above deals only with methods to mitigate seabird bycatch and does not take into account existing preferences by industry. Some of the measures proposed above will require changes to current fishing practices, such as the line weighting regimes needed to deter diving species of seabirds.

Taking into account the amount of information provided in the review table, and the need to provide clear advice to fisheries managers, the SBWG recommends that best practice advice be synthesised into an advice statement that can be readily transmitted to target audiences (RFMOs and Party's fisheries managers). This approach should be taken for all gear types for which ACAP has developed advice. The relevant statement for pelagic longline gear is provided at Annex 4.

6. TRAWL BYCATCH MITIGATION

Papers presented

The WG welcomed recent improvements identified by the Albatross Task Force in Argentina and South Africa in the use of a specifically designed towed device to improve the performance of streamer lines to reduce warp cable strikes in trawl fisheries (SBWG Docs 11 and 12) and noted that this research would be on-going in Argentina in 2010. This will include the refinement of the specifications and operation of the towed device with the objective of finalising a model that can be implemented in target trawl fisheries.

Further data on the effectiveness of streamer lines in reducing both warp cable and third wire (net-sonde) cables were highlighted in the pollock trawl fishery in the Bering Sea (SBWG Doc 14 Rev1). This study was also the first quantification of seabird cable strikes in a Northern Hemisphere pelagic trawl fishery. This study concludes that the third wire used by trawl vessels is valuable to fishing operations and that interaction with this cable and birds can be mitigated for through the use of tori lines. Although birds were attracted in greater numbers to a vessel that was mincing its offal before discharge than another vessel mealing[1] offal, the greater aerial extent of vessel cables was an overriding factor in the higher number of bird strikes observed at the mealing vessel. The study also demonstrated that pulling the third wire closer to the water's surface via a snatch block can reduce bird strikes, although not as effectively as the

[1] Mealing - the conversion of waste into fish meal waste reducing discharge to stick or sump water only.

use of tori lines. Warp booms (or a bird baffler) with streamers designed to divert seabirds away from the warp cables did not prove effective in reducing warp strikes.

The WG reaffirmed that the long term solution to reducing seabird bycatch in trawl fisheries is related to the management of offal discharge, and welcomed the planned discharge management research project to be conducted by the South African ATF team in 2010.

Review of current mitigation for trawl gear

The Working Group reviewed mitigation measures available for both demersal and pelagic trawl gear, based on published literature and expert opinion. The results of this review are attached as Annex 5. Recommended mitigation approaches have been extracted from the review and incorporated into a best practice advice statement for trawl gear (Annex 6). It is recommended that the Advisory Committee endorse this advice and encourage Parties to use this information to guide the development of policy and practice within trawl fisheries under their jurisdiction.

Research priorities

Based on discussions and the review of mitigation, the SBWG confirmed the following four research areas still remain the highest priority for reducing seabird bycatch in trawl fisheries:

(1) offal discharge management, (e.g. meal plant, batching, discharge in areas not adjacent to warp cables) recognising the differences between small and larger vessels may require different approaches;

(2) methods to reduce seabird entanglements during hauling;

(3) improving the performance of streamer lines (e.g. towed devices that perform better in cross winds, flexibility in attachment point to account for wind variation); and

(4) the effectiveness of net binding and net weighting.

The SBWG requested the AC to encourage Parties and others to prioritise these areas of research and to keep the SBWG informed of developments in this area.

7. DEMERSAL LONGLINE BYCATCH MITIGATION

The Working Group reviewed information on current mitigation measures for demersal long-line fisheries and updated the information in the table presented at AC4 (AC4 Doc 14 Rev 4, Annex 3). The results of this review are attached as Annex 7, and a best practice advice statement for demersal longline gear developed during the meeting of the WG is attached as Annex 8. It is recommended that the Advisory Committee endorse this advice and encourage Parties to use this information to guide the development of policy and practice within demersal longline fisheries under their jurisdiction.

8. BYCATCH DATA PROVISION BY PARTIES, WITH RESPECT TO ACAP REPORTING AND ACAP INDICATORS

Collection of data from Parties

The Working Group assessed intersessional progress on developing a bycatch data reporting system (AC5 Inf 10). The paper noted that the metadata survey on bycatch data collection had been completed successfully and that two Parties had provided a full set of trial data for analysis,

as requested. A third Party, New Zealand, would shortly do so. Based on currently available information, the Working Group was advised that it was practical to collect bycatch data from all Parties in a consistent manner. Some members of the Working Group supported this view, noting that they would also be able to provide data from their Party in the required fashion; others were unconvinced. However, representatives from all Parties were not present.

It was also noted that there was currently a great deal of uncertainty over whether or not the stated aims of the data collection exercise – namely to provide an estimate of the levels and trends of mortalities of ACAP listed species of albatrosses and petrels – could be met, as a methodology for analysing the data had not yet been developed. The Advisory Committee should be cognisant of these potential obstacles when determining whether to proceed with detailed data collection within country reports at this stage.

When observer coverage is low or not representative, extrapolations are potentially inaccurate and misleading. Work by CCAMLR has suggested that the level of observer coverage needed to accurately estimate bycatch levels in longline fisheries is 20% of all hooks set. Based on this recommendation and the levels of observer coverage identified by the metadata survey, the WG noted that it will not be possible to develop robust bycatch estimates for all fisheries from analysis of the data to be provided.

Revised National Reporting Template

AC5 Doc 16 provided a draft revised template for national reporting by ACAP Parties. The Working Group noted its format and contents had been developed in accordance with the guidance of MoP3. The SBWG noted that some parts of the draft template would be revised to include the results of the two ad hoc, intersessional working groups currently developing the prioritisation framework and the format for national seabird bycatch reporting.

The SBWG reviewed those parts of the template and the suggested basic performance indicators that were relevant to its Terms of Reference. The SBWG discussed the desirability of seeking information from Parties about tracking or other data on seabird distribution and what type of data and questions would be most appropriate. It concluded that an annual update from Parties to identify recent distribution data was desirable and could, for example, comprise asking Parties to provide the data owner's name, the species involved, and the data collection period. This issue needed to be reviewed at the next SBWG meeting following completion by parties of the new template.

The SBWG endorsed the format and content of those sections of the revised template relevant to its responsibilities; performance indicators were separately discussed under agenda item 13 (see Section 16).

9. COORDINATION OF ACTIVITIES RELATING TO RFMOs & OTHER RELEVANT INTERNATIONAL ORGANISATIONS

Reports from ACAP observers at recent meetings

A number of reports from ACAP observers at recent international meetings were provided to SBWG members for consideration intersessionally (SBWG-3 Doc 22, 23, 24, 25, 26, and 27). These reports were not discussed in detail at the meeting, but members were given the opportunity to seek clarification on any matters contained within these reports. No matters were raised.

Review of RFMO Coordination and Planning for next 12 months

The Working Group reviewed the draft RFMO engagement strategy adopted at AC4 (SBWG-2 Doc 14 / AC4 Doc 56). It was noted that the RFMO engagement strategy has proven to be effective overall; however, there are two areas that need to be addressed. The first is a capacity issue, and in particular the work-load for the RFMO Coordinators and the amount of time required to undertake this role effectively. The second is the need to improve the transfer of information to ACAP Parties' representatives within fisheries meetings, to ensure they understand and are supportive of the messages and positions being put forward by ACAP.

The WG recommended that funding of $30K continue to be provided annually for travel costs associated with attending RFMO meetings and that consideration be given to providing additional funding for the Technical Officer position within the Secretariat to improve liaison with ACAP Parties on RFMO issues.

The WG also encouraged ACAP Parties to improve the participation of their fisheries management agencies in ACAP meetings/work so they have a better appreciation of the outcomes being sought at RFMO meetings to further the conservation of albatrosses and petrels.

The Working Group further recommended that the Advisory Committee give a high priority to the completion of products to be used in RFMO meetings, such as RFMO specific engagement strategies, risk assessment recommendations and observer programme protocols.

In regard to action to be taken within specific RFMOs and other international organisations over the next year, and recognising the need to take account of how the Kobe 2 Bycatch Workshop outputs affects work within tuna RFMOs to manage bycatch, the WG recommended that the following priorities be:

RFMO/ OTHER ORGANISATION		**Action**
WCPFC	1	Encourage development of the ecological risk assessment approach;
	2	Development of an independent observer programme;
	3	Compilation of data on the effectiveness of mitigation measures being used in the WCPFC
	4	Review effectiveness of mitigation measures being used in WCPFC and amend CMM 2007-04, if appropriate
IOTC	1	Assist in development of a seabird ecological risk assessment;
	2	Review effectiveness of mitigation measures being used in IOTC and amend Resolution 10-06, if appropriate;
CCSBT	1	Lower priority – ERSWG unlikely to meet until 2012
	2	Provide ongoing advice to assist in revision of CCSBT seabird pamphlet;
IATTC	1	Refine and ensure adoption of a conservation measure
	2	Improve communication between ACAP Parties to ensure consistent positions are put forward to IATTC meetings.
	3	Draft MOU between ACAP and IATTC

ICCAT	1	Assist in adoption of a seabird conservation measure based on results of the existing ecological risk assessment
Joint meetings of Tuna Management Organisations		
	1	Attend Kobe 2 Bycatch Workshop, Brisbane, Australia, 2010
	2	Review seabird background paper developed by Experts Drafting Group
	3	Prepare ACAP position paper for consideration by K2B workshop.
CCAMLR	1	No action planned – IMAF not meeting until 2011, and seabird bycatch reduced substantially in most fisheries.
	2	Discuss with CCAMLR Secretariat transfer of responsibility for aspects of IMAF work to ACAP

The Working Group recommended that ACAP continue to prioritise the meetings of RFMO and other international organisations it will attend on the basis of the likelihood of being able to progress the Agreement's agenda within the meeting/RFMO and targeting those RFMOs whose fishing effort overlaps the greatest number of at-risk populations/species.

Kobe 2 Bycatch Workshop

Nicole LeBoeuf reaffirmed that the United States was co-hosting the upcoming meeting of the five tuna RFMOs to discuss the issue of bycatch, which is to be held 23-25 June in Brisbane, Australia. She noted that the date selected for the meeting was chosen to facilitate attendance at the bycatch meeting of high-level decision makers from the tuna RFMO members as it was planned to abut another Kobe 2 Bycatch Meeting in the same location.

The draft agenda was available for review and comment on the joint tuna RFMO web site (www.tuna-org.org). It was acknowledged that preparations for the meeting and input from others will be challenging in such a short period of time, but ACAP and its members were encouraged to do what they could to attend and participate in the meeting, as appropriate.

As the chair of the planning committee, the United States is following the agenda set in the Kobe 2 process, but that the workshop steering committee had decided to allow non-tuna RFMO and expert IGO input into the preparation of background papers. It was noted that Nicole LeBoeuf is coordinating this effort on behalf of the steering committee and both Mark Tasker and Barry Baker had accepted invitations to provide expert input to the development of several of the background papers based upon their involvement in ICES, ACAP and CMS. Nicole also mentioned that a select few IGOs would be invited to submit discussion papers that would be among the official documents for the meeting, and invited ACAP to begin discussions along those lines as ACAP would be among those offered this opportunity.

The steering committee was still in the process of identifying speakers and moderators of the meeting's sessions. Nicole noted the difficulty in covering issues related to the bycatch of all five taxa: marine mammals, sea turtles, seabirds, sharks, and finfish in one meeting. She stressed

that this meeting is likely to result in process-oriented discussions and outcomes as a way to identify opportunities for joint work among the tuna RFMOs and others and also to find efficiencies in using the expertise of other organisations, like CCAMLR and ACAP. She recommended that any recommendations or desired outcomes for the individual meetings of the tuna RFMOs that ACAP may develop should be flexible enough to respond to the outcomes of this workshop.

A small group, led by the Secretariat, was formed to identify general principles that might be included in a discussion paper to be provided to the workshop participants on behalf of ACAP, should it be able to do so. The following nine principles were identified for inclusion in the discussion paper:

a) ACAP's objective is to achieve and maintain a favourable conservation status for albatrosses and petrels;

b) many populations of albatrosses and petrels are faced with extinction as a result of being killed or injured in fishing operations managed by tuna RFMOs;

c) the FAO Code of Conduct for Responsible Fisheries and, for those tuna RFMO members which are also Parties to the UN Fish Stocks Agreement, the UN Fish Stocks Agreement established the 'Ecosystem Approach' and the 'Precautionary Approach' as key approaches necessary to achieve sustainable management of the world's fisheries, as well as establishing the duty of fishery management to minimise impacts on non-target species such as albatrosses and petrels (e.g., amongst others, Article 5(f) of the UN Fish Stocks Agreement1 and Article 6.6. of the Code of Conduct for Responsible Fisheries 2);

d) Article 5(f) places a binding obligation on fisheries management organisations to maintain biodiversity and to establish conservation and management measures to minimise the catch of non-target species, including impacts on associated or dependent species. Article 5(f) requires States to do this to the extent practicable, and to develop and use environmentally safe and cost-effective fishing gear and techniques;

e) ACAP has established a comprehensive database of information on the biology and ecology of albatrosses and petrels listed in its Annex;

f) the ACAP Seabird Bycatch Working Group regularly reviews the scientific literature on seabird bycatch mitigation measures as part of work to identify effective, best practice mitigation measures that do not adversely impact on the survival of other taxa;

g) advice is also provided by this Working Group on seabird ecological risk assessment processes, bycatch observer program protocols and data collection requirements;

h) recognition that RFMOs are required under UN Fish Stocks Agreement to manage fisheries on an ecosystem approach and the challenges that this presents, particularly in regard to the acquisition of relevant data to inform management decisions; and

i) ACAP welcomes the opportunity of providing its expertise on seabird bycatch mitigation to the tuna RFMOs and expresses its willingness to do so in any new structure proposed as a result of the discussions held in this Workshop.

10. IPOA/ NPOA SEABIRDS

BirdLife International provided an update of progress by FAO on the publication of Best practice guidelines for reducing the incidental catch of seabirds, as part of the FAO Technical Guidelines for the Code of Conduct for Responsible Fisheries. The work of ACAP and Birdlife at recent FAO COFI meetings and involvement in the FAO Expert Consultation (September 2008, Bergen,

Norway) was recognised by the Working Group as an important step in the development and publication of the guidelines to strengthen the delivery of FAO IPOA-Seabirds.

11. MITIGATION FACT SHEETS

The third meeting o the Advisory Committee (Cape Town, 2008) gratefully accepted the invitation by BirdLife (SBWG-2 Doc 9) to collaborate on an initiative to distribute and maintain a suite of fact sheets aimed at fisheries managers to assist in reducing bycatch in longline and trawl fisheries (AC4 Doc 14 Rev 5). The Working Group again thanked BirdLife for the opportunity to collaborate on the maintenance and dissemination of this important product and acknowledged the important contributions of Graham Robertson (Australia) and Ed Melvin (USA) who worked with BirdLife to develop the initial version of the series.

It is intended that the Fact Sheets will be co-branded as an ACAP and BirdLife product. The SBWG discussed the mechanisms for maintaining and updating the fact sheets and agreed that the series would be web-based and downloadable in pdf format.

The target languages for the series include in order of priority include; English (which is already available), Spanish, French, Japanese, Mandarin, Portuguese, and Korean. To minimise costs, individual fact sheets would be selected for translation based on target fisheries of that language that would assist in the conservation of ACAP listed species.

Discussions on the review and dissemination of the fact sheets series will become a standing agenda item with intersessional work to conduct the required periodic reviews. The process outlined by the Working Group applied the following principles:

- all Fact Sheets will be reviewed over a four year cycle, or as required based on new information, with the exception of streamer lines and line weighting for pelagic longlines, which will be reviewed every two years (see below); and
- the SBWG will assign responsibility to an individual for coordinating reviews of individual fact sheets.

The WG also noted on-going discussions with FAO about their potential involvement with the series of fact sheets. An update on this issue will be provided for SBWG 4/AC6.

SBWG requested that the AC allocate AU$5,000 a year for the next 5 years for the collaboration between the ACAP and BirdLife to maintain and update the fact sheet series.

Fact Sheet		Version	Revision					Languages						
			2011	2012	2013	2014	2015	English	Spanish	French	Japanese	Mandarin	Portugese	Korean
	Introduction	1	●				●	●	●	●	●	●	●	●
1	DemLL BSL	1		●				●	●	●			●	
2	Demersal LL external line weight	1			●			●	●	●			●	
3	Demersal LL IWL	1			●			●	●	●			●	
4	Demersal LL line weght Chilean sy	1				●		●	●				●	
5	LL Night Setting	1				●		●	●	●	●	●	●	●
6	Demersal LL UW setting chute	1			●			●	●	●			●	
7	Pelagic LL BSL	1	●		●		●	●	●		●	●	●	●
8	Pelagic LL line weighting	1	●		●		●	●	●		●	●	●	●
9	Pelagic LL side setting	1				●		●	●		●	●	●	●
10	Pelagic LL BDB Squid	1		●		●		●	●		●	●	●	●
11	Pelagic LL Bait caster & Line shoot	1	●	●	●	●	●	●	●		●	●	●	●
12	LL Haul Mitigation	1			●			●	●	●	●	●	●	●
13	Trawl Warp Strike	1	●	●	●	●	●	●	●	●			●	
14	Trawl Net Entanglement	1					●	●	●	●			●	

12. GLOBAL PROCELLARIFORM TRACKING DATABASE

SBWG-3 Doc 20 reported on progress on the enhancement and development of the Global Procellariform tracking Database in 2009. This included:

- the addition of 17 new remote tracking data sets, of which 13 were ACAP listed species;
- completion of the five tuna RFMO tracking overlap papers for ACAP;
- input into the ICCAT seabird assessment;
- the development of web portal for data access, submission and analysis (www.seabirdtracking.org); and
- production of case studies for presentation to the Convention on Biological Diversity in relation to its 2012 targets for establishing marine protected areas.

Key gaps in the tracking data for albatross and petrels were identified and ACAP Parties were encouraged to submit new data sets as part of the on-going work of the Agreement.

The WG discussed a tracking paper prepared by BirdLife for submission by ACAP to the June 2010 meeting of the ICCAT Sub-committee on Ecosystems. The Working Group thanked BirdLife, specifically Cleo Small, for the completion of the set of five tracking papers that cover the convention areas for all tuna RFMOs (SBWG3 Docs 28 and 29).

13. INGESTION OF FISHING GEAR AND ENTANGLEMENT OF SEABIRDS

SBWG-3 Doc 10 reported on the ingestion of discarded fishing gear and appropriate monitoring and management responses. Although deliberate dumping of plastics at sea is banned, not all fisheries legislation prohibits discarding of gear (hooks and line) in offal. Analysis of a 16 year dataset collected at Bird Island in the South Atlantic indicated that the amount of gear found in association with wandering albatross colonies was an order of magnitude greater than for any other species, reflecting their wider foraging range and larger gape. Unlike other taxa, most gear associated with grey-headed albatross was from squid and not longline fisheries, and mistaken for natural prey rather than the result of direct fishery interaction. Observed rates of foul-hooking (entanglement during line hauling) were much higher in giant petrels and wandering albatross than black-browed albatross, and no grey-headed albatross was affected. The index of wandering albatross gear abundance showed two peaks, the most recent corresponding with a substantial increase in the number of multifilament snoods, suggesting that the widespread adoption of a new longline system may have been responsible. Although gear was identified as being from demersal longline fisheries, little could be assigned to a specific fishery. Stomach content analysis showed that many hooks are completely digested by chicks, the long-term effects of which are entirely unknown. The paper includes recommendations for (i) management of fisheries that should help reduce or eliminate the ingestion of gear by seabirds, (ii) improvements to monitoring schemes, and (iii) further research, particularly into possible long-term toxicity as a result of hook digestion.

The subsequent move by fishers operating in CCAMLR waters to voluntarily use marked hooks to assign lost gear to specific vessels and fleets gear in the 2010 season is a laudable response to a pressing conservation problem.

To demonstrate responsible management practices in relation to this problem, ACAP parties with jurisdiction of fisheries operating in the South Atlantic basin region and over the Patagonian shelf are encouraged to adopt a similar program of fishery (and country)-specific hook identification.

Regarding the presentation made by Dr. Richard Philips (SBWG3 Doc 10), Argentina rejected the UK extension of ACAP to the disputed territories and reaffirmed its sovereignty over the Falkland Islands (Islas Malvinas), South Georgia and the South Sandwich Islands (Islas Georgias del Sur e Islas Sandwich del Sur)[2] and the surrounding maritime areas and made a statement included at Annex 10.

The UK response to this statement is included at Annex 11.

14. RISK ASSESSMENT

AC5 Doc 32 reviewed ecological risk assessments (ERAs) for the effects of fishing on seabirds carried out in recent years for, and by, fisheries management bodies. The paper highlighted the need for, and purposes of ERAs, which can help identify the seabird species most at risk from bycatch (a minimum requirement), the data gaps and research priorities, and potentially also the key areas, fisheries and seasons in which bycatch occurs. ERA methodologies are still under development and a variety of approaches are possible: those based on expert scoring; semi-quantitative productivity-susceptibility analysis, and; more complex models that may incorporate information on demography, overlap between bird distribution and fishing effort, and bycatch rates.

The paper highlighted ten issues that had arisen in recent ERAs in which the authors had been involved, and the advantages and disadvantages of attempted solutions to common problems, which mainly arise from data limitations. One of the most pertinent is the method used to determine overlap between bird distribution and fishing effort when seabird tracking data were missing for particular species, populations, age and status classes (e.g. active/failed/deferring breeder), and seasons. Developing a robust methodology to fill such data gaps is an essential element in the development of any ERA that has the purpose of identifying the areas and times of year when overlap (and risk) to a particular seabird is likely to be highest. The cost of employing a GIS expert during the inter-sessional periods for sufficient time (4-6 weeks) to compare the alternative approaches to such an analysis was estimated at AUS$ 7,000. The WG thanked the authors for contributing this paper, and recommended that in the first instance, it be revised, based on comments received from the Working Group, and submitted to the upcoming Joint Tuna Commissions Kobe 2 Bycatch Workshop. It was also agreed that there would be utility in further developing this paper for the series of ACAP Conservation Guidelines, as well as for wider dissemination in the scientific literature.

15. SBWG WORK PROGRAMME

The work programme was revised and a draft Revision of Section Four of the Advisory Committee Work Programme 20010-2012 prepared for consideration by the Advisory Committee. This is provided at Annex 9.

16. DEVELOPMENT OF PERFORMANCE INDICATORS

AC5 Doc 28 summarised the background to the requirement to develop a system of indicators to measure the success of the ACAP Agreement. It also provided suggestions for potential categories of indicators and some examples of specific indicators relating to these. AC5 Inf 8 extended this approach and provided additional suggestions for potential indicators, especially those relating to the marine environment and to capacity and resource aspects.

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[2] *A dispute exists between the Governments of Argentina and the United Kingdom of Great Britain and Northern Ireland concerning sovereignty over the Falkland Islands (Islas Malvinas), South Georgia and the South Sandwich Islands (Islas Georgias del Sur e Islas Sandwich del Sur) and the surrounding maritime areas.*

In addition it was recognised that AC5 Doc 16, proposing improvements to reporting on the implementation of the Agreement, contains a number of suggestions explicitly relevant to the development of basic performance indicators.

Accordingly the Working Group:

a) endorsed the general principles outlined in Doc 28 Annex B;

b) supported the proposition that, whenever possible, indicators should be aligned with and/or developed from the existing initiatives of the ACAP and its Working Groups and incorporated into the appropriate mechanisms of ACAP reporting and data collection; and

c) recommended that indicator categories should, as far as possible, conform with the State Pressure Response (SPR) system, while recognising that in some cases important indicators would need to relate to monitoring the progressive acquisition of relevant data to enable the development of SPR indicators.

In respect of potential indicators of specific relevance to operations and processes occurring in the marine environment, and especially in relation to bycatch, the WG recommended that an appropriate suite of indicators should be developed from amongst the following categories:

State

1. Feeding sites/areas/habitat

1.1 Knowledge of at-sea range/distribution of ACAP species

Indicators to monitor the progressive acquisition of information, reflecting the amount, scope (e.g. in terms of species, seasons, years, life history stages) and quality of data available. Such indicators are potentially available from the tracking data on ACAP species submitted to the Global Procellariform Tracking Database.

1.2 Condition of feeding habitat

Potential indicators for the key foraging areas of ACAP species might be derived from existing information on e.g. climatology, physical oceanography, biological oceanography (e.g. productivity) and possibly also from work developing marine pollution indicators. The collation and/or extraction of relevant data are not currently part of the ACAP work programme, but might be considered for investigation in the future.

1.3 Status of prey

For those ACAP species whose diet is sufficiently well known and comprises a substantial proportion of prey for which abundance data are available (e.g. via commercial fisheries or scientific research), indices of stock status may be relevant and applicable. The collation and/or extraction of relevant data is not currently part of the ACAP work programme, but might be considered for investigation in the future.

Pressure

2. Assessment of levels/rates of incidental mortality (bycatch) in fisheries

2.1 Availability of data

Indicators need developing to monitor changes in the amount (e.g. number of data sets, fisheries etc), scope (e.g. coverage in terms of geographical area, proportion of relevant fisheries) and quality (e.g. reliability, statistical properties etc) of available data. Potential indicators might also include those related to the amount, scope and quality of observer programmes.

2.2 Levels and rates of bycatch

Reviewing existing data, not least to establish realistic baselines, where feasible, is a high priority. The WG requested members with appropriate summarised data to make these available to assist in taking this forward intersessionally.

Response

3. Implementation of bycatch mitigation

3.1 Within EEZs

a) extent (e.g. number/proportion of fisheries/vessels etc)

b) quality (in relation to ACAP criteria of best practice)

c) regulatory effectiveness (e.g. voluntary vs mandatory, oversight through observer programme etc)

3.2 Interaction with RFMOs

a) attendance at relevant RFMOs and their Working Groups

b) advocacy of ACAP recommendations at relevant RFMOs and their Working Groups

c) submission of papers to relevant RFMO WGs on topics of relevance to bycatch of ACAP species

Other

4 Capacity and resources

Appropriate indicators might be developed from the responses to data requests posed in AC Doc 16 Section D, and to other analogous information requests.

In respect of most, if not all, the potential indicators suggested above, considerable work is needed to investigate and assess the current and likely future availability of relevant data in order to develop precise formulations of appropriate indicators.

The work by ACAP in developing a Bycatch Reporting System (see e.g. AC5 Inf 10) will provide considerable relevant input and advice, especially once the responses to the Bycatch Data Request are available for analysis.

While it would, therefore, be premature to recommend particular indicators at this stage, the Working Group advised that special priority should be given to progress with those on pressure and response.

This section of the report has been used to compile AC5 Inf 16, and will be discussed under AC5 Agenda 14.

17. ADVISORY COMMITTEE WORK PROGRAMME – PROJECTS GRANTED IN 2009

A series of documents were produced for the SBWG and the Advisory Committee following Parties' recommendations on (1) the relevance of refining the process for the allocation of funds to the AC work programme based on the identification of difficulties and lessons learnt during 2009 (see proposed recommendations to the AC in AC5 Doc 30), and (2) the relevance of conducting a periodic review of project outcomes as part of the assessment of implementation of the Agreement (AC5 Inf 1). Also, a list of the projects supported by the Agreement during 2009 is provided for the information of SBWG members (AC5 Inf 23). The working group endorsed the recommendations in AC5 Doc 30 and discussed the ways in which project outcomes should be reviewed and effectively used as one way to assess the Agreement's implementation.

18. WAVED ALBATROSS ACTION PLAN

AC5 Doc 20 reviewed for the first time the progress achieved in implementation of the Waved Albatross Action Plan, developed by Ecuador and Peru in collaboration with ACAP during 2007 and 2008. More extensive information on actions undertaken by Peru is provided in AC5 Inf 3. Jeffery Mangel provided a brief update on the activities of Pro Delphinus in Peru. He elaborated on some of the challenges of working in small artisanal fleets with little regulatory oversight. SBWG recognised the urgency of revising the priorities and assessing the steps needed to achieve the expected outcomes in the plan. To that end, the Working Group, through the Advisory Committee, recommends that the Parties and Range States primarily engaged with the implementation of the Plan create a Steering Committee tasked to periodically (yearly) revise the contents of the POA, to optimise its implementation and the use of limited resources.

19. RECOMMENDATIONS

It is recommended that the Advisory Committee:

a) endorse the review of pelagic longline mitigation measures (Annex 3);

b) endorse the best practice advice statement on pelagic longline mitigation (Annex 4) for use by RFMOs and Party's to guide the development of policy and practice within fisheries under their jurisdiction;

c) endorse the review of trawl mitigation measures (Annex 5);

d) endorse the best practice advice statement on trawl mitigation (Annex 6) for use by RFMOs and Party's to guide the development of policy and practice within fisheries under their jurisdiction;

e) endorse the review of demersal longline mitigation measures (Annex 7);

f) endorse the best practice advice statement on demersal longline mitigation (Annex 8) for use by RFMOs and Party's to guide the development of policy and practice within fisheries under their jurisdiction;

g) continue to annually provide funding of $30K for travel costs associated with attending RFMO meetings;

h) give consideration to providing additional funding for the Technical Officer position within the Secretariat to improve liaison with ACAP Parties on RFMO issues;

i) encourage ACAP Parties to improve the participation of their fisheries management agencies in ACAP meetings/work so they have a better appreciation of the outcomes being sought at RFMO meetings to further seabird conservation;

j) give a high priority to the completion of products to be used in RFMO meetings, such as RFMO specific engagement strategies, risk assessment recommendations and observer programme protocols;

k) endorse the proposed priorities for RFMO engagement for the next 12 months, as outlined in Section 9 above;

l) support the preparation of a discussion paper for the upcoming Kobe 2 Bycatch Workshop being held to discuss the issue of bycatch, covering the issues outlined in Section 9 above;

m) encourage all ACAP parties to utilise the FAO Best practice guidelines for reducing the incidental catch of seabirds, when developing or reviewing their NPOA-Seabirds;

n) allocate AUD $5,000 a year for the next 5 years for the collaboration between the ACAP and BirdLife to maintain and update the Mitigation Fact Sheet series (Section 11, above);

o) discuss and agree an amount for translation of Mitigation Fact Sheets into the languages of the Agreement, and into those of important fishing nations, as outlined in Section 11 of the report, above;

p) support revision of the review of ecological risk assessments (AC5 Doc 32) for submittal to the Kobe 2 Bycatch Workshop and further development for the series of ACAP Conservation Guidelines, noting that an amount of AUD $7,000 for additional GIS expertise would be required for the latter purpose;

q) incorporate the tasks detailed in this report into the AC Work Programme.

The Working Group also provides the following advice to the Advisory Committee;

r) in relation to bycatch data provision by Parties for ACAP reporting,

   i. data collected from two Parties intersessionally indicates that it appears practical to collect this data from all Parties in a consistent manner, although a few members of the Working Group were not of this opinion; and

   ii. taking into account the levels of observer coverage identified by the metadata survey, the WG noted that it will not be possible to develop robust bycatch estimates for all fisheries from analysis of the data to be provided.

s) The format and content of those sections of the draft revised template for national reporting by ACAP Parties (AC5 Doc 16) relevant to seabird bycatch is endorsed by the Working Group.

20. CLOSING REMARKS AND ACKNOWLEDGEMENTS

Argentina made a closing statement requesting the application of Resolution 2.9 in documents AC 5 Doc 19, AC 5 Inf 4, SBWG 3 Doc 9, SBWG 3 Doc 18, SBWG 3 Doc 28, SBWG 3 Doc 29 and SBWG 3 Working Document 1, discussed in this meeting. (Annex 12). In response, the United Kingdom stated that Resolution 2.9 applies only to documents authored by the Secretariat and other organs of the Agreement and therefore requests that the Secretariat does not extend this Resolution to documents authored by others. (Annex 13).

The Convenor of the SBWG thanked the Members and Observers for their valuable contributions at the meeting and in developing the report, and the authors of the excellent papers submitted for consideration by the SBWG. He also thanked Argentina and the Secretariat for providing an excellent venue and facilities for the meeting; Marco Favero, Kim Rivera, Nicole LeBoeuf, Graham Robertson, Ben Sullivan, Mark Tasker, John Croxall, Anton Wolfaardt, Ian Hay and Warren Papworth for their assistance during both the intersessional period and the meeting; Juan Pablo Seco Pon, Sofia Copello, German Garcia & Luke Finley for administrative and technical assistance during the meeting, and JC Lloyd-Southwell and Adriana Caminiti de Perez for interpretation services.

The Members also thanked the Convenor for his leadership and commitment in progressing the work of the Working Group.

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ANNEX 2 – SBWG 3 AGENDA

1	Mitigation research update.
2	Pelagic Longline Bycatch Mitigation
3	Trawl Bycatch Mitigation
4	Demersal Longline Bycatch Mitigation
5	Bycatch data provision by Parties, with respect to ACAP Reporting and ACAP Indicators
6	Coordination of activities relating to RFMOs
7	IPOA/NPOA-Seabirds
8	Mitigation Fact Sheets
9	Global Procellariform Tracking Database
10	Ingestion of Fishing Gear and Entanglements of Seabirds
11	Risk Assessment
12	SBWG Work Programme
13	Development of Performance Indicators
14	Advisory Committee Work Programme - Projects granted in 2009
15	Waved Albatross Action Plan

Annex 3: Review of Seabird Bycatch Mitigation Measures for Pelagic Longline Fisheries.

Measure	Scientific evidence for effectiveness in pelagic fisheries	Caveats /Notes	Need for combination	Research needs	Minimum standards
Night setting	Duckworth 1995; Brothers et al. 1999; Gales et al 1998; Klaer & Polacheck 1998; Brothers et al. 1999; McNamara et al. 1999; Gilman et al. 2005; Baker & Wise 2005; Jiménez et al 2009.	Less effective during full moon, under intensive deck lighting or in high latitude fisheries in summer. Less effective on nocturnal foragers e.g. White-chinned Petrels (Brothers et al. 1999; Cherel et al. 1996).	Recommend combination with bird scaring lines and weighted branch lines	Data on current time of sets by WCPFC fisheries. Effect of night sets on target catch for different fisheries.	Night defined as nautical dark to nautical dawn
Side setting	Brothers & Gilman 2006; Yokota & Kiyota 2006.	Only effective if hooks are sufficiently below the surface by the time they reach the stern of the vessel. In Hawaii, side-setting trials were conducted with bird curtain and 45-60g weighted swivels placed within 0.5m of hooks. Japanese research concludes must be used with other measures (Yokota & Kiyota 2006).	Must be combined with other measures. Successful Hawaii trials use bird curtain plus weighted branch lines. In Southern Hemisphere, strongly recommend use with bird scaring lines until side-setting is tested in the region.	Currently untested in the Southern Ocean against seabird assemblages of diving seabirds and albatrosses - urgent need for research.	In Hawaii, side setting is used in conjunction with a bird curtain and 45 weighted swivel within 1m of the baited hook. Clear definition of side setting is required. Hawaiian definition is a minimum of only 1 m forward of the stern, which is likely to reduce effectiveness.

Measure	Scientific evidence for effectiveness in pelagic fisheries	Caveats /Notes	Need for combination	Research needs	Minimum standards
Single bird scaring lines - conventional configuration	Imber 1994; Uozomi & Takeuchi 1998; Brothers et al. 1999; Klaer & Polacheck 1998; McNamara et al. 1999; Boggs 2001; CCAMLR 2002; Minami & Kiyota 2004. Melvin 2003.	Effective only when streamers are positioned over sinking baits. Baited hooks are unlikely to sink beyond the diving depths of diving seabirds within the 150 m zone of the bird scaring line, unless combined with line weighting or underwater setting. Entanglement with fishing gear can lead to poor compliance by fishers and design issues need to be addressed. In crosswinds, bird scaring line must be deployed from the windward side to be effective.	Effectiveness increased when combined with other measures e.g. weighted branch lines and night setting	Optimal design for pelagic fisheries under development: refine to minimise tangling, optimise aerial extent and positioning, and ease hauling/retrieval. Two studies in progress developing optimal bird scaring line for pelagic fisheries including Washington Sea Grant and Global Guardian Trust in Japan. Controlled studies demonstrating their effectiveness in pelagic fisheries remain very limited.	Current minimum standards for pelagic fisheries are based on CCAMLR Conservation Measure 25-02
Single bird scaring line - Light configuration	Yokota et al. 2008 considered light lines to be more effective in reducing bait take by Laysan albatrosses than conventional bird scaring lines. A similar study conducted by Brouwer et al. 2008 in New Zealand contained confounding effects and inadequate description of	Evidence for effectiveness in Yokota et al (2008) is unconvincing because of small number of sets (18), no seabirds were caught in one experiment, and although a significant difference was detected in a 2nd experiment, the confidence limits around the mean values of both treatments overlapped extensively.		Thorough comparative experimental assessment of light and conventional bird scaring lines against Southern Ocean seabird assemblages of diving seabirds and albatrosses urgently needed. Research must be based on larger sample sizes and more transparent methodologies.	Use of this measure is not recommended at this time.

Measure	Scientific evidence for effectiveness in pelagic fisheries	Caveats /Notes	Need for combination	Research needs	Minimum standards
	methodologies; these concerns preclude confident conclusions to be drawn from this study.				
Paired bird scaring line – conventional configuration	Two streamer lines best in crosswinds to maximise protection of baited hooks (Melvin et al. 2004). Hybrid tori lines (with long and short streamers) were more effective than short tori lines (only short streamers) in deterring diving seabirds (white-chinned petrels) (Melvin et.al., 2010.	Potentially increased likelihood of entanglement - see above. Development of a towed device to prevent tangling with fishing gear essential to improve adoption and compliance. Diving species increase vulnerability of surface foragers (albatrosses) due to secondary interactions.	Effectiveness increased when combined with other measures. Essential to use with weighted branch lines and night setting	Development and trialling of paired streamer line systems for pelagic fisheries. Essential research addresses effectiveness with respect to both primary and secondary interactions.	Current minimum standards for pelagic fisheries are based on CCAMLR Conservation Measure 25-02 Research still in progress. Current optimal tori line configuration for Japanese high seas vessels involves mix of short & long streamers to reduce drag needed to maintain a 100 m aerial extent. Long streamers to extend from 10 m to 50 from the stern. A “sweeper” streamer extending to the water on the port tori line forward of the stern protects the area forward of the zone where the baits typically land in the water during line setting.

Measure	Scientific evidence for effectiveness in pelagic fisheries	Caveats /Notes	Need for combination	Research needs	Minimum standards
Weighted branch lines	Brothers 1991; Boggs 2001; Sakai et al. 2001; Brothers et al. 2001; Anderson & McArdle 2002; Gilman et al. 2003a, Hu et al. 2005.	Critical measure, essential to use in all pelagic longline fisheries with seabird interactions. Weights will shorten but not eliminate the zone behind the vessel in which birds can be caught. Even in demersal fisheries where weights are much heavier, weights must be combined with other mitigation measures (e.g. CCAMLR Conservation Measure 25-02).	Must be combined with other measures e.g. bird scaring lines and/or night setting	Mass and position of weight both affect sink rate. Further research on weighting regimes needed. Testing of safe-leads in progress. Where possible, effect on target catch as well as seabird bycatch should be evaluated. Factors such as swivel weights, mainline tension, bait hooking position, bait size and life status, deployment position (effect of propeller turbulence) all affect sink rate and need to be quantified.	Global minimum standards not yet established. Requirements now vary by fishery and vessel. Hawaii minimum requirements are 45g less than 1 m from hook. Australia requires 60 or 100g located 3.5 or 4 m from the hook, respectively. Australian requirements currently being re-assessed.
Blue dyed bait	Boggs 2001; Brothers 1991; Gilman et al. 2003a; Minami & Kiyota 2001; Minami & Kiyota 2004; Lydon & Starr 2005. Cocking et al. 2008.	New data suggests only effective with squid bait (Cocking et al. 2008). Onboard dyeing requires labour and is difficult under stormy conditions. Results inconsistent across studies.	Must be combined with bird scaring lines or night setting	Need for tests in Southern Ocean.	Mix to standardized colour placard or specify (e.g. use 'Brilliant Blue' food dye (Colour Index 42090, also known as Food Additive number E133) mixed at 0.5% for minimum 20 minutes)

Measure	Scientific evidence for effectiveness in pelagic fisheries	Caveats /Notes	Need for combination	Research needs	Minimum standards
Line shooter and mainline tension	Robertson et al (2010).	Robertson et al (2010).showed that mainline set into propeller turbulence with a line shooter without tension astern (e.g. slack) as in deep setting significantly slows the sink rates of hooks. Use of a line shooter to set gear deep cannot be considered a mitigation measure.			Use of this measure is not recommended as a mitigation measure.
Bait caster	Duckworth 1995; Klaer & Polacheck 1998.	Not a mitigation measure unless casting machines are available with the capability to control the distance at which baits are cast. This is necessary to allow accurate delivery of baits under a bird scaring line. Needs more development. Few commercially-available machines have this capability.	Not recommended as a mitigation measure.		Not recommended as a mitigation measure.
Underwater setting chute	Brothers 1991; Boggs 2001; Gilman et al. 2003a; Gilman et al. 2003b; Sakai et al. 2004; Lawrence et al. 2006.	For pelagic fisheries, existing equipment not yet sturdy enough for large vessels in rough seas. Problems with malfunctions and performance inconsistent (e.g. Gilman et al. 2003a and Australian trials cited in Baker & Wise	Not recommended for general application	Design problems to overcome	Not yet established

Measure	Scientific evidence for effectiveness in pelagic fisheries	Caveats /Notes	Need for combination	Research needs	Minimum standards
		2005)			
Management of offal discharge	McNamara et al. 1999; Cherel et al. 1996.	Supplementary measure. Definition essential. Offal attracts birds to vessels and where practical should be eliminated or restricted to discharge when not setting or hauling. Strategic discharge during line setting can increase interactions and should be discouraged. Offal retention and/or incineration may be impractical on small vessels.	Must be combined with other measures.	Further information needed on opportunities and constraints in pelagic fisheries (long and short term).	Not yet established for pelagic fisheries. In CCAMLR demersal fisheries, discharge of offal is prohibited during line setting. During line hauling, storage of waste is encouraged, and if discharged must be discharged on the opposite side of the vessel to the hauling bay.
Bait life status	Trebilco et al 2010; Robertson et al (submitted)	Live fish bait sinks significantly slower than dead bait (fish and squid), increasing the exposure of baits to seabirds. Use of live bait is associated with higher seabird bycatch rates.	Live bait is not a mitigation measure.	.	Use of live bait is not a mitigation measure.
Thawing bait status	Brothers 1991; Duckworth 1995; Klaer & Polacheck; Brothers et al 1999; Robertson & van den Hoff 2010.	Baits cannot be separated from others in frozen blocks of bait, and hooks cannot be inserted in baits, unless baits are partially thawed (it is not practical for fishers to use fully frozen baits). Partially thawed baits sink at similar rates to fully thawed baits.	Not a mitigation measure		Not recommended as a mitigation measure.

Measure	Scientific evidence for effectiveness in pelagic fisheries	Caveats /Notes	Need for combination	Research needs	Minimum standards
Area closures	Avoiding fishing at peak areas and during periods of intense foraging activity has been used effectively to reduce bycatch in longline fisheries.	An important and effective management response, especially for high risk areas, and when other measures prove ineffective. There is a risk that temporal/spatial closures could displace fishing effort into neighbouring or other areas which may not be as well regulated, thus leading to increased incidental mortality elsewhere.	Must be combined with other measures, both in the specific areas when the fishing season is opened, and also in adjacent areas to ensure displacement of fishing effort does not merely lead to a spatial shift in the incidental mortality.	Further information about the seasonal variability in patterns of species abundance around fisheries.	No work done but highly recommended

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ANNEX 4: Summary Advice Statement for reducing impact of pelagic longline gear on seabirds

Summary

Streamer lines have been widely promoted to deter seabirds in pelagic longline fisheries since the 1990s. However, recent evidence shows that streamer lines of either conventional or 'light' design, used in either single or double configuration, are inadequate for reducing seabird bycatch unless combined with other mitigation measures. To be effective they must be used with branchline weighting and, preferably, night setting.

The most effective measures to reduce incidental take of seabirds in pelagic longline fisheries are:

- use of an appropriate line weighting regime to reduce the time baited hooks are near or on the surface and thus available to birds;
- avoiding peak areas and periods of seabird foraging activity;
- setting at night; and
- actively deterring birds from baited hooks by means of bird scaring lines, in combination with appropriate line weighting.

Responsible management of offal and discards can also assist.

It is important to note that there is no single solution to reduce or avoid incidental mortality of seabirds in pelagic longline fisheries, and that the most effective approach is to use the above measures in combination.

Introduction

The incidental mortality of seabirds, mostly albatrosses and petrels, in longline fisheries has been of growing global concern. This was a major reason for the establishment of the Agreement on the Conservation of Albatrosses and Petrels (ACAP). A large number of mitigation methods to reduce and eliminate seabird bycatch has been developed and tested over the last 10 to 15 years, especially for pelagic longline fisheries. Although most mitigation measures will be broadly applicable, the feasibility, design and effectiveness of some measures will be influenced by the type of longlining method and gear configuration used. In particular it should be noted that most scientific literature relates to fleets of larger vessels, with longline usage from artisanal fleets receiving less attention. Some of this advice may need to be modified for smaller vessels. ACAP has comprehensively reviewed the scientific literature dealing with seabird bycatch mitigation in pelagic fisheries and this document is a distillation of the review (Annex 6).

Best practice mitigation measures for pelagic longline fisheries are listed below; the first recommendation is a general measure followed by those for line setting and line hauling.

<u>Best practice measures - general</u>

Area and seasonal closures

- The temporary closure of important foraging areas (e.g. areas adjacent to important seabird colonies during the breeding season when large numbers of aggressively feeding seabirds are present) has been very effective in reducing incidental mortality of seabirds in fisheries in those areas.

Best practice measures - line setting

Line weighting

- Lines should be weighted to get the baited hooks rapidly out of the range of feeding seabirds. Research on line weighting is still in progress and head-to-head comparisons of the effectiveness of line weighting regimes (and associated sink rates) as seabird deterrent are encouraged. Further studies on the effects of line weighting on the economics of fishing (catch rates of target and non target fish taxa) are required.
- Metrics pertaining to sink rates to target depths should recognize the importance of the "initial" (e.g. 0-2 m) and "final" (e.g. 4-6 m, or thereabouts) sink rates. A fast initial sink rate reduces visual cues in the critical shallow depths and a fast final rate maximizes the rate at which baited hooks sink deeper in the water column. Both considerations are likely to be important to seabirds that seize baits at or near the surface (e.g. albatrosses) and seabirds that hunt deeper in the water column (e.g. *Procellaria* spp. petrels and *Puffinus* spp. shearwaters).
- In practice, a trade off exists regarding the relative importance of the initial and final sink rates of baited hooks. In general, the closer the weight is to the hook the faster the initial sink rate. Additionally, the heavier the weight the faster the final sink rate. Thus, a heavy weight placed close to the hook will best reduce seabird by-catch.
- Best practice line weighting will maximize sink rates at the surface without overly compromising sink rates at deeper depths. The 60-75 g swivels ± 4 m from hooks commonly preferred by industry in coastal state fisheries are unlikely to deter seabirds (used with an effective streamer line) in all circumstances. Future research should be based on weighting regimes that contrast strongly, such a comparison of 120 g ≤ 2 m from hooks with a regime similar to that mentioned above. An alternative to the latter regime is to use smaller amounts of weight (e.g. 40 g) located at the hook.
- To improve crew safety issues associated with the use of a point source of weight (e.g. leaded swivels) in pelagic gear, use of the recently developed "safe "leads is encouraged. Safe leads slide away from crew during bite offs or when the line breaks under tension, thereby greatly reducing the incidence of dangerous fly-backs towards the vessel, as can occur with leaded swivels.

Night setting

- Setting longlines at night, between the times of the end of nautical twilight and before nautical dawn) is effective at reducing incidental mortality of seabirds because the majority of vulnerable seabirds are diurnal foragers.

Bird scaring lines

- Bird scaring lines are designed to provide a physical deterrent over the area where baited hooks are sinking.
- Two bird scaring lines should be used.
- The design of the bird scaring lines should include the following specifications:
- The attachment height should be at least 7 m above sea level.
- The lines should be at least 150 m long to ensure the maximum possible aerial extent.

- Streamers should be brightly coloured and reach the sea-surface in calm conditions, and placed at intervals of no more than 5 m.
- A suitable towed device should be used to provide drag, maximise aerial extent and maintain the line directly behind the vessel during crosswinds.

Mainline tension

- Mainlines should be set in the 'surface set tight' configuration. Baited hooks connected to mainline set tight sink faster in surface waters than hooks attached to mainline set loose, as in deep setting. Mainline can be set tight either off the drum holding the mainline or with a line shooter. Enough gear should be set at the start of lines to prevent hooks dragging towards the vessel and being pulled up the water column where they are more accessible to seabirds.

Bait life status

- Avoid the use of live bait. Use dead bait only. Many individual live baits remain near the water surface for lengthy periods (e.g. up to 120 seconds) after deployment. The use of live bait increases the likelihood seabirds will be caught

Bait species and size

- Use small species of fish bait (and small individuals) in preference to squid bait. Common fish baits are pilchards, sardines and various species of mackerel (Japanese, blue, yellow-tail). The difference in sink rates between large and small fish baits of the same species is minor. The important point is that large squid bait sinks considerably slower than small fish bait.

Bait thaw status

- Baits need only be thawed to the 'fisherman's thawed' state (i.e. to the point where individual baits can be separated from others in blocks of bait and hooks can be inserted by hand without undue effort). Bait thaw status has either no effect on sink rates (gear with leaded swivels) or an effect that is very minor (gear without leaded swivels). In practical terms the thaw status of baits has no effect on the sink rate of baited hooks.

Bait hooking position

- To ensure fast sink rates, hook baits in either the head (fish) or tail (fish and squid), not in the middle of the back or top of the mantle (squid).

Offal and discard discharge management

- Seabirds are attracted to offal that is discharged from vessels. Ideally offal should be retained onboard but if that is not possible, offal and discards should not be discharged while setting lines
- All hooks should be removed and retained on board before discards are discharged from the vessel.

<u>Best practice measures - line hauling</u>

- During hauling operations birds can accidentally become hooked as gear is retrieved. Best practice line hauling in pelagic longline fisheries is currently unknown.

Further options

- New technologies such as underwater setting devices and hook pods are currently under development. They show considerable promise and will be reported on in the near future.

The following mitigation options are **not** recommended best practice:

Hook design and olfactory deterrents have been insufficiently researched.

Side setting has been insufficiently researched and there have been operational difficulties on some vessels.

Annex 5: Review of Seabird Bycatch Mitigation Measures for Trawl Fisheries.

Measure	Scientific evidence for effectiveness in pelagic fisheries	Caveats /Notes	Need for combination	Research needs	Minimum standards / Recommendation
Nets					
Net binding	Shown to be a highly effective mitigation measure in CCAMLR icefish trawl fishery, reducing seabird bycatch to minimal levels (Sullivan 2010 submitted).	Sisal string has been used to bind the sections of the net which pose the greatest threat seabirds prior to shooting (Sullivan et al. 2004). Bindings are simply tied onto the net to prevent the net from lofting and the mesh opening as the tension created by the vessel speed of between 1-3 knots is lost due to waves and swell action. Once shot-away the net remains bound on the surface until it sinks. Once the trawl doors are paid away and the net has sunk beyond the diving depth of seabirds the force of the water moving the doors apart is sufficient to break the bindings and the net spreads into its standard operational position	Recommend combination with net cleaning and net weights to minimise the time the net is on the surface (Sullivan et al 2010 submitted)		Recommended for reducing bycatch when shooting gear in pelagic gear. 3–ply sisal string (typical breaking strength of c.110 kg), or a similar inorganic material should be applied to the net on the deck, at intervals of approximately 5 m to prevent net from spreading and lofting at the surface. Net binding should be applied to mesh ranging from 120–800 mm as these are known to cause the majority of seabird entanglements (Sullivan et al 2010). When applying string, tie an end to the net to prevent string from slipping down the net and ensure it can be removed when net is hauled

Measure	Scientific evidence for effectiveness in pelagic fisheries	Caveats /Notes	Need for combination	Research needs	Minimum standards / Recommendation
Net weights	Evidence suggests net weighting on or near the cod end increases the rate of ascent of the net during hauling operations, thus reducing the time the net is on the water's surface. All attempts should be made to retrieve the net as quickly as possible. Good deck practices to minimise the time that the net is on the water's surface have been the key factors in reducing seabird entanglements during hauling in South Atlantic trawl fisheries (Hooper et al 2003; Sullivan 2010 submitted).		Recommend combination with net binding and net cleaning to minimise the time the net is on the water's surface during both setting and hauling (Sullivan 2010 submitted)	Development of minimum standards for amount and placement of weight (cod end, wings, footrope, mouth, belly), to build on work to date in CCAMLR trawl fisheries (Sullivan et al 2010 submitted).	None established. Recommended for reducing bycatch during both shooting and hauling of gear (Sullivan et al 2010). Suitable for both Pelagic and Demersal gear.
Net cleaning	Removal from nets of all fish 'stickers' and other material is a critical step to reducing net entanglement during shooting (Hooper et al 2003; Sullivan et al 2010 submitted).		Recommend combination with net binding and net weights to minimise the time net is on water's surface during both setting and hauling (Sullivan 2010 submitted)		Remove all stickers from net prior to shooting gear. Recommended for reducing bycatch during both shooting and hauling of gear. Suitable for both Pelagic and Demersal gear.

Measure	Scientific evidence for effectiveness in pelagic fisheries	Caveats /Notes	Need for combination	Research needs	Minimum standards / Recommendation
Reduced mesh size	Roe (2005) reported on the use of reduced mesh size from 200 to 140 mm in the pelagic icefish fishery in CCAMLR waters, but did not quantify effectiveness of the measure.	Measure may be impractical. Reduced mesh size was believed to have caused severe damage to the net because of increased water pressure during trawling (Roe 2005), although the use of chain weights in the net may also have been influential.		Thorough testing in a range of fisheries required if measure is practical.	None. Insufficient evidence to recommend this measure, although theoretically should be effective in reducing seabird entanglement in nets.
Net jackets	Free-floating panels of net attached to the most dangerous mesh sizes have been trialled in CCAMLR's icefish trawl fishery, with efficacy uncertain (Sullivan et al 2010 submitted).	Found to cause serious drag and subsequent damage to the net. Drag also slows vessel speed and increases fuel consumption (Sullivan et al 2010 submitted).		Efficacy of measure not quantified.	Not recommended. Currently detrimental to fishing efficiency and mitigation efficacy uncertain.
Acoustics	The use of acoustic 'scaring' devices on nine vessels in CCAMLR trawl fisheries indicated that loud noises (bells and flares/fireworks) had limited effect and birds quickly became habituated to the sound, no longer causing an aversion response (Sullivan et al 2010).	May be a useful back-up measure for circumstances when another measure is needed immediately (Sullivan et al 2010 submitted).			None. Insufficient evidence to recommend this measure.

Measure	Scientific evidence for effectiveness in pelagic fisheries	Caveats /Notes	Need for combination	Research needs	Minimum standards / Recommendation
Cables					
Offal discharge[3] and fish discard management	The most important factor influencing contacts between seabirds and warp cables is the presence of discharge (Bull 2009). Methods used to reduce the attractiveness of vessels to seabirds through management of offal discharge and fish discards include mealing (the conversion of waste into fish meal waste reducing discharge to sump water), mincing waste to a nominal maximum particle size of 25 mm diameter prior to discharge, batching (storage or controlling release of discards / discharge during fishing operations) and full retention of all waster material.				
	Mealing resulted in significant reduction in the number of seabirds species feeding behind vessels, relevant to the discharge of unprocessed fish waste (Abraham 2009; Wienecke & Robertson 2002) or minced waste (Melvin et al 2010).	Good evidence in global fisheries that fish meal processing and reducing discharge to stick / sump water is highly effective in reducing seabird bycatch.		None	Vessels must have alternative mitigation strategies in place in the event of meal plant breakdown Suitable for both pelagic and demersal trawl gear
	Mincing reduced the number of large albatrosses (*Diomedea* spp) attending vessels but had no effect on other groups of seabirds **(**Abraham et al 2009).			At present only effective against large *Diomedea* spp albatrosses. Efficacy with *Thalassarche* spp albatrosses needs to be proven before measure can be recommended.	None. Insufficient evidence to recommend this measure.

[3] Offal discharge refers to the disposal at sea of any fish waste resulting from processing, including heads, guts and frames. Fish discards refers to any unwanted whole fish (and or benthic material)

Measure	Scientific evidence for effectiveness in pelagic fisheries	Caveats /Notes	Need for combination	Research needs	Minimum standards / Recommendation
	Batching (storage or controlling release of discards / discharge during) has had limited trialling in New Zealand with uncertain results. **Full retention –** storage of all fish discard and offal, either for processing or for controlled release when cables are not in the water resulted in a significant reduction in attendance of all groups of seabirds (Abraham et al 2009)	Repeated studies have shown in the absence of offal discharge / fish discards seabirds interactions and mortality levels are negligible (Sullivan et al 2006, Watkins et al 2008, Melvin et al 2010 SBWG-3 Doc 14 Rev 1)**.**		Robust trialling needed to support efficacy	None. Insufficient evidence to recommend this measure Vessels must have alternative mitigation strategies in place in the event of meal plant breakdown Suitable for both Pelagic and Demersal trawl gear
Bird Scaring Lines (BSL or Streamer lines) for warp cables	Attachment of a Bird Scaring Line to both the port and starboard sides of a vessel, above and outside of the warp blocks, greatly reduces the access of birds to the danger zone where warps enter the water (Watkins et al 2006, Reid and Edwards 2005; Melvin et al 2010).	Effectiveness reduced in strong cross winds and rough seas, when BSLs are deflected away from warps (Sullivan and Reid 2003; Crofts 2006a, 2006b). This can be alleviated in part by towing a buoy or cone attached to the end of lines to create tension and keep lines straight (Sullivan et al 2006a).		Further experimentation and assessment of towed devices (cones) to improve BSL tension could be beneficial (Crofts 2006a)	Recommended, even when appropriate offal discharge and fish discard management practices in place (Melvin et al 2010). Suitable for both pelagic and demersal trawl gear.
Warp scarers	Warp scarers (weighted devices attached to each warp with clips or	Attachment to the warp eliminates problems associated with crosswinds as			None. Insufficient evidence to recommend this measure.

Measure	Scientific evidence for effectiveness in pelagic fisheries	Caveats /Notes	Need for combination	Research needs	Minimum standards / Recommendation
	hooks, allowing the device to slide up and down the warp freely and stay aligned with each warp) create a protective area around the warp (see Bull 2009, Fig.2; Sullivan et al 2006a). Warp scarers have been shown to reduce contact rates but not to significant levels, and were not as effective as BSLs (Sullivan et al. 2006b, Abraham et al, cited in Bull 2009).	they do not behave independently of warps. Warp scarers cannot be deployed while the warp cable is being set, or remain in place during hauling, leaving periods when warps are not protected. Concerns have been raised regarding associated practicality and safety issues (Sullivan et al. 2006a; Abraham et al, cited in Bull 2009).			
Bird bafflers	Bird bafflers comprise two booms attached to both stern quarters of a vessel. Two of these booms extend out from the sides of the vessel and the other two extend backwards from the stern. Dropper lines are attached to the booms, to create a curtain to deter seabirds from the warp–sea interface zone (see Bull 2009, Fig.3; Sullivan et al 2006a).	Various designs exist including the Brady Baffler and the Burka. While bafflers where designed to minimise warp interactions, the Brady Baffler has been used (inappropriately) within CCAMLR Icefish fisheries to mitigate net entanglements where they have been found to be consistently ineffective (Sullivan et al 2010). The great variability in the		The effectiveness of the Burka has not been experimentally tested. Needs to be trialled in a range of fisheries and areas to demonstrate efficacy	None. Insufficient evidence to recommend this measure

Measure	Scientific evidence for effectiveness in pelagic fisheries	Caveats /Notes	Need for combination	Research needs	Minimum standards / Recommendation
	Generally bird bafflers are not regarded as providing as much protection to the warp cables as BSLs or warp scarers (Sullivan et al. 2006a).	design and deployment of bird bafflers may influence their effectiveness.			
Cones on warp cables	A plastic cone attached to each warp cable reduced the number of contacts during hauls in the Argentine Hake Trawl Fishery by 89% and no seabirds were killed (Gonzalez-Zevallos et al 2007).			Needs to be trialled in a range of fisheries and areas to demonstrate efficacy.	None. Insufficient evidence to recommend this measure.
Snatch block	A snatch block, placed on stern of a vessel to draw the third-wire close to the water to reduce its aerial extent, reduced seabird strikes, although performance varied by vessel (Melvin et al 2010).	Melvin et al (2010) were confident that third-wires can be pulled closer to the water or submerged at the stern to make this measure highly effective, but noted that, as third-wires are fragile and expensive, any snatch block-like system should aim to minimise cable wear.		Needs to be trialled in a range of fisheries and areas to further demonstrate efficacy. Development of technical specification required.	None. Recommended on the basis that shortening aerial extent of monitoring cables will, intuitively, reduce seabird strikes.
General measures					
Area closures	Avoiding fishing at peak areas and during periods of intense foraging activity has been used effectively to reduce bycatch in longline fisheries. The	An important and effective management response, especially for high risk areas, and when other measures prove ineffective. There is a risk that temporal/spatial closures could displace fishing	Must be combined with other measures, both in the specific areas when the fishing season is opened, and also in adjacent areas to	Further information about the seasonal variability in patterns of species abundance around trawl fisheries.	No work done but highly recommended

Measure	Scientific evidence for effectiveness in pelagic fisheries	Caveats /Notes	Need for combination	Research needs	Minimum standards / Recommendation
	principles are directly transferrable to trawl and other net fisheries. In some studies, longline-associated mortality has been almost exclusively within the breeding season of seabirds. Several studies have also shown that proximity to breeding colonies is an important determinant of seabird bycatch rates (Moreno et al. 1996; Nel et al. 2002) and temporal closures around breeding areas contributed to a substantial reduction in seabird bycatch (Croxall & Nicol 2004	effort into neighbouring or other areas which may not be as well regulated, thus leading to increased incidental mortality elsewhere.	ensure displacement of fishing effort does not merely lead to a spatial shift in the incidental mortality.		

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ANNEX 6: Summary Advice Statement for reducing impact of pelagic and demersal trawl gear on albatrosses and petrels

The most effective measure to reduce incidental take of seabirds in trawl fisheries is the effective management of offal discharge and fish discards through full retention of all waste material, or mealing (the conversion of waste into fish meal waste reducing discharge to sump water). In the absence of this it is critical not to discharge offal or fish discards during shooting and hauling.

Other measures shown to be effective are:

Cable strike

- actively deterring birds from trawl warps and netsonde monitoring cables (or 3rd wires) during trawling by means of bird scaring lines;
- installation of a snatch block, placed on the stern of a vessel, to draw the third-wire close to the water to reduce its aerial extent;

Net entanglement

- cleaning of nets after every shot to remove stickers and other benthic material to discourage bird attendance during shooting of gear;
- minimising 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, net binding applied to meshes ranging from 120–800 mm, together with a minimum of 400 kg weight incorporated into the net belly.

Further measures include avoiding peak areas and periods of seabird foraging activity. It is important to note that there is no single solution to reduce or avoid incidental mortality of seabirds in trawl fisheries, and that the most effective approach is to use the measures listed above in combination. Avoiding fishing at peak areas and during periods of intense foraging activity has been used effectively to reduce bycatch in longline fisheries, and this principle is directly transferrable to trawl and other net fisheries.

Background

In recent years the focus on seabird mortality in longline fisheries has been broadened to include stern trawl fisheries, particularly in the Southern Hemisphere. This is reflected in the recently adopted FAO Best Practice Guidelines for IPOA/NPOA-Seabirds (FAO 2008), which includes trawl fisheries in addition to longline fisheries. The causes of mortality in trawl fisheries are varied and depend on the nature of the fishery (pelagic or demersal) and the species targeted, however, it may be categorised into two broad types: cable-related mortality, including collisions with net monitoring cables, warp cables and paravanes; and net-related mortality, which includes all deaths caused by net entanglement.

Global concern over the extent of seabird bycatch was a major reason for the establishment of the Agreement on the Conservation of Albatrosses and Petrels (ACAP). ACAP has comprehensively reviewed the scientific literature dealing with seabird bycatch mitigation in trawl fisheries and this document is a distillation of the review (available from the ACAP website).

Annex 7: Review of Seabird Bycatch Mitigation Measures for Demersal Longline Fishing and identification of knowledge gaps

Mitigation measure	Scientific evidence for effectiveness in demersal fisheries	Caveats /Notes	Need for combination	Research needs	Minimum standards
1. Avoiding peak areas and periods of seabird foraging activity					
Night setting	(Ashford et al. 1995; Cherel et al. 1996; Moreno et al. 1996; Barnes et al. 1997; Ashford & Croxall 1998; Weimerskirch et al. 2000; Belda & Sánchez 2001; Nel et al. 2002; Ryan & Watkins 2002; Sánchez & Belda 2003; Reid et al. 2004)	Bright moonlight and decklights reduce the effectiveness of this mitigation measure (Cherel et al. 1996; Klaer & Polacheck 1998). Not as effective for crepuscular/nocturnal foragers such as the white-chinned petrel but even for these species night setting is more effective than setting during the day (Ashford et al. 1995; Gómez Laich et al. 2006; Weimerskirch et al. 2000; Nel et al. 2002). In order to maximise effectiveness of this mitigation measure, decklights should be off or kept to an absolute minimum, and used in combination with additional mitigation measures, especially when setting in bright moonlight conditions. Night setting is not a practical option for fisheries operating at high latitudes during summer. Setting should be completed at least 3 hours before sunrise to avoid the predawn activity white-chinned petrels (Barnes et al. 1997)	Recommend combination with bird scaring lines and/or weighted lines, especially to reduce incidental mortality of birds that forage at night	Effect of night setting on catch rates of target species for different fisheries.	Night defined as the period between the times of nautical twilight (nautical dark to nautical dawn)

Area and seasonal closures	A number of studies have reported marked seasonality in seabird bycatch rates, with the majority of deaths taking place during the breeding season (Moreno et al. 1996; Ryan et al. 1997; Ashford & Croxall 1998; Ryan & Purves 1998; Ryan & Watkins 1999; Ryan & Watkins 2000; Weimerskirch et al. 2000; Kock 2001; Nel et al. 2002; Ryan & Watkins 2002; Croxall & Nicol 2004; Reid et al. 2004; Delord et al. 2005). In some studies, mortality has been almost exclusively within the breeding season. Several studies have also shown that proximity to breeding colonies is an important determinant of seabird bycatch rates (Moreno et al. 1996; Nel et al. 2002). The much higher rate of seabird bycatch during the breeding period led to the temporal closure of the fishery in	It's difficult to separate the temporal closure from the increased uptake/implementation of other mitigation measures, but it is clearly an important and effective management response, especially for high risk areas, and when other measures prove ineffective. There is a risk that temporal/spatial closures could displace fishing effort into neighbouring or other areas which may not be as well regulated, thus leading to increased incidental mortality elsewhere.	Must be combined with other measures, both in the specific areas when the fishing season is opened, and also in adjacent areas to ensure displacement of fishing effort does not merely lead to a spatial shift in the incidental mortality.	Further information about the seasonal variability in patterns of species abundance, and particularly how these interact with the spatial and temporal characteristics of fishing effort, especially for high risk areas (e.g. adjacent to important breeding colonies). In some studies, incidental mortality has been greatest during the chick-rearing period (Nel et al. 2002; Delord et al. 2005), whereas others have reported highest mortality during the incubation period (Reid et al. 2004). This difference likely relates to where the birds are foraging in relation to fishing effort at the time, and highlights the importance of understanding this interaction. Research is also required to determine the regional impact of closures on catches of target species	Currently, the area around South Georgia (CCAMLR Subarea 48.3) is open from May 1st. to Aug. 31st or till established catch limit is reached, as provided for by CCAMLR Conservation Measures in force. (41-02/2007).

	CCAMLR sub-area 48.3 from 1998, which contributed to a ten-fold reduction in seabird bycatch (Croxall & Nicol 2004). Movement of fishing effort away from the Prince Edward Islands coincided with a reduction in seabird bycatch in the sanctioned Prince Edward Island fishery.				
2. Reducing the time baited hooks are near or on the surface and thus available to birds					
Externally weighted lines	(Agnew et al. 2000; Robertson 2000; Melvin et al. 2001; Moreno et al. 2006).	It is important that tension astern is minimised to optimise the sink rate of the line weighting regime. This can be done by preventing hooks snagging on baskets/boxes and by ensuring that weights are released from the vessel before line tension occurs (Robertson et al. 2008a,b). Various methods are used to ensure smooth flow of hooks and avoid entanglements. On autoliners, this is achieved by ensuring the correct looping of the line on racks and oiling the line. On the Spanish system it is achieved by correct packing of the lines and hooks and using boxes with smooth edges. Externally attached weights must be attached and removed for each set-haul cycle, which is onerous	Must be combined with other measures, especially bird scaring lines, judicious offal management and/or night setting.	Sink rates and profiles of line weighting regimes may vary according to vessel type, setting speed, how the line is set (relative to the propeller wash for example). It is important that the sink rate relationships of different line weighting regimes are understood for a particular fishery (or fishery method) and that the effectiveness of the line weighting regime and the sink profile in reducing seabird mortality is tested.	Global minimum standards not established. Requirements vary by fishery and vessel type. For example, CCAMLR minimum requirements for vessels using the Spanish method of longline fishing are 8.5kg mass at 40m intervals (if rocks are used), 6kg mass at 20m intervals for traditional (concrete) weights, and 5kg weights at 40m intervals for solid steel weights. For autolines, CCAMLR requires as a minimum 5kg mass at intervals no more than 40m. It is also required that weights be released before line tension occurs. In the New Zealand

		and potentially hazardous for crew members. Weights made up of rocks enclosed in netting bags and concrete blocks deteriorate and require ongoing maintenance/replacement and monitoring to ensure the required mass is made up (Otley 2005); standard mass weights of steel are better in this respect, both from a handling and compliance perspective (Robertson et al. 2008b). Longlines with externally added weights sink unevenly, faster at the weights than at the midpoint between weights, Gear configuration and setting speed influence the sink rate profiles of the hook lines (Seco Pon et al. 2007), but the principle determinants of sink rates are the mass of the weights and the distance between weights (Robertson et al. 2008a). See later section on the Chilean longline system.			fisheries, a minimum of 4kg (metal weight) or 5kg (non-metal weight) be attached every 60m if the hook bearing line is 3.5mm or greater in diameter, and a minimum of 0.7kg of weight every 60m when the line is less than 3.5mm diameter. The New Zealand minimum standards also include requirements relating to the use of floats.
Integrated weighting of lines	Apart from the practical advantages of integrated weight (IW) longlines – superior handling qualities and practically inviolable – the IW longlines sink more quickly and uniformly out of reach of most seabirds compared with	Restricted to autoline vessels. The sink rate of IW longlines can vary depending on vessel type, setting speed and deployment of line relative to propeller wash (Melvin & Wainstein 2006; Dietrich et al. 2008). Setting speed influences the extent of the seabird access window – the area in which most seabirds are still able to access the baited hooks in the	Recommended combination with bird scaring lines, judicious offal management and/or night setting.	The relationship between line-weighting regime, setting speed, sink rates/profiles and the seabird access window should be investigated for other fisheries (i.e. those that haven't already been tested –Bering Sea, Alaska, and New Zealand ling fishery) including with additional mitigation	Global minimum standards not in place. CCAMLR currently require as a minimum IW lines with a lead core of 50g/m, which is also required in the New Zealand demersal longline fishery.

	externally weighted lines. IW longlines have been shown to reduce substantially mortality rates of surface foragers and diving seabirds, while not affecting catch rates of target species (Robertson et al. 2002; Robertson et al. 2003; Robertson et al. 2006; Dietrich et al. 2008)	absence of bird scaring lines (Dietrich et al. 2008). Use of IW lines is likely to increase the portion of the line on the seafloor, and may lead to increases in the bycatch of vulnerable fish, shark and ray species. This may be mitigated by placing a weight and a float on a 10m line at the point of the dropper line attachment, thus ensuring the line sinks rapidly to 10m, out of reach of vulnerable seabirds, but remains off the seabed (Petersen 2008).		measures (particularly bird scaring lines); these investigations would be useful in determining the necessary aerial extent of the bird scaring lines.	
Side setting	Has not been widely tested in demersal longline fisheries. In trials in the New Zealand ling fishery, side setting appeared to reduce seabird bycatch; however, the results were not convincing and there were practical/operational difficulties, with the line becoming entangled in the propeller (Bull 2007). Sullivan (2004) reported that side setting has been used in some demersal fisheries (e.g. shark fisheries) which have experienced negligible incidental	Practical difficulties, especially in difficult weather/sea conditions. In many cases it may be difficult and expensive converting the vessel's deck design to employ a side setting system.	Must be used in combination with other mitigation measures, especially the use of a bird curtain (Gilman et al. 2007), and bird scaring lines.	Largely untested in the demersal fisheries, especially in the Southern Ocean, where the seabird assemblages include proficient diving seabirds. Research urgently needed.	Only in Hawaii for the pelagic longline fisheries, where it is used in conjunction with a bird curtain and weighted branch lines (45g within 1m of hook); side setting is defined as a minimum of 1m forward of the stern.

	mortality.				
Underwater setting funnel/chute	An underwater setting funnel has been tested in demersal longline fisheries in Alaska, Norway and South Africa, with all studies showing a reduction in the mortality rate, although the extent of the reduction varied between studies (Løkkeborg 1998, 2001; Melvin et al. 2001; Ryan & Watkins 2002).	Present design is mainly for a single line system. Results from studies to date have been inconsistent, likely due to the depth at which the device delivers the baited hooks and the diving ability of the seabirds in the fishing area studied. The pitch angles of the vessel, which are influenced by the loading of weight and sea conditions, affect the performance of the funnel (Løkkeborg 2001).	Must be used in conjunction with other mitigation measures – bird scaring lines, weighted lines, night setting and judicious offal management.	Need to investigate improvements to the current design to increase the depth at which the line is set, especially during rough seas. Should also be tested with integrated weight lines to determine whether this improves bycatch reduction. Also need to investigate optimal use of device together with other mitigation measures (bird scaring lines and weighted lines).	Not yet established
Line setter/shooter	Less used in demersal long-line fisheries; variation in the precise method of operation is cause of variation in efficacy.. Reduced bycatch of northern fulmars relative to sets with no mitigation measures in trials conducted in Norway, but not significantly (Løkkeborg & Robertson 2002; Løkkeborg 2003). However, seabird bycatch in Alaska increased when a line shooter was used (Melvin et al. 2001).	A significant reduction in seabird bycatch when setting with a line shooter has not yet been demonstrated. At this stage it should be seen as a supplementary measure in need of further refinement. Robertson et al. (2008c) found no significant difference between the sink rates of integrated weight longlines of autoline vessels that were set with and without a line setter in the Ross Sea, and were doubtful that the use of line setters would lead to substantial reductions in interactions between seabirds and longlines.	Must be combined with other measures, such as bird scaring lines, night setting, weighted lines and judicious offal management.	Need to investigate whether refinement/modification of the device will be able to overcome the problem of propeller wash and ensure consistently rapid sink rates and significantly reduced seabird mortality.	Not yet established

Thawing bait	Not as much of an issue compared with pelagic longlining. For autoliners, the bait must be at least partially thawed before they can be sliced by the automated baiting system; in the Spanish system, the interval between manually baiting the hooks and setting the lines is sufficiently long to allow for thawing (except in very low ambient temperatures); and the line weighting regime overcomes most of the problems with frozen bait (Brothers et al. 1999).	Supplementary measure. Must be combined with the range of other measures already described. Well thawed bait comes off the hooks more easily when deployed from the vessel than half-thawed or frozen bait (Brothers et al. 1999).		There is some evidence that the number of seabirds caught varies according to the type of bait used (Weimerskirch et al. 2000). This should be investigated further.	
3. Actively deterring birds from baited hooks					
Single bird scaring line	The use of a single bird scaring line has been shown to be an effective mitigation measure in a range of demersal longline fisheries, especially when used properly (Moreno et al. 1996; Løkkeborg 1998, 2001; Melvin et al. 2001; Smith 2001; Løkkeborg & Robertson 2002;	Effective only when streamers are positioned over sinking hooks. Single bird scaring lines can be less effective in strong crosswinds (Løkkeborg 1998; Brothers et al. 1999; Agnew et al. 2000; Melvin et al. 2001; Melvin et al. 2004). In the event of strong crosswinds, bird scaring lines should be deployed from the windward side. This problem can also be overcome by using paired bird scaring lines (see below).The	Effectiveness is increased when used in combination with other measures – e.g. night setting, appropriate weighting of line and judicious offal management.	The use and specifications/performance standards are fairly well established in demersal longline fisheries. However, there is scope to improve further the effectiveness and practical use of bird scaring lines on individual vessels or vessel type.	Current minimum standards vary. CCAMLR was the first conservation body that required all longline vessels in its area of application to use bird scaring lines (Conservation Measure 29/X adopted in 1991). The bird scaring line has gone on to become the most commonly applied mitigation measure in longline fisheries

	Løkkeborg 2003)	effectiveness of the bird scaring lines is also dependent on the design, the aerial coverage of the bird scaring line , seabird species present during line setting (proficient divers being more difficult to deter from baits than surface feeding birds) and the proper use of the bird scaring line. The aerial coverage and the position of the bird scaring line relative to the sinking hooks are the most important factors influencing their performance. There have been a few incidents of birds becoming entangled in bird scaring lines (Otley et al. 2007). However it must be stressed that the numbers are minuscule, especially when compared with the number of mortalities recorded in the absence of bird scaring lines. Bird scaring lines remain a highly effective mitigation measure, and efforts should be directed to improving further their design and use so that their effectiveness can be improved further.			worldwide (Melvin et al. 2004). CCAMLR currently prescribes a range of specifications relating to the design and use of bird scaring lines. These include the minimum length of the line (150m), the height of the attachment point on the vessel (7m above the water), and details about streamer lengths and intervals between streamers. Other fisheries have adapted these measures. Some, such as those in New Zealand and Alaska have set explicit standards for the aerial coverage of the bird scaring lines, which varies according to the size of the vessel.
Paired or multiple bird scaring lines	Several studies have shown that the use of two or more streamer lines is more effective at deterring birds from baited hooks than streamer line (Melvin et al. 2001; Sullivan & Reid 2002; Melvin	Potentially increased likelihood of entanglement with other gear. Use of an effective towed device that keeps lines from crossing surface gear essential to improve adoption and compliance. See also above comment about bird entanglements in bird scaring	Effectiveness is increased when used in combination with other measures – e.g. night setting, appropriate weighting of line and judicious offal	Further trialling in fisheries which currently only use single streamer lines.	Paired streamer lines required in Alaskan fisheries and encouraged/recommended by CCAMLR, except in the French exclusive economic zone (CCAMLR Subarea 58.6 and Division 58.5.1), where paired

	2003; Melvin et al. 2004; Reid et al. 2004). The combination of paired streamer lines and IW longlines is considered the most effective mitigation measure in demersal longline fisheries using autoline systems (Dietrich et al. 2008).	lines. Manually attached and operated paired or multiple bird scaring lines requires some effort to operate (a 150m double line takes about 8-10 men to retrieve). One way of overcoming this is to make use of electronic winches.	management.		streamer lines have been compulsory since 2005. Paired streamer lines have also been required in the Australian longline fisheries off Heard Island since 2003 (Dietrich et al. 2008)
Haul mitigation	The use of a bird exclusion device such as a Brickle curtain can effectively reduce the incidence of birds becoming foul hooked when the line is being hauled (Brothers et al. 1999; Sullivan 2004; Otley et al. 2007; Reid et al. submitted, Snell et al. in prep.).	Some species, such as the black-browed albatross and cape petrels, can become habituated to the curtain, so it is important to use it strategically – when there are high densities of birds around the hauling bay (Sullivan 2004).	Must be used in combination with other mitigation measures – bird scaring lines at setting, line weighting, night setting and judicious offal management.		A device designed to discourage birds from accessing baits during hauling operations is required in high risk CCAMLR areas (exact design not specified, but it is required that they fulfil two operational characteristics: 1) deter birds from flying into the area where the line is being hauled, and 2) prevents birds that are sitting on the surface from swimming into the hauling bay area). Also required in the Falkland Islands (Islas Malvinas) longline fishery, where the Brickle Curtain is recommended (Snell et al, in prep).

Olfactory deterrents	Dripping shark liver oil on the sea surface behind vessels has been shown to effectively reduce the number of seabirds (restricted to burrow-nesting birds) attending vessels and diving for bait in New Zealand (Pierre & Norden 2006; Norden & Pierre 2007).	The shark liver oil did not deter albatrosses, giant petrels, or Cape Petrels from boats (Norden & Pierre 2007). The potential impact of releasing large amounts of concentrated fish oil into the marine environment is unknown, as is the potential for contaminating seabirds attending vessels and the potential of seabirds to become habituated to the deterrent (Pierre & Norden 2006).	Must be used in combination with other mitigation measures – bird scaring lines at setting, line weighting, night setting and judicious offal management – especially until further testing has been conducted.	Testing should be extended to candidate/suitable species of conservation concern, such as white-chinned petrels and sooty shearwaters. Research is also required to identify the key ingredients in the shark oil that are responsible for deterring seabirds, and the mechanism by which the birds are deterred. The potential "pollution" effects also need to be investigated.	None yet.
4. Reducing attractiveness and visibility of baited hooks and attractiveness of vessel to birds					
Strategic management of offal discharge	Some studies have shown that dumping homogenised offal (which is generally more easily available and thus attractive to seabirds than bait) during setting attracts birds away from the baited line to the side of the vessel where the offal is being discharged, and thus reduces bycatch of seabirds on the baited hooks (Cherel et al. 1996; Weimerskirch	Although strategic offal discharge has been shown to be effective at reducing seabird bycatch around Kerguelen Island, there are many risks associated with the practice. Offal discharge needs to be continued throughout the setting operation so as to ensure the birds do not move on to the baited hooks. This will only be possible in fisheries where line setting is short, and there is sufficient offal to sustain the line-setting period. This measure also has the potential to foul hook birds if offal is	Must be used in combination with other mitigation measures – bird scaring lines. line weighting, and night setting.	Further information needed on opportunities to manage offal more effectively – considering both practical aspects and seabird bycatch mitigation – in the short and long term.	In CCAMLR demersal fisheries, discharge of offal is prohibited during line setting. During line hauling, storage of waste is encouraged, and if discharged must be discharged on the opposite side of the vessel to the hauling bay. A system to remove fish hooks from offal and fish heads prior to discharge is required. Similar requirements are prescribed by other demersal longline fisheries

	et al. 2000).	discharged with hooks. It is crucial, then, that all offal is checked for hooks before being discharged. Given these risks, and the fact that the presence of offal is a critical factor affecting seabird numbers attending vessels, most fisheries management regimes require that no offal can be discharged during line setting, and that if discarding is necessary at other times it should take place on the side of the vessel opposite to where the lines are being hauled.			(e.g. Falkland Islands (Islas Malvinas),[4] South Africa and New Zealand)
Blue-dyed bait	The performance of this measure has only been tested in the pelagic longline fishery (Boggs 2001; Minami & Kiyota 2004; Gilman et al. 2007; Cocking et al. 2008), and with mixed success.	New data suggests that this measure is only effective with squid bait (Cocking et al. 2008). It has not been tested in demersal fisheries, possibly due to larger number of hooks deployed and thus the need for considerably more bait (Bull 2007). There is no commercially available dye. Onboard dyeing is practically onerous, especially in inclement weather. In the long-term birds may become habituated to blue-dyed bait.	Must be used in combination with other mitigation measures – bird scaring lines. line weighting, night setting and judicious offal management	Need for tests of efficacy and practical feasibility in demersal longline fisheries, especially in the Southern Ocean to determine its effectiveness as a long-term mitigation measure. Research would also need to determine the effect of dyed bait on catches of target species.	Mix to standardized colour placard or specify (e.g. use 'Brilliant Blue' food dye (Colour Index 42090, also known as food additive number E133) mixed at 0.5% for a minimum of 20 minutes).
5. Other					
Hook size and shape	Hook size was found to be an important determinant in seabird bycatch rates of Argentinean and	Other than the finding in Moreno et al (1996), little or no work has been conducted to investigate the impact of hood design and shape on seabird	Must be used in combination with other mitigation measures – bird scaring lines. line	Determine impact on seabird bycatch and on catch of target species	No global standard

[4] *A dispute exists between the Governments of Argentina and the United Kingdom of Great Britain and Northern Ireland concerning sovereignty over the Falkland Islands (Islas Malvinas), South Georgia and the South Sandwich Islands (Islas Georgias del Sur e Islas Sandwich del Sur) and the surrounding maritime areas.*

	Chilean longline vessels fishing in Subarea 48.3 in the 1995 season, with smaller hooks killing significantly more seabirds than larger hooks (Moreno et al. 1996)	bycatch levels.	weighting, night setting and judicious offal management		
Gear configuration – Chilean method (linked with the sink rates)	A new method of demersal longline fishing, called the Chilean longline method, developed from the Chilean artisanal toothfish fishery, has been shown to reduce significantly seabird bycatch as a consequence of significantly faster sink rates compared with traditional longline systems (Moreno et al. 2006; Moreno et al. 2008; Robertson et al. 2008b). This system makes use of net sleeves or 'cachaloteras' which slide down over the hooks and captured fish during hauling and thus protect fish from toothed whales. The configuration of the Chilean system is	This is a new system and should be monitored and possibly refined further. Concern has been raised about the excessive discard of unwanted hooks that may be associated with this longline system, and the ingestion of these hooks by seabirds (Phillips et al. 2010). The solution to this problem is to stop hooks from being discarded in the first place. This is best achieved by banning the discarding of hooks as part of the licence conditions, as is already done in many fisheries, and also increasing awareness amongst fishers, observers and operators to facilitate compliance with such a ban.	One of the few techniques that is effective on its own. Preferably use in combination with bird scaring lines.	Test broader applicability and test impact on fish bycatch. The relationship between weight mass, weight type and sink rate should be investigated to determine the minimum weight requirement. The Chilean system is used primarily to prevent depredation of caught fish by cetaceans, the by-product of which is significantly reduced seabird bycatch. Given the possibility that cetaceans may become habituated to the net sleeves over time, it is important that the efficacy of this system at deterring cetaceans continues to be monitored.	No global standards yet

	such that all the hooks are directly above the weights ensuring a rapid sink rate. This system was first tested on large longline vessels in 2005. Because of the effectiveness of the Chilean longline system in reducing impacts of toothed whales, it is currently used in many longline fleets operating in South American waters (Moreno et al. 2008), as well as in the south west Atlantic.				

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ANNEX 8: Summary Advice Statement for reducing impact of demersal longlines on albatrosses and petrels

Summary

The most effective measures to reduce incidental take of seabirds in demersal longline fisheries are:

- use of an appropriate line weighting regime to reduce the time baited hooks are near or on the surface and thus available to birds,
- actively deterring birds from baited hooks by means of bird scaring lines, and
- setting by night.

Further measures include bird deterrent curtains at the hauling bay, responsible offal management and avoiding peak areas and periods of seabird foraging activity. It is important to note that there is no single solution to reduce or avoid incidental mortality of seabirds in demersal longline fisheries, and that the most effective approach is to use the measures listed above in combination.

Introduction

The incidental mortality of seabirds, mostly albatrosses and petrels, in longline fisheries has been of growing global concern. This was a major reason for the establishment of the Agreement on the Conservation of Albatrosses and Petrels (ACAP). A large number of mitigation methods to reduce and eliminate seabird bycatch has been developed and tested over the last 10 to 15 years, especially for demersal longline fisheries. Within demersal longlining, there are different systems – the autoline system, the Spanish double line system, and more recently the Chilean system. Although most mitigation measures will be broadly applicable, the feasibility, design and effectiveness of some measures will be influenced by the type of longlining method and gear configuration used. In particular it should be noted that most scientific literature relates to fleets of larger vessels, with longline usage from artisanal fleets receiving less attention. Some of this advice may need to be modified for smaller vessels. ACAP has comprehensively reviewed the scientific literature dealing with seabird bycatch mitigation in demersal fisheries and this document is a distillation of the review (available from the ACAP website).

Best practice mitigation measures for demersal longline fisheries are listed below; the first recommendation is a general measure followed by those for line setting and line hauling.

Best practice measures - general

Area and seasonal closures

- The temporary closure of important foraging areas (e.g. areas adjacent to important seabird colonies during the breeding season when large numbers of aggressively feeding seabirds are present) has been a very effective way to reduce incidental mortality of seabirds in fisheries in those areas.

Best practice measures - line setting

Line weighting

- Lines should be weighted to get the baited hooks rapidly out of the range of feeding seabirds. While the amount and spacing of weights may vary depending on the type of fishing gear in use, the objective should be to achieve a sink rate of at least 0.24 to 10 m depth, respectively. Weights should be deployed before line tension occurs to ensure that the line sinks rapidly out of reach of seabirds.

Weighted lines for Spanish gear

- Steel weights are considered best practice. The mass should be a minimum of 5kg at 40m interval.

(Where steel weights are not used, longlines should be set with a minimum of 8.5kg at 40m intervals when using rocks, and a minimum of 6kg at 20m intervals when using concrete weights).

Weighted lines for autoline gear

- Integrated weight longlines (IWL) are designed with lead core of 50g/m, and are effective at sinking quickly out of reach of foraging seabirds.
- Where it is practical to use IWL gear in a fishery, IWL is preferred over externally weighted alternatives because of its consistent ability to achieve the minimum sink rate.

(When using external weights, ensure a minimum mass of 5kg at intervals no more than 40m).

Night setting

- Setting longlines at night, between the times of the end of nautical twilight and before nautical dawn) is effective at reducing incidental mortality of seabirds because the majority of vulnerable seabirds are diurnal foragers.

Bird scaring lines

- Bird scaring lines are designed to provide a physical deterrent over the area where baited hooks are sinking.
- Two bird scaring lines should be used.
- The design of the bird scaring lines should include the following specifications:
- The attachment height should be at least 7m above sea level.
- The lines should be at least 150m long to ensure the maximum possible aerial extent.
- Streamers should be brightly coloured and reach the sea-surface in calm conditions, and placed at intervals of no more than 5m.
- A suitable towed device should be used to provide drag, maximise aerial extent and maintain the line directly behind the vessel during crosswinds.

Offal and discard discharge management

- Seabirds are attracted to offal that is discharged from vessels. Ideally offal should be retained onboard but if that is not possible, offal and discards should not be discharged while setting lines.

Best practice measures - line hauling

Bird deterrent curtain/Brickle curtain

- During hauling operations birds can accidentally become hooked as gear is retrieved. A curtain, consisting of a horizontal support with vertical streamers that reach the water surface, should be deployed to prevent birds entering the area around the hauling bay either by swimming or by flying.

Offal and discard discharge management

- Ideally offal should be retained onboard, but if that is not possible offal and discards should be either, preferably, retained on board during hauling or released on the opposite side of the vessel to the hauling bay.
- All hooks should be removed and retained on board before discards are discharged from the vessel.

Further options

Chilean method

- The Chilean method of longline fishing was designed to prevent toothed whale depredations of fish. Because weights are deployed directly below the hooks, the lines sink rapidly, making it an effective method of for avoiding bycatch of foraging seabirds.
- Care must be taken to not discard any hooks.

The following mitigation options are **not** recommended best practice:

Hook design, olfactory deterrents, and **underwater setting chutes** have been insufficiently researched. **Side setting** has been insufficiently researched and there have been operational difficulties. **Blue-dyed bait**, **thawed bait** and the **use of a line setter** are not relevant in demersal longline gear.

ANNEX 9: SBWG Work Programme 2010 – 2012 Amended from AC Work Plan

	Topic/Task	Responsible group	Timeframe	Action detail
4.1	To consolidate Seabird Bycatch Working Group	Parties with assistance of Convenor of SBWG	End of September 2008	Brazil, Ecuador, France, Norway, Peru, Spain, Uruguay and further interested Range States to nominate working group members
4.2	Continue to develop and implement the interaction plan for ACAP and relevant Parties to engage and assist RFMOs and other relevant international organisations to assess and minimise bycatch of albatrosses and petrels	SBWG and AC	1) End Aug 2008 2) End Mar 2009 3) 4) and 5) 2010-2012	1) Agree initial plan and nominate first RFMO coordinators (AC) 2) Analysis of needs, coordination of work and report back on initial RFMOs (RFMO coordinators intersessionally with SBWG, AC and Parties, as described in AC4 Doc 56) 3) Attendance at selected RFMO meetings 4) Review of process and suggest any changes (SBWG). (Further funds may be required). 5) RFMO by RFMO development of strategies for engagement (commenced by AC5)
4.3	Continue to review availability of albatross and petrel tracking/distribution data to ensure representativeness of species/age classes. Prioritise gaps and encourage studies to fill gaps.	SBWG, AC, Parties and BirdLife International	2010-2012	Review status at AC5, AC7, AC9
4.4	Complete reports on analysis of overlaps of distributions and albatrosses and petrels with fisheries managed by RFMOs	BirdLife / ACAP	1) Oct 2008 2) 2011 3) 2011	1) Complete last of initial five reports (already funded) Completed by AC5 2) Analysis of information for remaining RFMOs including those managing trawl fisheries (by AC6) 3) Review if updated overlap analyses required (AC6)

	Topic/Task	**Responsible group**	**Timeframe**	**Action detail**
4.5	Develop and keep under review materials (both generic and specific) to assist RFMOs and other relevant international and national organisaions in reducing seabird bycatch and to maximise effective participation and consideration of issues relevant to ACAP	NZ / SBWG /UK UK/BirdLife	1) 2011 2) 2010-2012	1) Observer programme designs including protocols for the collection of seabird bycatch data, with consideration of analytical methods for assessing seabird bycatch to be examined first. Info paper from UK in 2011 2) Summary of risk assessment methods and key contacts in this area. Priority decided inside the RFMO interaction plan. First draft paper considered at AC5. Further editorial work required to develop ERA toolkit. Ideal for Brisbane Tuna Commissions meeting. (Further funds may be required)
4.6	Review and utilise available information on foraging distribution, fisheries and seabird bycatch to assess and prioritise the risk of fishing operations on ACAP species in waters subject to national jurisdiction. Linked to broader prioritisation process	SBWG and Parties	1) 2011 2) 2011	1) Commission initial report on knowledge of fisheries, status of any bycatch mitigation, knowledge of relevant seabird distribution for AC5. Note overlap with 4.4. NPOA seabirds also can be used. 2) Assess needs for waters subject to national jurisdiction and any capacity building requirements
4.7	Define bycatch data requirements from Parties	SBWG (lead USA), [Science Officer]	2009-10	Requires a clear objective statement of purpose, terms of reference and timeline for the collection of bycatch data. Completed by AC5
4.8	Collate information (metadata) on bycatch monitoring schemes and data held by each Party	SBWG (lead USA), [Science Officer]	2009	Requires development of a metadata survey form. Completed by AC5
4.9	Develop a prototype bycatch data collection form with comprehensive instructions for completing the form.	SBWG (lead USA), [Science Officer]	2009-10	Completed by AC5
4.10	Test and develop bycatch data collection form	SBWG (lead USA), [Science Officer]	2009-2010	A sample of Parties to test and evaluate the utility of the form and appropriateness of its questions based on the sample completed forms and revise as necessary. Approaching completion, but no formal evaluation yet.
4.11	Incorporate bycatch data collection form into standard Party reports	AC	2009-2010	

	Topic/Task	**Responsible group**	**Timeframe**	**Action detail**
4.11a	Analyse bycatch information from Party reports to determine if it can deliver the products required in evaluating bycatch	Secretariat and SBWG	By AC6 deadlines	Additional resources may be needed by Secretariat
4.12	Create and maintain a bibliography of relevant bycatch information	BirdLife/SBWG (Secretariat)	2010-2012	BirdLife producing report /database. To include both published and unpublished literature
4.13	Maintain tabular reviews and develop summary advice on mitigation measures for fishing methods known to impact albatrosses and petrels (demersal longline, pelagic longline, and trawl). Maintain individual mitigation fact sheets	Leads: New Zealand (trawl), Australia (Pelagic LL), UK (Demersal LL), BirdLife (individual mitigation measures) (BirdLife/SBWG)	2010 2011-2012	Initial versions of each tabular review and summary advice completed by AC5 Individual mitigation fact sheets completed by AC5) Process/costs still need to be agreed
4.14	Produce report on lessons from mitigation success stories in commercial fisheries	BirdLife/ Australia/ Convenor SBWG	2010-2012	
4.15	Assist in the preparation, adoption and implementation of FAO NPOA-Seabirds or equivalent	SBWG and Parties/ Range States	2010	FAO expert consultation including ACAP input scheduled for September 2008. Completed and published in March 2010.
4.15a	Review existing NPOA seabirds in light of new FAO Technical guidelines	SBWG	2011	Leads: Convenor SBWG, Ben Sullivan
4.16	Prepare review of knowledge on deliberate take/killing of ACAP species at sea	Australia/ Brazil/ New Zealand/ Peru/ UK/ WWF/ SBWG Needs a clear lead	2011	Review to describe current knowledge (much from unpublished literature) and causes of any deliberate take and to consider possible take reduction strategies
4.17	Review results of any research funded by ACAP on seabird bycatch issues	SBWG	2010-2012	Draw conclusions and make recommendations to AC as appropriate
4.17a	Review any other relevant mitigation research	SBWG	2010-12	Draw conclusions and make recommendations to AC as appropriate
4.18	Maintain review of research needs and priorities for bycatch research and mitigation development	SBWG	2010-2012	Gill-netting to be examined in 2011
4.19	Provide and consider annual reports to AC on WG activities	SBWG and AC	2010-2012	

	Topic/Task	Responsible group	Timeframe	Action detail
4.20	Estimate mortality in previously unobserved fisheries in range of Waved albatross	Ecuador and Peru, BirdLife, AC, American Bird Conservancy	2010	Part of implementation from Waved Albatross Action Plan
5.1	Develop strategy for capacity building	AC Chair, New Zealand, Brazil, Argentina, Ecuador, Chile	2010	Utilising work on potential projects by Brazil and AC and including potential sources of funding
5.2	Improve seabird data collection from observer programmes in South America	All South American Parties	2010-2012	Development of a South American seabird observers course, development of standard methodology (see also 4.5) and exchange of observers between Parties
5.3	2nd South American Fishers Forum	All South American Parties, Southern Seabird Solutions, WWF	December 2009	Some support would be welcome Did not take place
5.4	Provide assistance and capacity building to ensure drafting and implementation of NPOA-Seabirds	AC and Parties to consider	2010-2012	Capacity building in accordance with the needs identified by interested Parties in order to encourage implementation, particularly in Argentina, Ecuador France, Peru, South Africa, (Mozambique, Madagascar), Tristan da Cunha (UK), and EC external fisheries
5.5	Technical Cooperation to train observers and develop an observers programme in Ecuador	Argentina, Ecuador, BirdLife International, American Bird Conservancy	2008 - 09	Part of Waved Albatross Action Plan implementation
5.6	Development of an observers programme in Peru	Peru, BirdLife International, American Bird Conservancy	2009	Part of Waved Albatross Action Plan implementation

ANNEX 10 Statement from the Argentine Republic

The Argentine Republic reminds that the Islas Malvinas, Georgias del Sur and Sandwich del Sur and the surrounding maritime areas are an integral part of its national territory and, being illegitimately occupied by the United Kingdom of Great Britain and Northern Ireland, are subject to a sovereignty dispute between both countries, recognized by the United Nations.

The United Nations General Assembly adopted Resolutions 2065 (XX), 3160 (XXVIII), 31/49, 37/9, 38/12, 39/6, 40/21, 41/40, 42/19 and 43/25, acknowledging the existence of the sovereignty dispute and urging the Governments of the Argentina and the United Kingdom of Great Britain and Northern Ireland to initiate negotiations with a view to finding the means to resolve peacefully and definitively the pending problems between both countries.

For its part, the Special Committee on Decolonisation of the United Nations has repeatedly pronounced itself in this regard, most recently through a resolution adopted on 18 June 2009.

The British presence in said archipelago and the surrounding maritime spaces constitutes an illegitimate occupation and is rejected by Argentina as well as any other unilateral action resulting from it.

We recall that when the Argentine Republic ratified the Agreement on the Conservation of Albatrosses and Petrels, it rejected the extension of the same made by the United Kingdom to said archipelago and surrounding maritime spaces.

The Argentine Republic reaffirms its sovereignty over the Islas Malvinas, Georgias del Sur and Sandwich del Sur and the surrounding maritime areas.

Further, Argentina requests the Secretariat the use of double nomenclature and the insertion of a footnote regarding the sovereignty dispute between the Government of the Argentine Republic and the Government of the United Kingdom of Great Britain and Northern Ireland, in accordance with Resolution 2.9 adopted by ACAP.

ANNEX 11 Statement from the United Kingdom of Great Britain and Northern Ireland

The United Kingdom deeply regrets the need to make an intervention following the statement by the distinguished delegate of the Argentine Republic.

The UK delegation does not believe that this is the appropriate forum to raise sovereignty issues of any kind, which are outside the scope and purpose of the Agreement on the Conservation of Albatrosses and Petrels, and particularly outside the scope of this scientific working group meeting.

The United Kingdom has no doubt about its sovereignty over the Falkland Islands, South Georgia and the South Sandwich Islands and their surrounding maritime areas.

The principle of self-determination, enshrined in Article 1.2 of the Charter of the United Nations and Article 1 of the International Covenant on Civil and Political Rights, underlies our position on the sovereignty of the Falkland Islands. There can be no negotiation on the sovereignty of the Falkland Islands unless and until such time as the Falkland Islanders so wish. The Islanders regularly make it clear that they wish the Falkland Islands to remain under British sovereignty.

The United Kingdom frequently repeats its position on the Falkland Islands within the International Community, including at the United Nations.

The United Kingdom notes that Resolution 2.9 applies only to documents authored by the Secretariat and other organs of the Agreement and therefore requests that the Secretariat does not extend this Resolution to documents authored by others.

ANNEX 12 Statement from the Argentine Republic

Argentina made reference to documents AC 5 Doc 19, AC 5 Inf 4, SBWG 3 Doc 9, SBWG 3 Doc 18, SBWG 3 Doc 28, SBWG 3 Doc 29 and SBWG 3 Working Document 1, discussed in this meeting. Said documents contain references to the Islas Malvinas, Georgias del Sur y Sandwich del Sur and the surrounding maritime areas that the Argentine Republic rejects, in accordance with the reservation duly made on 29 August 2006, included in its instrument of ratification of ACAP, preserving its legitimate sovereignty rights over the Islas Malvinas, Georgias del Sur and Sandwich del Sur and the surrounding maritime areas.

For that reason, Argentina requests the Secretariat to circulate between the delegates a note to be presented in relation to the use of the double nomenclature and the insertion of a footnote regarding the sovereignty dispute between the Government of Argentina and the Government of the United Kingdom of Great Britain and Northern Ireland, in accordance with Resolution 2.9 adopted by ACAP.

ANNEX 13 Statement from the United Kingdom of Great Britain and Northern Ireland

The United Kingdom notes that Resolution 2.9 applies only to documents authored by the Secretariat and other organs of the Agreement and therefore requests that the Secretariat does not extend this Resolution to documents authored by others.