Agreement on the Conservation of Albatrosses and Petrels

Fourth Meeting of Advisory Committee

Cape Town, South Africa, 22 – 25 August 2008

Title: Report of the Second Meeting of the Seabird Bycatch Working Group, Hermanus, South Africa, 17-18 August 2008

Author: Seabird Bycatch Working Group

1. PURPOSE

This paper reports on discussions and recommendations of the Second 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, Mr Barry Baker welcomed all working group members and observers (Annex 1). Apologies were noted from Ed Melvin (USA), Ramiro Sanchez (Argentina) 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 rapporteur for 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 2. It should be noted that not all Parties are officially represented on the Working Group. Nominations of working group members by France, Spain, Peru, Ecuador and 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 bait pods, smart hooks, safe leads and the underwater setting capsule for the pelagic longline method, and new information on offal treatment for trawl fisheries and the effect of line-setters on hook sink rate.

Safe Leads (Ben Sullivan)

Safe Leads are an alternative line weighting option for pelagic longline fisheries developed by Fishtek (U.K.) and BirdLife International in response to crew safety concerns. During a bite-off (usually by a shark) traditional lead swivels can be slingshot back at the boat at several hundred km/h. Safe Leads offer a new approach to line weighting. They are not crimped into branch lines, but slide onto the lines. During a bite off the weight simply slides towards the end of the branch line (or off the end of the

branch line, depending on the length of the 'bottom'), greatly reducing the recoil force of the stretched line.

BirdLife briefly reported on results of the on-shore and at-sea trials conducted in Australia to test the effectiveness of Safe leads. Both sets of trials indicated that the Safe leads were safer to use than traditional lead swivels. In addition to sliding off the line with 1-2m bottoms, on longer bottoms when Safe Leads were propelled this occurred at a much lower angle, which means they would often strike the side of the boat, posing less risk of injury to fishermen. At-sea trials in Australia are also proving successful, with fishermen preferring to use the Safe Leads than traditional lead swivels. Preliminary trials have also been conducted in Hawaii and New Zealand (http://www.doc.govt.nz/templates/MultiPageDocumentTOC.aspx?id=46392). Safe leads have great potential to increase the uptake of appropriate line weighting in pelagic longline fisheries by providing a safe and easy to use alternative to the traditional lead swivel.

Bait pod (Ben Sullivan)

BirdLife updated the WG on further work with Fishtek (UK) on the development of two types of 'Bait pods' for pelagic longline fisheries:

1. a 'bait pod' that encapsulates the entire hook and a large proportion of the bait and is attached to the mainline and re-usable for several thousand setting operations
2. a 'micro-pod', based on a miniature pressure release system that is designed to cover the barb of the hook. Two versions of the micropod are being developed: one is tethered to the line and the other is disposable.

The pods are designed to prevent seabirds from accessing baits before a pressure sensitive valve operates at a pre-determined depth to release baited hooks. This device is based on new technology that captures the inherently reliable and predictable forces of pressure to operate a release mechanism. The pods are made of a non-polluting polymer and can be produced at a very low unit cost. Preliminary trials are planned for late 2009 to test the operational practicalities of the pods, and these will be followed by more extensive trials to test their effectiveness at reducing seabird bycatch.

Underwater bait setting capsule (Graham Robertson)

SBWG-2 Doc 8 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 a marine engineering company in collaboration with the Australian Antarctic Division. Underwater setting has never been developed for pelagic longline fisheries, but the technique has the potential to greatly reduce, or eliminate, seabird mortality. A MK1 version of the underwater setter has been completed and is scheduled for testing in the Australian tuna fishery in the last quarter of 2008. Plans for 2009 involve testing the bait retention success of hooks deployed with the setter (affects fish capture success) in Australia and conducting an experiment in collaboration with Uruguay to determine the seabird deterrent effectiveness of underwater setting compared to conventional methods

of setting gear. That experiment is scheduled to take place between September and November 2009 and the results should e available by early 2010.

NZ offal management update (Johanna Pierre)

Recent New Zealand research in deepwater trawl fisheries has investigated several questions around trawler seabird bycatch. Specifically, the effects of mincing fish offal and discards prior to release, retaining waste on board, and releasing discharge at certain stages through the fishing cycle are being investigated. From work in 2006 on the effects of mincing fish waste prior to discharge (Abraham et al. in press[1]),, we found that mincing reduced the numbers of large albatrosses (*Diomedea* spp.) feeding astern of the vessel, but had no significant effects on the abundances of other groups of seabirds (other albatross species, petrels and shearwaters). In contrast, reducing discharge to sump water only resulted in a significant reduction in numbers of all groups of seabirds. In particular, the abundance of the small albatross group (principally *Thalassarche* spp.), and some smaller procellarids, (e.g. sooty shearwater, *Puffinus griseus*, and white-chinned petrel, *Procellaria aequinoctialis*), was reduced to less than five percent of the number that attending the vessel when unprocessed discharge was released. In New Zealand, relatively small numbers of *Diomedea* albatrosses attend trawl vessels and associated bycatch rates are low. Therefore, compared to mincing, it has been concluded that fish waste retention is a more effective management strategy for reducing seabird bycatch, across a broad range of seabird species groups occurring in New Zealand waters.

In subsequent discussions the SBWG was informed that some European vessels were equipped with subsurface discharge outlets, and this approach would be worth pursuing in other fisheries. Given the complexity of retro-fitting vessels with subsurface discharge technology, subsurface discharge may only be feasible for vessels entering a fishery. In response to a question on whether the NZ research had considered differential attractiveness of different fish species discarded, the Group was informed that while NZ observers had commented that minced crab appeared less attractive to foraging seabirds, no quantitative assessment had been made of seabird responses to different fish species discharged.

Smart hook development for pelagic fisheries (Barry Baker)

An Australian company, Ahi Enterprises Pty Ltd, has developed a mitigation device that disarms the hook during setting. The 'safe hook' solution acts in two distinct and separate ways. Firstly, it minimises interaction by adding weight (c.40gms at the hook), increasing the sink rate, and secondly, it prevents hooking by creating a large barrier that covers the hook and prevents ingestion and accidental hooking during setting. The barrier detaches and falls away from the hook, after a short period of time, and when the baited hook is beyond the feeding range of seabird. The smart hook was recently quantitatively assessed in New Zealand in a short trial where baited smart hooks were thrown within 5 metres of albatrosses and giant petrels interacting with fishing vessels

[1] Abraham, E.A, J.P. Pierre, D.A.J. Middleton, J. Cleal, N.A. Walker, S.M. Waugh. In press. Effectiveness of fish waste management strategies in reducing seabird attendance at a trawl vessel. Fisheries Research.

that were discarding offal. The smart hook was shown to sink rapidly when baited with both squid and fish baits, and on most occasions the sink rate was sufficient to discourage take by seabirds. The baited smart hook was only taken by seabirds in <1% of the occasions that baits were presented to birds, and then only when it landed within 1 metre of a bird. On the four occasions that this did occur, birds were unable to dislodge the hook barrier and quickly dropped the device. The Australian government has provided funds for further testing of the smart hook and more comprehensive testing under operational fishing conditions is planned within the next 12 months.

Line shooter (Graham Robertson)

Graham Robertson presented the results of a recently completed experiment in the Australian tuna fishery on the effect of a line shooter on the sink rates on baited hooks. Line shooters are used to vary the degree of tension on the mainline during setting operations in accordance with fishing strategy and are often cited by RFMOs as a seabird by-catch mitigation measure (referred to as a "deep set line shooter"). Setting gear deep involves paying out mainline at a faster rate than vessel forward speed such that the mainline falls in loose coils in propeller turbulence at the vessel stern. The experiment revealed that baited hooks attached to a mainline set loose (with the line shooter) sank significantly slower than baited hooks attached to mainline set without a line shooter that entered the water 30-40 m astern and outside the worst of the propeller turbulence. Deploying mainlines into propeller turbulence is likely to increase exposure of baited hooks to seabirds. It was recommended that advice to RFMOs refers to mainline tension (loose in propeller turbulence versus tight such that lines avoid propeller turbulence) rather than the method of achieving tension (e.g. line shooter) in order to more accurately describe the operational procedure that affects sink rates and exposure of hooks to seabirds.

Streamer lines for pelagic longline gear (Washington Sea Grant)

An update was provided on the Washington Sea Grant research programme to develop a bird scaring-line system for application to world high-seas pelagic longline fisheries with funding from the David and Lucile Packard Foundation. Most phase I tasks were completed: The ad-hoc advisory committee was formed; several towed device prototypes were fabricated and trialled in several pelagic fisheries; and the pelagic fishery assessment was carried out in the Japanese joint venture fishery for southern bluefin tuna within the New Zealand EEZ. This collaborative work is described in a report "Optimizing tori line designs for pelagic tuna longline fisheries" available at the WSG website. The efficacy of dual tori lines and weighted branch lines were being tested but a substantial number of birds were caught as a result of the bait casting machine that delivered baited hooks outside the protection of the tori lines and that the streamers of the tori line did not protect an area immediately behind the stern of the vessel. These initial results demonstrate the importance of operational standards and parameters for deployment of fishing gear and mitigation measures. Phase II research is being planned for New Zealand, South Africa and Chile in 2009 and much of this is in cooperation with the BirdLife International Albatross Task Force.

5. TRAWL BYCATCH MITIGATION

At the first meeting of the SBWG in Valdivia, Chile (June 2007), mitigation of seabird bycatch in trawl fisheries was identified as a key focus of the second meeting of the Working Group. This lead to the drafting of SBWG-2 Doc 5 (AC4 Document 55) which addresses AC3 Work Programme Item 4.8 in reviewing methods used to reduce seabird bycatch in trawl fisheries. It summarises developments in the field of trawl mitigation prior to 2004 which have been described in detail in Bull[2] (2007), and provides an update of recent work including methods that have been trialed or proposed during the period of 2004-2008. The body of work investigating and documenting methods to mitigate seabird bycatch in trawl fisheries is significantly less advanced than for longline fisheries. Consequently, new developments in this field in recent years are few.

Seabird interactions with trawl vessels fall into two broad categories: those focused on the trawl warps (the thick cables that link the net to the vessel), and those focused around trawl nets. For reducing seabird strikes on trawl warps, the use of bird-scaring lines has been proven to be the most effective mitigation device in the trawl fisheries in which comparative studies have been undertaken. However, the retention or strategic management of fish waste (offal and discards) is recommended as the most effective primary measure for bycatch reduction, and as such should be viewed as the best long-term solution to reducing seabird bycatch in trawl fisheries. Coincident with effective fish waste management, operational measures such as cleaning the net prior to shooting and reducing the time the net is on the surface at shooting and hauling should be viewed as best practice measures and incorporated into routine fishing activities. While a number of methods have been trialed to reduce the incidence of warp strikes, there continues to be the need for more work on effective measures for reducing seabird interactions with the trawl net.

The Working Group agreed to produce a table intersessionally that was analogous to that produced at SBWG-1 for pelagic longline gear (AC3 Doc 14 Rev 4, Appendix 4, Table 2), including descriptions of measures, current knowledge (described in SBWG Doc 5), implementation guidance and research needs.

The WG discussed research needs in trawl fisheries and priorities in detail (SBWG-2 Doc 32). Seabird mortality in trawl fisheries fits into two broad categories: (1) birds colliding with trawl warps, net-sonde and paravane cables, which particularly impacts larger birds such as albatrosses, and (2) birds becoming entangled in nets during shooting and hauling which affect the smaller albatross but, more commonly, affects the smaller petrels. Relative to pelagic fisheries, some demersal fisheries have been found to have higher levels of discharge than pelagic fisheries, higher levels of mortality caused by warp strikes, smaller nets with smaller mesh sizes and so lower levels of net entanglement. In fisheries that experience mortality from a combination of the two primary causes, warp cable strike is usually considered to cause higher levels of mortality.

[2] Bull, L.S. (2007). Reducing seabird bycatch in longline, trawl and gillnet fisheries. *Fish & Fisheries* **8**: 31-56.

The SBWG broadly discussed trawl mitigation in four categories; discharge management, cable strikes, net entanglements and hauling mitigation (including good deck practices).

Discharge management

Offal management: Given that research from around the world has indicated that seabird strikes on warp cables can be reduced to almost zero in the absence of offal discharge, the WG recognized the importance of research to identify the most effective and economically viable discharge management techniques. It was recognised that these methods may be regionally, and even fishery specific. A range of discharge issues to be considered are contained in SBWG Doc 32. There was some discussion about the potential impact of removing a reliable food source (vessel discharge) for seabird populations and the effect this might have on some populations. It was agreed that while this was an important issue for which we had limited knowledge, particularly in the Southern Hemisphere, it was an issue beyond the remit of the SBWG. Further, depending on the offal management measure used, discharge would still be available to birds but just not at times when there was bycatch risk.

Cable strikes

Tori lines: Using examples from the South Atlantic, New Zealand and Alaska, the effectiveness of tori lines in reducing warp strikes was highlighted. It was agreed that research to improve their performance, particularly in cross-winds, was a high priority. The WG noted that towed (tension) devices on tori lines need to be manageable to ensure uptake by fishermen. The issue of twin (or paired) trawls, when seabird strikes could occur on 3 warps astern of the vessel, was also highlighted. Based on research in New Zealand that raised concerns about seabird strikes on tori lines, it was recognised that the impact of such strikes should also be investigated. However, the group agreed that, given that tori lines had been proven to reduce seabird strikes by over 90% in some cases, this research was not the highest priority.

Warp scarers: The WG discussed trials conducted in the South Atlantic, New Zealand and Alaska which had highlighted that while devices placed on the warp to reduce seabird strikes had proven to be successful, in all cases there were safety concerns involved with their deployment and retrieval. Marco Favero (Argentina) informed the group about a road cone placed on the warp cable at the interface with the sea surface that has been used successfully in inshore trawlers in Argentina to reduce warp cable strikes. The effectiveness of this device on larger, off-shore vessels would be tested in 2009. Barry Watkins (BirdLife) informed the WG that a similar device (110 mm PVC tubing) had been trialled in the South African hake trawl fishery with some success, but fishermen had safety concerns about deploying and retrieving the device.

Warp booms: Several studies have clearly shown that the Brady baffler (see Figure 3, AC 4 Doc 55) is largely ineffective at reducing seabird strikes on warp cables. However, modifications of the boom concept were considered to have potential, particularly for vessels with a steep warp angle, resulting in a relatively short distance between the stern of the vessel and the warp-sea surface interface. In New Zealand a new device called

'the Burka', (see Figure 4 AC Doc 55) has shown some positive results in reducing warp cable strikes on a single vessel with a steep warp cable angle. While most applicable to demersal trawl fisheries in which effectively deploying tori lines can be difficult due to frequent reversing by the vessel, this device was considered worthy of further research to quantify efficacy.

The WG discussed recording and quantifying the proportion of seabirds that are dragged under water by warp cable strikes and killed. It was noted that various approaches had been taken on this issue, including basing mortality estimates solely on the number of dead seabirds record during the haul. It was agreed that the SBWG work to support the development of standardised protocols for recording these data.

Net-sonde cable: Net-sonde cables (or third wires) are not commonly used in the Southern Hemisphere and have been prohibited in several fisheries, for example CCAMLR and New Zealand. The WG was informed that net-sonde cables were used by some vessels in South Africa and the U.S.A. The work of Ed Melvin (Washington Sea Grant) in the Alaskan pollock trawl fishery was discussed. It was noted that this work was successful at reducing seabird strikes on net-sonde cables with tori lines being up to 90% effective under experimental conditions. Using a snatch block to lower the position of the net-sonde cable was also identified as a promising technique. The WG recognised that if the Northern Pacific albatross were added to the ACAP list of species, the importance of this research would be increased from an ACAP perspective.

Paravane entanglement: It was noted that fisheries not using net-sonde cables use paravane cables to monitor the position and aperture of the net. These cables, with a transducer attached below the water level, are typically positioned 3-4 metres outboard close to the stern of the vessel. Seabird entanglements and mortality have been recorded with paravane cables in the South Atlantic and New Zealand. The group agreed that preliminary research into the effectiveness of a boom with straps/streamers reaching to the waters surface adjacent to the paravane were promising.

Net entanglement

Net binding: The WG discussed the evidence from the CCAMLR icefish fishery which suggests that net-binding is an effective means of reducing seabird entanglements during the shot. It was recognised that because the technique had been used in combination with a range of other methods it was not possible to determine its effectiveness in isolation. However, research into its effectiveness outside the CCAMLR area was identified as a high priority, and has just begun in New Zealand. Chris Heinecken (South Africa) indicated that there was evidence to suggest that seabird mortality in the South African mid-water trawl was an issue, and net-binding could be an appropriate solution.

The importance of removing 'stickers' (net cleaning) prior to shooting the net was recognised as a vital step to reducing the attraction of the net to seabirds, and hence helping to reduce seabird entanglements.

The WG discussed adding external weights (often chain links) on the cod-end or net belly to increase both the rate of descent and ascent of the net and thereby reduce the time that the net is on the surface of the water. It was agreed that based on evidence from the CCAMLR icefish trawl fishery and South Africa, where weight has been integrated into the bottom ropes, this approach could be very effective in reducing mortality. Chris Heinecken indicated that added weights can cause net damage, but that one vessel fishing in CCAMLR had modified its net construction to integrate weights onto the bottom of the net, and thereby reduce the potential for net damage.

The issue of paired trawling, whereby two vessels drag a single large net, was considered more likely to impact penguins than ACAP listed species. However, given that there were indications that this method could be increasing in some areas, it was considered important to monitor any potential interactions with ACAP listed species.

Haul mitigation

In terms of reducing net entanglements, with the exception of net weighting, which increases the ascent rate of the net during hauling, there is a lack of effective methods for reducing seabird entanglements and mortality during hauling operations. The group discussed a set of deck practices measures adopted in CCAMLR trawl fisheries that are aimed at reducing net entanglements. These are focused on reducing the time the net is on the waters surface, and include maintaining winches to reduce breakdowns and having a well trained crew. While these were recognised as important steps to be taken, it was agreed that identifying technical methods to reduce seabird entanglements during hauling was a research priority.

Research priorities

Based on the discussions of the SBWG the following four research areas were identified as the highest priority to reduce seabird bycatch in trawl fisheries:

(1) Offal discharge management (e.g. meal plant, batching, discharge in areas not adjacent to warp cables)

(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)

(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.

6. DEMERSAL LONGLINE BYCATCH MITIGATION

The Working Group considered SBWG-2 Doc 6, which had been developed intersessionally in order to help meet Item 4.8 of the Advisory Committee work programme. The objective of the paper was to produce an equivalent review for demersal longlining to that developed at SBWG-1 for pelagic longlining (AC3 Doc 14 Rev 4, Appendix 4, Table 2). The paper did not review all of the mitigation

research that had occurred as this would largely have repeated that in the pelagic longlining review paper. A key difference was that demersal fishers usually wanted the hooks to reach the seabed as rapidly as possible and extra weight on the line was less of an issue than in pelagic fisheries.

Key mitigation techniques relate to a) avoiding peak times/places of seabird feeding activity; b) getting the baited hooks as deep and as fast as possible; c) deterring seabirds from interacting with hooks, and d) reducing the visibility of hooks and the attractiveness of vessels.

Argentina made an intervention to explain that it had withdrawn its co-authorship of Doc. 6 due to references to the Islas Malvinas, Georgias del Sur and Sandwich del Sur and the surrounding maritime areas which were not acceptable to Argentina and that the United Kingdom had not accepted to eliminate or modify. The final version of the document contains such references and does not adjust to Resolution 2.9 adopted in MOP2, in relation to which Argentina, in line with the declaration included in its instrument of ratification of ACAP, rejected the document.

The UK clarified that it had been willing to amend Document 6 in line with Resolution 2.9 of MoP2, but were unwilling to remove or modify reference to valid scientific studies.

In relation to this, Chile made an intervention expressing its support to the legitimate sovereignty rights of Argentina over the Islas Malvinas, Georgias del Sur and Sandwich del Sur and the surrounding maritime areas, reiterated the need that Argentina and the United Kingdom resume negotiations in order to find, as soon as possible, a peaceful solution to this sovereignty dispute taking into account the relevant resolutions of international organisations –in particular the United Nations- and expressed the need to foster a frank, constructive, and efficient dialogue between both countries to solve this situation.

The Table from Document 6 was revised in line with comments received and is attached at Annex 3. A re-evaluation of the priorities for research was carried out (Annex 4). The Working Group proposed that the ACAP Advisory Committee endorse Annexes 3 and 4 as representing the current best scientific advice of ACAPs Seabird Bycatch Working Group, and encourage Parties to use these materials to guide the development of policy and practice within the fisheries under their jurisdiction.

7. PELAGIC LONGLINE BYCATCH MITIGATION

Review of current mitigation for pelagic longline gear

A major product of the SBWG-1 meeting was 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). 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, based on published literature and expert opinion. The results of this review are attached as Annex 5. 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.

A list of key research questions to reduce seabird mortality in Southern Hemisphere pelagic longline fisheries was developed and is attached at Annex 6.

Light tori lines

There was considerable discussion on the use of light tori or bird scaring lines, a variation on the conventional tori line. This measure has recently been proposed by Japan as an effective mitigation measure for pelagic longline fisheries. The Working Group noted that there was conflicting information on the effectiveness of this measure. Light tori lines (short streamers and no drag) have been used by the foreign Asian fleet operating in South African waters where substantial seabird bycatch has been reported (0.44 birds killed per 1000 hooks). As a result of improved compliance in 2008, these vessels began using conventional tori lines and seabird bycatch was reduced to 0.05 birds per 1000 hooks. This is likely to be due to a number of factors, but anecdotal evidence suggests that the improved tori line design is a substantial contributor.

A recent Japanese study tested conventional and light bird scaring lines and compared the frequency of bait-taking behaviour by Laysan albatrosses for each type of bird scaring line. A similar study conducted in New Zealand contained confounding effects and inadequate description of methodologies. Hence it is not possible to draw confident conclusions from this study. Other information from Brazil indicates that light bird scaring lines significantly reduced seabird mortality in the absence of any other mitigation measures.

A subsequent evaluation conducted by SBWG members Graham Robertson and Barry Baker found the evidence for effectiveness in the Japanese study to be unconvincing because of the small number of sets (18) in one experiment and the fact that no albatrosses were caught when either bird scaring line type was in use. In a second experiment, although a significantly difference in seabird mortality between the two types of bird scaring lines was detected, the confidence limits around the mean values of both treatments overlapped extensively. They concluded that thorough comparative experimental assessment of light and conventional bird scaring lines needs to be undertaken against Southern Ocean assemblages of diving seabirds (e.g., *Procellaria* sp petrels and *Puffinus* sp. shearwaters) and albatrosses, with research based on larger sample sizes and more transparent methodologies. This information has been incorporated into Annex 5.

Lessons from mitigation success stories in commercial fisheries

In recognition of the difficulties likely to be experienced in attempts to reduce seabird by-catch in pelagic longline fisheries in areas with a high occurrence of both albatrosses and diving species, SBWG-2 Doc 13 expressed opinions in the interests of maximizing the effectiveness of the Agreement, especially in pelagic longline fisheries in coastal States. To enable the Agreement to be cognizant of the often hard-won lessons as to why certain longline and trawl fisheries in the world have adopted seabird-safe gear and practices, it was recommended that the SBWG produce a document that analyses the

circumstances/reasons that have driven change on a fishery-by-fishery basis. The document would also include assessment of the processes in CCAMLR (especially in the Scientific Committee and Commission) with respect to assessing the relevance of incorporating elements of the CCAMLR process in to the work of ACAP. The working group agreed to add the production of this document to its work program.

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

Collection of data from Parties

The ACAP Action Plan calls on the Advisory Committee to review and update on a regular basis data on the mortality of albatrosses and petrels in commercial and other relevant fisheries (ACAP Action Plan 5.1(f)). At present, although ACAP Parties report regularly on the steps taken to implement the Agreement, the SBWG notes that few data are provided to allow a succinct and accurate assessment of the current levels of incidental mortality of ACAP listed species in fisheries of ACAP Parties. Submission of fishery-specific bycatch information could be included in the Parties' regular reporting of the implementation of the Agreement. Additionally, information could also include whether or not bycatch mitigation measures are used as knowledge of trends in mitigation use and effectiveness will aid in bycatch reduction efforts.

The 2nd Session of the Meeting of the Parties (MOP2) acknowledged that the outputs of the various working groups, including the SBWG, could be used in the future development and refinement of a suite of indicators to measure the success of ACAP (MOP2 Final Report, Annex 8, Resolution 2.8). Thus, the bycatch trends for ACAP species could serve as a performance indicator for the Agreement.

The SBWG reviewed SBWG-2 Doc 15 and engaged in extensive discussion regarding the Advisory Committee's collection of seabird bycatch data from the Parties. Key areas of interest regarding the data collection included: purpose of the collection, identifying clear objectives of how the data would be used by the Advisory Committee, what specific data elements would be collected, and at what level of detail, and a possible timeframe for developing and implementing this information collection.

The SBWG agreed that prior to the Parties submitting seabird bycatch data, several tasks should be completed during the next intersessional period using a step-wise approach:

1) develop an objective statement of purpose, terms of reference, and a timeline for the data collection;
2) a timely (e.g., within three months of the completion of AC4) metadata survey of the Parties to learn what data are available, including detailed information on how the fisheries are monitored and bycatch data collected (e.g. observer program, fishing logbooks);
3) create a bibliography (published and grey literature) of bycatch data provided by Parties;
4) develop a prototype bycatch data collection form with comprehensive instructions;

5) test the prototype data form by having a small sample of Parties complete it;
6) evaluate the utility of the form and appropriateness of its questions based on the sample completed forms and revise as necessary; and
7) incorporate the revised bycatch data collection form into the reporting required of Parties under the implementation of the Agreement.

The Working Group asked Ms Kim Rivera to lead this process during the intersessional period.

Assessment of data

The meeting welcomed Dr Keith Reid from the Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) secretariat, who introduced SBWG-2 Doc 31 Rev1. CCAMLR Parties submit data on catches of target and by-catch (including fish, marine mammals and birds and other species, including benthos) that allows analysis of the data at the level of the fishery, by area, gear type and by vessel. This analysis is conducted by the Secretariat and in Working Groups of the Scientific Committee. With respect to the by-catch of marine mammals and birds, this work is primarily conducted in the Working Group on Incidental Mortality Associated with Fisheries (WG-IMAF).

All vessels participating in the finfish fishery must carry at least one scientific observer who collects scientific data to assist with fisheries assessments as well as data with which compliance assessments can be conducted. These data are summarised by the CCAMLR Secretariat and presented to the Scientific Committee's Working Groups in the form of working group papers, examples of which were appended to SBWG-2 Doc 31 Rev1.

Critical review of CCAMLRs working group papers by the WG-IMAF has seen the development of advice on mitigation measures that has been taken to CCAMLRs Scientific Committee and Commission, resulting in the development of mandatory conservation measures. A combination of proven mitigation measures, extensive monitoring by independent observers, annual expert review of seabird bycatch rates and continually evolving fishery and mitigation practices have been instrumental in reducing seabird bycatch in CCAMLR fisheries.

The SBWG noted the comprehensive nature of the data collection and assessment process that has been developed by CCAMLR and agreed that it formed a useful model for ACAP. An observer program with high levels of coverage has been critical to understanding bycatch problems and has been key to CCAMLR's success in reducing bycatch in its fisheries. The model was entirely relevant to other RFMOs but could also be adopted by the SBWG for assessment of summary bycatch information provided by ACAP Parties.

The SBWG thanked Dr Reid for his presentation. ACAP values the close working relationship it has with CCAMLR and looks forward to continuing to work with the Commission to ensure the highest levels of management are applied to ensure seabird bycatch is minimized in CCAMLR fisheries.

9. COORDINATION OF ACTIVITIES RELATING TO RFMOS

Work Program Item 4.3 requested the SBWG to develop a strategy for the Agreement and Parties to engage and assist Regional Fisheries Management Organisations (RFMOs) and other relevant bodies to assess and minimise bycatch of albatrosses and petrels. There was considerable work on this item intersessionally, which culminated in the paper SBWG-2 Doc 14 / AC4 Doc 56. This paper summarises the current status of RFMOs overlapping spatially with ACAP-listed species, in terms of RFMO actions that relate to the conservation of these species. The paper is intended to facilitate ACAP Working Group and Advisory Committee discussions on developing strategic engagement with RFMOs and other fishery management bodies.

RFMOs are inter-governmental organisations which work to manage fish stocks. As part of that management, RFMOs consider ecosystem impacts of fishing, including seabird bycatch. Because of the capacity for RFMOs to establish management measures relating to seabird conservation in 'their' fisheries, ACAP may progress its own objective through engaging with these bodies. SBWG-2 Doc 14 proposes goals and processes for such engagement, and suggests areas of work in each RFMO to which attention could be devoted for the benefit of albatross and petrel conservation.

The SBWG considered the document outlined a useful approach to Party engagement with each other on RFMO issues and engaging with RFMOs, and was supportive of the suggestion of nominating an RFMO Coordinator for each RFMO meeting. The importance of good coordination between agencies within Parties was noted, e.g. the agency responsible for seabird conservation and that managing fisheries. It was considered essential that discussions on seabird bycatch are closely linked to those of fishery management, to ensure ownership of seabird bycatch issues by fishery managers, and the joint progression of both target catch and seabird bycatch issues.

The Working Group recognised that RFMO Coordinators would succeed best when able to act as stand-alone ACAP representatives, rather than also being part of national delegations. This was particularly relevant with respect to attendance and participation at meetings. The Working Group noted that where ACAP representation was undertaken by a Coordinator also serving on a national delegation, that representative could be constrained in terms of the time they were able to contribute to ACAP, versus national, duties. Further, the Working Group noted that the Coordinator may be perceived as more independent as a stand-alone representative of ACAP, rather than when also representing a nation and RFMO Member. While stand-alone ACAP representation was highly desirable, however, the Working Group recognised that this would not always be possible. For this reason a combination approach of RFMO Coordinators acting as stand-alone representatives of ACAP, and Coordinators who were part of national delegations, would be the required approach. The Group considered the RFMO Coordinator process outlined in SBWG-2 Doc 14 to be ideal, and agreed that this should be reviewed at subsequent ACs and MOPs and amended, as appropriate, to ensure its efficacy.

The RFMO Coordinators would work with Parties and AC officials to develop an ACAP-agreed approach to relevant RFMO meetings. The Working Group noted that the

approach to each RFMO meeting would be different and engagement strategies should be considered on an RFMO by RFMO basis, and a meeting by meeting basis. Further, while ACAP could produce some products that would be usefully deployed across RFMOs, there would also be the need for specifically tailored products to maximize the efficacy of ACAP engagement.

The Working Group agreed that priority products for ACAP to produce and deploy in RFMO meetings were:

- ACAP's Species Assessments, which contain information on seabird population status and foraging distribution, including overlap with RFMOs, which have been derived from maps generated from the Global Procellariiform Tracking Database;
- Information on management measures and strategies for reducing seabird bycatch, including new information on mitigation measures;
- Summary of risk assessment methods and key contacts in this area; and
- Guidance on observer requirements for effective seabird bycatch monitoring

Having discussed the content of SBWG-2 Doc 14 / AC4 Doc 56 and related issues, the Working Group completed the outstanding elements (e.g. consideration of priority RFMO products). The document was revised to incorporate these changes and other Working Group feedback. The revised document is SBWG-2 Doc 14 Rev 1 / AC4 Doc 56 Rev 1.

The SBWG suggests that the AC:

- adopts goals and processes for engagement with RFMOs as proposed here, or amended as appropriate;
- evaluate priority areas for RFMO engagement, alongside other work areas for ACAP;
- agree to the development of RFMO-specific engagement strategies;
- agree to consider priority products identified above for inclusion in the AC Work Programme; and
- review RFMO progress and priority areas for work at AC5.

Update on BirdLife Global Tracking Database

BirdLife International updated the SBWG on recent developments with the Global Procellariiform Tracking Database (SBWG-2 Doc 12). Since 2003, the database has continued to grow as new datasets have been added, and it was recognized that it is a vital conservation tool for BirdLife and ACAP. In particular, the database has facilitated analysis of the global distribution of ACAP species, and overlap with fisheries. Remote tracking data submitted to the database represent 20 of the 22 species of albatross, both species of giant-petrel, and several species of petrel and shearwater.

However, key data gaps remain for some species and sites, which influence overall estimates of albatross and petrel distribution. Overall, fewer data exist on the non-breeding distribution of birds, particularly in relation to juvenile and immature life history

stages. The SBWG discussed these data gaps and request the AC to encourage Parties to prioritise the collection of these data.

BirdLife notified the SBWG that they had secured USD$50k from the David and Lucille Packard Foundation to fund the purchase of remote tracking hardware to fill data gaps for species that overlap with relevant RFMOs. BirdLife will notify ACAP as soon as the process for application has been finalised.

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-2 Doc 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, and 30). 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. However, it was noted that SBWG-2 Doc 17 and SBWG-2 Doc 19 both report upon the same meeting, and it is suggested that single reports of each meeting are provided to the Agreement in future.

NPOA Guidelines and FAO expert consultation

BirdLife provided an update of progress since the 27th Session of the FAO Committee on Fisheries (March 2007) on the planning for an Expert Consultation to develop Best Practice Technical Guidelines supporting the implementation of IPOA-Seabirds and elaboration of NPOA-Seabirds (SBWG-2 Doc 10) to be held in Bergen, Norway in September 2008. The guidelines will be prepared to; (1) assist countries in preparing and implementing more effective NPOA-S and (2) provide RFMOs with guidance on implementing IPOA-Seabirds within a regional framework, (3) and to address the incidental catch of seabirds in other relevant gears (e.g. trawl and gillnet).

Following on from the third meeting of the Advisory Committee (Valdivia, June 2007) where the ACAP Advisory Committee agreed to provide AUD $13,000 funding to support the initiative, the SBWG further endorsed the importance of the initiative. There was strong recognition of the importance of the Guidelines gaining broad support from FAO Member States at the FAO's Committee on Fisheries.

Mitigation fact sheets

SBWG-2 Doc 09 outlined progress made on the drafting of a suite of mitigation fact sheets (currently, 17 in total) for longline and trawl fisheries. The sheets will cover the full suite of recognized measures in seven languages (Chinese, English, French, Japanese, Korean, Portuguese and Spanish). The fact sheets are targeted primarily at fisheries managers to inform decision making on appropriate measures to reduce seabird bycatch. They contain a suite of information including: a description of a measure and its best practice adoption, a summary of the measures effectiveness, a review of measures that can effectively be used combination, potential limitations and solutions and recommend relevant literature.

BirdLife invited the SBWG to consider collaborating on the dissemination and maintenance of the fact sheets. This would involve a co-branding arrangement and reciprocal web site downloads (ACAP and BirdLife websites). BirdLife would be

responsible for coordinating the periodic review of the fact sheets and incorporating suggested updates by the SBWG, either intersessionally or when the WG meets.

The SBWG agreed that there was a need for such a product and that it could help the Agreement meet its objectives in a range of fora. The SBWG gratefully accepted the invitation by BirdLife to collaborate on this initiative and encourages the AC to support this invitation.

10. CAPACITY BUILDING ISSUES

Marco Favero reported on the most recent advances in capacity building initiatives in South America. A project on capacity building in South America (AC4 Doc 26), the product of a Secretariat secondment undertaken by Tatiana Neves (Brazil), was introduced, along with an information paper that explored the potential for interaction on capacity building initiatives between Uruguay, Brazil and Argentina (AC4 Inf. 1). A process for the elaboration and refinement of these documents in the course of the Advisory Committee Meeting was proposed, with a view to achieving regional consensus and to give final shape to both documents. A prioritised list of projects derived from those listed in AC4 Doc 26 is another expected outcome of this process.

Another proposal presented by Ecuador, Argentina and BirdLife International for the implementation of a capacity building project for technical training of Ecuadorian and IATTC observers was introduced (AC4 Doc 54). The project has partial financial support from BirdLife International, which has agreed to provide USD $12,000. Another USD $5,000 is required to fully fund this work, which ACAP has been requested to provide. The proposal was supported by the SBWG, and annexed to the list of project applications to be considered by the Advisory Committee for financial support.

The meeting was informed of a collaboration between the fishing industry, WWF and BirdLife, which has seen the development and implementation of a training course for skippers in the South African trawl and longline fisheries, which seeks to equip these fisheries with the necessary skills to implement an Ecosystem Approach to Fisheries management and to specifically address seabird bycatch. Materials developed for this collaborative arrangement include a training manual, interactive DVD and numerous support tools. These materials are available to the ACAP secretariat and/or ACAP parties to adapt and use as they see fit. On behalf of the Agreement the Chair thanked the WWF representative (Samantha Petersen) for this kind offer.

11. SBWG WORK PROGRAMME

The following items of the current AC Work Program remain outstanding or involve ongoing work:

Item 4.1 **SBWG membership**. France, Spain, Peru, Ecuador and Norway have not nominated working group members

Item 4.3 **Develop a interaction plan for RFMOs**. Addressed by AC4 Doc 56 Rev 1, but discussion and agreement from AC still required.

Item 4.4 **Analysing existing remote tracking data.** Four of the five commissioned analyses have been completed.

Item 4.5 **Risk assessment for RFMO and other fisheries.** Some work by ACAP representatives has been carried out with the WCPFC and ICCAT. No other information available at AC4.

Item 4.6 **Develop generic products to assist RFMOs reduce seabird bycatch.** Pelagic longline mitigation advice has been provided to IOTC, WCPFC and IATTC. Note that there is some dependency on completion of item 4.3

Item 4.7 **Develop specific products to assist RFMOs reduce seabird bycatch.** No progress.

Item 4.8 **Review information on mitigation measures for trawl and demersal longline fishing methods.** Both reviews completed by AC4.

Item 4.9 **Assist in the preparation, adoption and implementation of FAO NPOA-Seabirds.** ACAP to participate in FAO Guideline development meeting in Bergen, Norway, in September; this activity not yet completed by FAO.

Item 4.12 **Bycatch issues relevant to Waved Albatross Action Plan.** Likely social influencing programme needs to be planned. Further consideration required; project application addressing this received by ACAP.

The work programme was revised and a draft Revision of Section Four of the Advisory Committee Work Programme 2008-2012 prepared for consideration by the Advisory Committee. This is provided at Annex 7.

12. PROJECT APPLICATIONS

Ten funding applications relevant to the SBWG were considered, which included the project identified and discussed under Agenda Item 7 – Capacity Building. This consideration resulted in the allocation of a rank of either high, medium or low, as priorities measured against the ACAP action plan. This assessment was then forwarded to the ACAP Secretariat for further consideration by ACAP officials and the Advisory Committee.

13. RECOMMENDATIONS

It is recommended that the tasks detailed in this report be considered for incorporation into the AC Work Programme.

14. CLOSING REMARKS AND ACKNOWLEDGEMENTS

The Convenor of the SBWG thanked the Members and Observers for their valuable contributions at the meeting and in developing the report. He also thanked the Deputy Convenor, Carlos Moreno, for his assistance during both the intersessional period and the meeting; the authors of the excellent papers submitted for consideration by the SBWG; JC Lloyd-Southwell for interpretation provided at the meeting; the Republic of South Africa and the Secretariat for providing an excellent venue and facilities for the meeting; and to Marco Favero, Wieslawa Misiak Johanna Pierre, Kim Rivera, Graham Robertson, Ben Sullivan and Mark Tasker for comprehensively documenting the WG discussions. 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: AGENDA

1. Mitigation research update
2. Trawl Bycatch Mitigation
3. Demersal Longline Bycatch Mitigation
4 Pelagic 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 Capacity Building Issues
8 SBWG Work Programme
9 Project applications

Annex 3. Summary 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). 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 CCAMLR sub-area 48.3 from 1998, which	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 around demersal longline fisheries. If closed areas are to be considered, determine the 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).

	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. 2008). 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 and potentially hazardous for crew members. Weights made up of rocks enclosed in netting bags and concrete blocks deteriorate and require ongoing	Must be combined with other measures, especially bird scaring lines, judicious offal management and/or night setting.	Improving understanding of sink rate relationships of different line weighting regimes for particular fisheries (or fishery method) and testing the effectiveness of the line weighting regime and the sink profile in reducing seabird mortality.	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 autoliners, 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 fisheries, a minimum of 4kg (metal weight) or 5kg (non-metal weight) be

		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. in press). 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). See later section on the Chilean Mixed System			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 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)	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 absence of bird scaring lines (Dietrich et al. 2008)	Recommended combination with bird scaring lines, judicious offal management and/or night setting	Improving understanding of sink rate relationships of different line weighting regimes for particular fisheries (or fishery method) and testing the effectiveness of the line weighting regime and the sink profile in reducing seabird mortality.	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.

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 mortality.	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.	Side setting is largely untested in demersal fisheries, especially in the Southern Ocean, where the seabird assemblages include proficient diving seabirds.	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.
Underwater setting funnel	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.	Improvements to the current design of shooting tube to increase the depth at which the line is set, especially during rough seas. Also need to investigate optimal use of device together with other mitigation measures (bird scaring lines and weighted lines).	Not yet established

Line shooter	Less used in demersal longline 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.	Must be combined with other measures, such as bird scaring lines, night setting, weighted lines and judicious offal management.	Investigation to refine/modify line shooters to overcome the problem of propeller wash and ensure consistently rapid sink rates.	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	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).		Investigation of the effects of frozen/thawed bait.	

	problems with frozen bait (Brothers et al. 1999).				
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; Løkkeborg 2003)	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 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	Effectiveness is increased when used in combination with other measures – e.g. night setting, appropriate weighting of line and judicious offal management.	Further improvement in 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 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

		effective mitigation measure, and efforts should be directed to improving further their design and use so that their effectiveness can be improved further.			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 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).	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 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.	Effectiveness is increased when used in combination with other measures – e.g. night setting, appropriate weighting of line and judicious offal management.	Further trialling of paired (or more) streamer-lines 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 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)
Brickle curtain	Anecdotal evidence indicates that the use of 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).	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). Also required in the Falkland Islands (Islas Malvinas) longline fishery, where the Brickle Curtain is

					recommended.
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 of olfactory deterrence should be extended to white-chinned petrels. 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 et al. 2000).	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 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	Must be used in combination with other mitigation measures – bird scaring lines. line weighting, and night setting.	Improved ways to manage offal more effectively 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 (e.g. Falkland Islands (Islas Malvinas), South Africa and New Zealand)

		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.			
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 fishes, 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.	Must be used in combination with other mitigation measures – bird scaring lines. line weighting, night setting and judicious offal management	Test the efficacy and practical feasibility of using dyed bait in demersal longline fisheries. 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 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)	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 bycatch levels.	Must be used in combination with other mitigation measures – bird scaring lines. line weighting, night setting and judicious offal management	Determine the impact of hook size/shape on seabird bycatch and on catch of target species.	No global standard

Gear configuration – Chilean method (linked with the sink rates)	A new method of demersal longline fishing, called the Chilean or Mixed System, 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. in press; Robertson et al. in press). 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 such that all the hooks are directly above the weights ensuring a rapid sink rate. This system was first tested on large vessels in 2005, and because of the effectiveness of the system in reducing impacts of toothed whales, it is currently used in many South	This is a new system and should be monitored and possibly refined further. An issue with excessive discard of unwanted hooks may exist.	One of the few techniques that may work on its own. Preferably use in combination with bird scaring lines.	Test broader applicability of Cachaloteras and test impact on fish catch.	No global standards yet

	American waters (Moreno et al. in press).				

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Annex 4: Generic research priorities for demersal long-line fisheries in the Southern Hemisphere

Mitigation research	Priority	Caveats
1. Effect of night setting on catch rates of target species for different fisheries	Low	
2. Further information about the seasonal variability in patterns of species abundance around demersal long-line fisheries	Low for coastal fisheries, high for areas beyond national jurisdiction.	More tracking information on all life stages and seasons
3. If closed areas are to be considered, determine the impact of closures on catches of target species	Low	Closed areas not currently proposed
4. Improve understanding of sink rate relationships of different line weighting regimes for particular fisheries (or fishery method) and testing the effectiveness of the line weighting regime and the sink profile in reducing seabird mortality	Medium in fisheries with recent and in press papers. High in riskiest fisheries.	
5. Side setting is largely untested in demersal fisheries, especially in the Southern Ocean, where the seabird assemblages include proficient diving seabirds.	Medium-High	Technique most applicable only for new vessels.
6. Improvements to the current design of shooting tube to increase the depth at which the line is set, especially during rough seas. Also need to investigate optimal use of device together with other mitigation measures (e.g., bird scaring lines and weighted lines).	High	Provided device can be retrofitted.
7. Investigation to refine/modify line shooters to overcome the problem of propeller wash and ensure consistently rapid sink rates.	Low	Not very applicable to demersal long-lines.
8. Investigation of the effects of frozen/thawed bait.	Low	Not so relevant for higher sink rates in demersal fisheries.
9. Further improvement in the effectiveness and practical use of bird scaring lines on individual vessels or vessel type.	Low	Technique well established
10. Further trialing of paired (or more) streamer-lines in fisheries which currently only use single streamer lines.	High	Need way to reduce effects of side winds
11. Testing of olfactory deterrence should be extended to white-chinned petrels. 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.	Low	Not very effective on ACAP species and not so applicable to demersal.
12. Improved ways to manage offal more effectively in the short and long term.	Medium	Main issue is making operational.
13. Test the efficacy and practical feasibility of using dyed bait in demersal longline fisheries. Research would also need to determine the	Low	Not so relevant in demersal fisheries.

effect of dyed bait on catches of target species.		
14. Determine the impact of hook size/shape on seabird bycatch and on catch of target species.	Medium	
15. Test broader applicability of Cachaloteras and test impact on fish catch.	High	Overall technique appears effective and fishers like it.

Annex 5: 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.	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/or 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 wth 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 Japan, NRIFSF will continue testing in 2007.	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 1 m forward of the stern.

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. In pelagic fisheries, 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 other measures such as 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/or 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 compared conventional and light bird scaring lines against Laysan albatrosses and considered light lines to be more effective in reducing bait take. A similar study conducted by Brouwer et al. 2008 in New Zealand contained confounding effects and inadequate description of methodologies; these concerns preclude confident conclusions to be drawn from this study. Neves et al. 2008 showed light BSLs significantly reduced seabird mortality in the absence of any other	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 significantl 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 needs to be based on larger sample sizes and more transparent methodologies.	Use of this measure is not recommended at this time.

	mitigation measures.				
Paired bird scaring line – conventional configuration	Two streamer lines best in crosswinds to maximise protection of baited hooks (Melvin et al. 2004).	Potentially increased likelihood of entanglement - see above. Development of a towed device that keeps gear from crossing surface gear essential to improve adoption and compliance.	Effectiveness will be increased when combined with other measures. Recommend use with weighted branch lines and/or night setting	Development and trialling of paired streamer line systems for pelagic fisheries.	Current minimum standards for pelagic fisheries are based on CCAMLR Conservation Measure 25-02
Weighted branch lines	Brothers 1991; Boggs 2001; Sakai et al. 2001; Brothers et al. 2001; Anderson & McArdle 2002; Gilman et al. 2003a; Robertson 2003; Lokkeborg & Robertson 2002, Hu et al. 2005.	Supplementary measure. 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 90g located 3.5 or 4 m from the hook, respectively, which is a compromise specification recognising that live bait is used extensively in fishery.
Blue dyed bait	Boggs 2001; Brothers 1991; Gilman et al. 2003a; Minami & Kiyota 2001; Minami & Kiyota 2004; Lydon & Starr 2005. Double and Cocking, 2008.	New data suggests only effective with squid bait (Double & Cocking). 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 of 20 minutes)

Line shooter effect on mainline tension	Reduced bycatch of Northern Fulmar in trials of mitigation measures in North Sea, Lokkeborg & Robertson 2002; Lokkeborg 2003. Increased seabird bycatch in Alaska (Melvin et al. 2001). Robertson et al (2008) found no effect on sink rates in demersal IWL gear. Robertson et al (In Prep) indicates that use of a line shooter in pelagic longline fisheries to reduce mainline tension (e.g., for deep setting) slows significantly the sink rates of hooks.	Supplementary measure. No published data for pelagic fisheries. May enhance hook sink rates in some situations but unlikely to eliminate the zone behind the vessel in which birds can be caught. More data needed. Found ineffective in trials in North Pacific demersal longline fishery (Melvin et al. 2001).	Must be combined with other measures such as night setting and/or bird scaring lines or weighted branch lines	Data needed on effects on hook sink rates in pelagic fisheries.	Not established
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.		

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 2005)	Not recommended for general application	Design problems to overcome	Not yet established
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.
Thawing bait	Brothers 1991; Duckworth 1995; Klaer & Polacheck; Brothers et al 1999.	Supplementary measure. If lines are set early morning, full thawing of all bait may create practical difficulties.	Must be combined with other measures.	Evaluate sink rate of partially thawed bait.	

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Annex 6: Key research questions to reduce seabird mortality in Southern Hemisphere pelagic longline fisheries

Country	Fishery	Research questions and intentions
Brazil	Tunas, swordfish and sharks	1. What is the effect of tori line design (light line versus 'normal' line) and aerial extent (short versus long) on seabird capture rates and incidence of mainline entanglement? 2. What is the effect of blue-dyed bait (blue squid baits versus natural squid baits) on the catch rates of seabirds and target and non-target fish? 3. Are there behavioral differences between seabird species towards blue dyed and control/natural baits?
	Dolphin fish (longline at or near the surface)	1. What are the seabird capture rates and species affected in the fishery? 2. What are the potential conservation actions to avoid seabird by-catch in the fishery?
Uruguay	Tunas, swordfish and sharks	1. What is the effect of swivel weight (heavy versus light) and leader length (existing length versus 'new' length) on baited hook sink rate and seabird mortality? 2. What is the effect of tori line configuration (attachment height on vessel and tori line aerial extent*) on mainline entanglement rate and the incidental capture of seabirds? *achieved by presence and absence of a towed device.
Chile	Artisanal swordfish fishery	1. What is the relationship between baited hook sink rate and seabird mortality? 2. What is best practice regarding the use of streamer lines?
	Industrial fishery	1. What are the factors affecting hook sink rates in heavy (storm) sea states (addresses the problem if increased capture rates in stormy weather? 2.What is the best design and operation of a streamer line for industrial pelagic vessels?
Peru	Dolphin fish	Opportunities will be investigated in Peru to develop practical and effective methods to reduce seabird by-catch in the dolphin fish longline fishery. Initial efforts will focus on testing the operational aspects of line weighting and explore the practicality of tori line use in the fishery. Investigations will also involve an initial assessment of the nature and extent of seabird by-catch in the Peruvian coastal gill net fishery.
Ecuador	Tunas and dolphin fish	Ecuador intends to conduct initial assessments of the incidence and levels of seabird by-catch in the dorado (dolphin fish) and tuna longline fisheries. The assessments will be preceded by a training program for at-sea observers conducted by specialists from the national observer program in Argentina and Birdlife International's Albatross Task Force. The training program is a first step in the development of a seabird by-catch component in the national observer program, and will involve the development of seabird by-catch data recording protocols and training in seabird identification. It is intended that the initial assessments of seabird by-catch levels will commence following the completion of the training program.
South Africa	Foreign fleet	*Line weighting* Phase 1 1. What line weighting regime (weight and placement in relation to hook) will effectively reduce seabird by-

		catch at night? 2. What is the effect of this weighting regime on target and other non-target catches (especially other vulnerable species e.g. sharks)? 3. What are the safety implications of this weighting regime? Phase 2 4. In the event that the above experiment result in the identification of an effective weighting regime to reduce seabird by-catch at night, then these three questions will be tested during the day. *Tori line* 1. What are the dimensions and streamer design of an effective tori line (i.e. reducing seabird interactions measured by a by-catch rate, but also minimizing gear entanglement and ease of deployment/retrieval)? 2. What is the relative advantage of using a paired tori line as apposed to a single tori line and relative positioning? 3. Are surface scaring devices effective on reducing by-catch of diving birds that sit on the water behind the aerial coverage.
	Domestic fleet	*Longline sink rate* 1. What weighting regime will achieve an "optimal" line sinking rate (focusing on distance of weight from hook)? 2. What is the effect of this weighting regime on the target (swordfish) and other non-target catches (especially other vulnerable species e.g. sharks and turtles)?
New Zealand	Tunas and swordfish	Aside from continuing observer coverage to monitor seabird by-catch in pelagic longline fisheries, and possible joint work with the Washington Sea Grant program (USA, see below), New Zealand does not have concrete plans for research in this field in the next year. However, current areas of interest include line weighting and improvements in tori line design. There has also been considerable interest from operators of small pelagic longline vessels in the efficacy of dyed bait. Government and industry representatives have collaborated on preliminary work investigating dyed bait and this work may be continued and expanded. It is possible that research commenced in 2008 by Washington Sea Grant in the Japanese tuna fishery will continue in 2009 and involve experiments designed to improve tori line performance and longline sink rates.
Australia	Tunas and swordfish	Research in Australia will mainly focus on completion of the research and development of the underwater bait setting capsule, testing the hook retention of baits deployed with the capsule and determining the operational effectiveness, and fish capture success, of the underwater setter. In the event that the underwater setter proves to be an effective device with which to fish for tuna and swordfish, it is intended that an experiment will be conducted in collaboration with colleagues from Uruguay to determine the seabird deterrent effectiveness of the underwater setter compared to surface setting from the stern and surface setting from the side of vessels.

Annex 7

DRAFT ***REVISION OF*** SECTION FOUR OF ADVISORY COMMITTEE WORK PROGRAMME 2008-2012

4.	**Seabird Bycatch**			
4.1	To consolidate Seabird Bycatch Working Group	Parties with assistance of Convenor of SBWG and Secretariat	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 bodies to assess and minimise bycatch of albatrosses and petrels	SBWG and AC	1) End Aug 2008 2) End March 2009 3) 3 months before AC5 4) AC5 and ongoing	1) Agree initial plan (AC4) and nominate first RFMO interaction coordinators (AC) 2) Analysis of needs, coordination of work and report back on initial RFMOs (RFMO interaction coordinator intersessionally with SBWG, AC and Parties, as described in AC4 Doc 56 Rev 1) 3) Review of process and suggest any changes (SBWG in time for AC5) 4) 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	AC5 and on-going	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) October 2008 2). AC6 3). 2011	1) Complete last of initial five reports. 2) Analysis of information for remaining RFMOs including those managing trawl fisheries (by AC6) 3) Review if updated overlap analyses required (AC6)

4.5	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 national EEZs	SBWG	1). For AC5 2). AC5 3). by AC6	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) Conduct prioritisation exercise (SBWG for AC5) 3) Assess needs for each EEZ and any capacity building requirements
4.6	Develop generic products to assist RFMOs and other relevant international and national bodies in reducing seabird bycatch	NZ / SBWG Convenor /Secretariat, with other SBWG consultation to review needs	1) By AC5 2) Defined by RFMO coordinators	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 (AU$ 20, 000). 2) Summary of risk assessment methods and key contacts in this area.
4.7	Develop specific materials and guidelines to assist ACAP coordinators attending RFMO and other relevant meetings to maximise effective participation and consideration of issues relevant to ACAP	SBWG, NZ and others as defined	First by AC6 and on-going	These materials would be defined in the RFMO implementation plan (See 4.3) and be tailored for each RFMO above and beyond those outlined above (AU$ 40,000). Priority decided inside the RFMO interaction plan.
4.8	Maintain information fact sheets on mitigation measures for fishing methods known to impact albatrosses and petrels (demersal longline, pelagic longline, trawl). Maintain individual mitigation fact sheets (BirdLife/ACAP).	Leads: Trawl: NZ Pelagic longline: Australia; Demersal longline: UK; individual: BirdLife	Ongoing review by SBWG at each meeting	Initial versions of each gear review completed by AC5 Individual mitigation fact sheets by AC5)
4.9	Assist in the preparation, adoption and implementation of FAO NPOA-Seabirds or equivalent	SBWG and Parties/ Range States	Review progress at AC5	Preparatory meetings scheduled for September 2008. Once developed, provide capacity building in accordance with the needs identified by interested Parties in order to encourage implementation, particularly in Argentina, Peru, Ecuador, South Africa, (Mozambique, Madagascar), Tristan da Cunha, France, and EC external fisheries.

4.10	Prepare review of knowledge on deliberate take of ACAP species by fishers	UK/Peru/ Australia/ WWF	By AC5	Review to describe current knowledge (much from grey literature) and causes of any deliberate take and to consider possible take reduction strategies
4.11	Review results of any research funded by ACAP on seabird bycatch issues	SBWG	At each meeting	Draw conclusions and make recommendations to AC as appropriate.
4.12	Maintain review of research needs and priorities for bycatch research and mitigation development	SBWG	At each meeting	
4.13	Provide and consider annual reports to AC on WG activities	SBWG and AC	At each meeting	
4.14	Implement relevant actions from waved albatross action plan	Ecuador and Peru		Likely social influencing programme needing to be planned. Further consideration required; project application addressing this received by ACAP.

Items to Add to SBWG Component of AC Work Programme:

1) Develop a clear objective statement of purpose, terms of reference and timeline for the collection of ACAP listed species bycatch data from Parties.
2) Develop and send a timely survey to Parties for metadata, ie what type of ACAP listed species bycatch data is available. The request will also include a need for detailed information on Party's observer program or other mechanism used for monitoring fisheries.
3) Create a bibliography (published and grey literature) of bycatch data in fisheries of Parties.
4) Develop a prototype bycatch data collection form with comprehensive instructions for completing the form.
5) Send the prototype data form to a small sample of Parties for completion. Evaluate the utility of the form and appropriateness of its questions. Revise as necessary based on the sample completed forms.
6) Incorporate the revised bycatch data collection form into the reporting required of Parties under the implementation of the Agreement.