Agreement on the Conservation of Albatrosses and Petrels

Sixth Meeting of Advisory Committee

Guayaquil, Ecuador, 29 August – 2 September 2011

Report of Seabird Bycatch Working Group

Seabird Bycatch Working Group

REPORT OF THE FOURTH MEETING OF THE SEABIRD BYCATCH WORKING GROUP, GUAYAQUIL, ECUADOR, 22-24 AUGUST 2011

PURPOSE

This Report reports on discussions and recommendations of the Fourth Meeting of the Seabird Bycatch Working Group (SBWG), held in Guayaquil, Ecuador, 22-24 August 2011, together with progress achieved in implementing the Working Group's Work Programme.

INTRODUCTION, WELCOME AND APOLOGIES

The Seabird Bycatch Working Group Convenor, Barry Baker, welcomed all Working Group members and observers (Annex 1) and introduced the Working Group's Vice-convenor, Anton Wolfaardt (United Kingdom). Apologies were noted from Elisa Goya (Peru), Svein Løkkeborg (Norway), Ramiro Sanchez (Argentina), Roberto Sarralde (Spain) and Cleo Small (BirdLife International).

The Convenor noted that there was a large number of observers present, and invited all attendees to contribute fully to the meeting. Those scheduled to lead on agenda items agreed to provide a written report on those items, with contributory text being drafted by participants who made presentations, as well as by several others.

1. PELAGIC LONGLINE BYCATCH MITIGATION

1.1 Mitigation research update

Agenda Item 1 focused on information sharing and included presentations highlighting initiatives specific to seabird conservation in pelagic longline fisheries. Brief summaries of presentations are included below.

SBWG-4 Doc 05 presented the preliminary findings of two line-weighing trials in the Australian tuna fishery. The trials examined the effects of seabird-friendly (fast sinking) branch lines on catch rates of target and non-target fish. In the event that no effects were detected the effectiveness in deterring seabirds would then be assessed. There was no statistical difference in the catch rates of Yellowfin tuna on gear configured with 60-g weights at 3.5 m from hooks (the industry standard) and gear with 120-g weights 2 m from hooks. Further, there was no statistically detectable difference between gear types in catch rates of other commercial species combined (Bigeye tuna, Albacore tuna, Dolphin fish and Broad-billed swordfish). It must be noted, however, that the catch data were highly variable and derived from a sample size of only 30 sets of the longline (36,000 hooks). Similarly, there were no statistical differences in the catch rates of Yellowfin tuna between branch lines with 60-g weights at 3.5 m and those with 40-g lead weights placed at the hook (hook-leads). There was also no detectable effect of the hook-lead gear on dolphin fish and a range of shark species combined. There was, however, a negative effect of the hook-lead branch lines on catch rates of broad-billed swordfish. However, the total number of swordfish caught

was too small to justify drawing firm conclusions about hook leads and swordfish at this stage. The hook lead trial is currently underway and will be completed in early 2012.

SBWG-4 Doc 06 provided an update on the BS30 underwater bait setter designed to release baited hooks at depth in pelagic longline fisheries. In the austral winter and spring of 2011 a prototype version of the underwater setter was tested in the Uruguayan swordfish fishery against White-chinned Petrels and Black-browed Albatrosses. In 35 days of fishing in the absence of other deterrent devices, two seabirds were caught on hooks deployed underwater and 11 were caught on hooks deployed at the surface. This result, although reasonable for a prototype underwater setter, fell short of the established standard, which is to eliminate or reduce to negligible levels mortality of deep diving species such as White-chinned Petrels. The prototype was sensitive to variation in vessel setting speed and set no deeper than 4-6 m, depending on sea conditions. The prototype is currently being developed as a mark-two version with a much improved performance in terms of maximum depth attained and cycle times. The intention is to complete development and operational testing in Australia in 2011 and return to Uruguay in April 2012 to complete the proof-of-concept experiment.

SBWG-4 Doc 07 reports results of a comprehensive research programme comparing the performance of weighted (W) and un-weighted (UW) branch lines deployed in combination with two “hybrid” streamer lines (long and short individual streamers) across night and day on two Japanese vessels. The research was staged in the tuna joint venture fishery in the South Africa Exclusive Economic Zone (EEZ), an area/fishery with aggressive seabirds and historically high bycatch rates, in the austral winter of 2010. Metrics for comparison included the rates and locations of seabird attacks relative to bird-scaring lines and the vessel during the set, seabird and fish catch rates, hook sink rates, and the number of seabirds attending the set and the haul. Branch lines were weighted with 65 g to 70 g within 3 to 3.5 m of the hook using the double-weight configuration: two leads placed at either end of a 1 to 1.5 m section of wire trace inserted into the branch line 2 m above the hook.

Weighting branch lines in combination with hybrid streamer lines dramatically reduced seabird attacks, secondary attacks and seabird mortalities with little effect on fish catch. Virtually all seabird attacks were beyond 100 m, the mean aerial extent of the two streamer lines. Overall the rate of primary attacks on W branch lines was over four times lower than on UW lines. Importantly, the percent of secondary attacks on W lines was half that of UW lines. Four of 27 bird mortalities were on W branch lines (0.040 birds/1,000 hooks) – a reduction in seabird bycatch rate of 86% compared to UW (0.290/1,000 hooks). Twenty-four of the 27 bird mortalities occurred after nautical dawn; all three birds caught at night were on UW lines. Mean tuna catch was near equal on the two branch line types. However, branch lines became entangled on themselves three times more often than did UW branch lines. No crew injuries occurred from either branch line type.

These results strongly suggest that two hybrid streamer lines together with weighted branch lines and night setting constitute best-practice seabird bycatch mitigation for the joint venture fleet operating in the South Africa EEZ and other White-chinned Petrel-dominated fishing areas. This paper notes; however, that the Column A and Column B mitigation Conservation Measure approach adopted by three of the five world tuna commissions (IATTC, IOTC and WCPFC) falls short of the best-practice mitigation identified in this study. The results call into question the approach of basing branch line weighting prescriptions solely on sink rate data and underscore the need to incorporate the influence of multiple mitigation measures used

simultaneously on the mass and configuration of branch line weights necessary to achieve seabird conservation in pelagic longline fisheries.

SBWG-4 Doc 09 reported the results of research by Birdlife International's Albatross Task Force and partners in Brazil, South Africa and Uruguay. The results of the research in Brazil and Uruguay are presented in documents SBWG-4 Doc 40 Rev1 and SBWG-4 Doc 42, respectively. The research in the South African domestic pelagic longline fishery examined the effect of fast sinking branch lines on the catch rates of target and non-target fish as a first step to assessing the seabird deterrent capability of branch line weighting. Increased line weighting (from 60-g to 150-g Safe Leads) significantly increased the 'initial' and 'final' sink rates of baited hooks. To date there is no evidence to suggest that target species catch rate is affected by the increased line weighting.

SBWG-4 Doc 10 reports good progress on further ACAP-funded development of the Hook Pod, designed to protect baited hooks to specific depths and reduce seabird bycatch in pelagic longline fisheries. Developments included the redesign of the pressure release mechanism and the incorporation of an LED light, designed to replace the need for disposable chemical light sticks. Recent at-sea trials conducted in Brazil (Projeto Albatroz) produced promising results with very few operational difficulties experienced and no negative impact on target catch rates. Continued trials are planned for a two to three month period to test the pod's effectiveness at reducing seabird bycatch and its durability. Further trials are also planned in other ACAP Party fisheries in 2012.

SBWG-4 Doc 40 Rev1 presents the results of research conducted in Brazil to reduce seabird bycatch on smaller vessels in 2010. Line-weighting experiments were conducted on six voyages and included assessment of the effect of 60-g or 75-g weighted swivels positioned 2 m and 5.5 m from the hook on sink rate and bird attack rate. A total of 55 longline sets was performed, of which 38 were made with a bird-scaring line and 17 without. Mean bird-scaring line aerial extension was 83 m (range: 40-110 m; n = 297), and in 50% of the measures the aerial extension reached from 80-90 m. The mean sink rates of baited hooks with both weights two metres from hooks were greater in each of the 0-2 m, 2-4 m and 4-6 m depth strata than hooks with weights set at 5.5 m; however, these differences were statistically significantly only for the 2-4 m strata on lines with 75-g weights. During 1420 minutes of direct observation during set operations 312 bird attacks were observed.

The mean attack rate with a bird-scaring line (0.1737 ± 0.2799 attacks/min.) was significantly lower (Mann-Whitney: $P < 0.05$) than without a line (0.4458 ± 0.0.4961 attacks/min.). This difference was much higher within the first 50 m beyond the vessel stern, where the mean attack rate under bird-scaring line protection (0.0085 ± 0.0335 attacks/min.) was 97% lower than the mean attack rate without the a line (0.2583 ± 0.4169 attacks/min.). No seabird bycatch was recorded during the 55 experimental sets (38 under bird-scaring line protection). There were no significant differences between the CPUE of the main target species under all treatments. Brazil also informed the Working Group of the adoption in April of 2011 of the required use of bird-scaring lines and branch line weights of at least 60 g placed two metres from the hooks for all pelagic longline vessels fishing south of 20°S.

SBWG-4 Doc 42 Rev1 characterises the structure of the seabird assemblage associated with pelagic longline vessels on the Uruguayan continental slope. The study analysed the temporal variation of the assemblage and species composition around fishing vessels and discard use. The data were collected on 20 commercial fishing trips conducted between 2005 and 2008 and resulted in 415 bird counts, 172 of which recorded behaviour. At least 38

seabird species were observed, the largest number for any fishery in the region. Species richness peaked in October-April although the abundances of many species were significantly greater between May and September. Of the 38 observed species, only 14 significantly made use of discards, these were all albatross and petrel species captured incidentally in the region. There was competition within and between species for discards. In general the frequency of intraspecific competition was greater in the most abundant species during the period of their greatest abundance. Success in interspecific competitive interactions was more frequent in albatross species. Success was principally related to body size. The seasonality and composition of the seabird bycatch were determined by spatio-temporal dynamics of the assemblage and by interspecific interactions. Discards from pelagic longline fleets operating in the Brazil/Malvinas Confluence region may be an important food source for at least eight species of globally threatened albatrosses and petrels. Understanding the effect of discards on these populations could generate useful information for their conservation. Nevertheless, efforts to reduce the bycatch levels on these populations should be considered the main goal.

SBWG-4 Doc 43 analyses the bait attacks of seabirds in the Uruguayan pelagic longline fishery. Species of petrels and shearwaters with a deep-diving capability, such as White-chinned Petrels, Grey Petrels and Great Shearwaters, could facilitate the catch of albatrosses in pelagic longline fisheries because they return bait to the surface from depths beyond the reach of albatrosses. In areas with high densities of petrels and shearwaters these species could indirectly increase the bycatch susceptibility of albatrosses. In 48 sets attacks on baits were quantified (mean *c*. 190 per set). There were 384 attacks on baits, 260 of which were attacked by a single individual and 124 by more than one (i.e. multiple attacks). Multiple attacks were the largest source of bycatch of albatrosses (at least 24 of 31). Combined, the presence of petrels increased the access to bait by albatrosses by 56%. In most cases (75%) this occurred because petrels dived after the bait and returned it to the surface. Diving by petrels and shearwaters indirectly increased by 55% the catch of albatrosses. This study shows that inter-specific interactions can affect the likelihood of bycatch and highlights the importance of making observations of attacks on bait during line setting.

SBWG-Doc-45 presents information on the efficiency of bird-scaring lines to reduce incidental seabird bycatch on smaller vessels in the Uruguayan pelagic longline fleet. Eleven trips were carried out on longline vessels in the area and season of high bycatch rates in the south-west Atlantic. Two different treatments were deployed randomly during the longline sets: sets with a "mixed" bird-scaring line (with long and short streamers) and sets without a line (control treatment). The bird-scaring line was set on the leeward side of the mainline and towed from a height of 6 m from sea level and a horizontal distance of 5 m (range 4-6 m) from the setting station. Forty-three birds were captured without a bird-scaring line (control treatment n = 42 sets; 40,873 hooks), whereas five captures were recorded in the bird-scaring line treatment (n = 43 sets; 42,061 hooks). These results show that a single bird-scaring line reduces seabird bycatch in pelagic longline fisheries. However, uptake is likely to be affected by ongoing problems of entanglements between bird-scaring lines and fishing gear.

1.2 Mitigation research update

A major product of previous SBWG meetings has been a review of information on current mitigation research for pelagic long-line fisheries and the identification of knowledge gaps

(AC3 Doc 14 Rev 4, Appendix 4, Table 2; AC4 Doc 14 Rev 4, Annex 5; AC5 Doc 14 Rev 1, Annex 3). The advice embodied in the table has been distributed to some of the tuna Regional Fishery Management Organisations (tRFMOs), where it has been well received.

At this year's meeting the Working Group reviewed and updated the information in this table, following presentation of the papers referred to in Section 1.1 of this Report. The format of the review table was discussed by the Working Group, and it was suggested that the current format of the table does not represent the most efficient presentation of the information. It was agreed that the review information for all fishery types should rather be presented in a more narrative style, clearly stating whether the mitigation measure has proven to be effective and thus recommended as a primary measure. The results of this review in the revised format are attached as Annex 2. The best-practice advice derived from the review was once again synthesised into an advice statement that can be readily transmitted to target audiences (tRFMOs and Party's fisheries managers). This advice is provided at Annex 3.

As before, it is recommended that the Advisory Committee endorse this advice and encourage Parties to use this information to guide the development of policy and practice within the fisheries under their jurisdiction.

1.3 Mitigation research priorities

The Working Group identified the following PLL mitigation research priorities:

Weighted branch lines: continued work to identify branch line weighting configurations (mass, placement, shape, number of leads and materials) that are effective at reducing seabird bycatch with and without other mitigation, and that are safe and practical.

Bird-scaring lines: compare the effectiveness of one compared with. two bird-scaring lines; develop methods that create drag to maximise aerial extent while minimising entanglements of the in- water portion of bird-scaring lines with longline floats; and compare the effectiveness of bird-scaring lines with different steamer lengths, configurations, and materials. Also trial methods for efficient retrieval and stowage of bird scaring lines.

Night setting: determine effectiveness of bird scaring lines and branch-line weighting at night by characterising seabird behaviour at night using thermal or night-vision technologies.

Combinations of mitigation measures: continue to evaluate the effectiveness of pairings of the three best-practice mitigation methods (night setting, branch-line weighting and bird-scaring lines).

Novel technologies: continue to develop novel technologies that release or protect baited hooks to depths beyond the reach of seabirds.

Seabird "hot spots": delineate areas of high concentrations where albatrosses and petrels are at most risk to mortality in pelagic longline fisheries and where the most rigorous seabird bycatch mitigation should be required, using bycatch rates reported by Parties as well as seabird tracking data and other data sources. It is useful also to understand which areas have least risk for albatrosses and petrels so as to avoid application of measures that fishers regard as pointless.

2. TRAWL BYCATCH MITIGATION

2.1 Mitigation research update

The Working Group welcomed recent improvements identified by BirdLife's Albatross Task Force in Argentina with the use of bird-scaring lines in the industrial demersal trawl fishery, particularly the testing of an off-setting towed device, which improved the performance of bird-scaring lines, significantly reducing the incidence of cross-over between bird-scaring lines and warp cables (SBWG-4 Doc 13). It was noted that results from these trials will be considered for inclusion in the Argentinean National Plan of Action - Seabirds. SBWG-4 Doc 13 also reviews progress in the demersal hake trawl fishery in Namibia where the use of bird-scaring lines has significantly reduced seabird interactions with trawl warp cables. Modelling highlighted that the most important factors related to seabird interactions were offal discard, use of a bird-scaring line and season in this fishery. As a result, mitigation requirements have been included in the Namibian Hake Management Plan and Namibia's draft National Plan of Action – Seabirds (NPOA – Seabirds).

SBWG-4 Doc 55 provides a review of seabird mitigation research and management in the Falkland Islands/Islas Malvinas[1]. The paper highlights data gaps within observer data and stresses the need for finding a statistically rigorous proxy for cable strike mortality which could be used as a measure of performance with respect to setting targets in NPOA - Seabirds. To investigate this issue, experimental plans were outlined that comprise the random allocation of bird-scaring lines under differing environmental conditions with personnel in a support vessel astern of the fishing vessel, noting injured, moribund or dead birds behind the vessel in order to examine the relationship between seabird and warp cable strikes and levels of unobserved ("cryptic") mortality. The paper also outlines future work to be conducted in the fishery which includes mesh size trials to improve the selectively in the rock cod fishery and thus reduce discard levels.

Argentina expressed their appreciation for the papers presented and made a statement in relation to SBWG-4 Doc 55, which they requested be annexed to the report (Annex 11).

The UK asked that their position on the issue raised by Argentina be included as an annex to this report (see Annex 12).

The Working Group reiterated previous advice that during trawl fishing seabirds are attracted to the vessel by the discharge of processing waste. All previous studies on this topic have shown that when there is no discharge, few seabirds are attracted to the vessel, and there are few, if any, collisions with the warps. The Working Group welcomed the findings of SBWG-4 Doc 14, which details an experiment conducted on a single New Zealand trawler fishing for Hoki and *Beryx* species to investigate the effect of batching waste discharge (holding the waste and dumping it at intervals) on the abundance of birds attending the vessel. Three experimental treatments were used: continuous discharge; batched discharge at 30-minute intervals, and batched discharge at two-hour intervals. During the experiment, counts were made of the number of birds within 10 m and 40 m of the stern of the vessel.

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

The number of birds rose rapidly during discharge and then fell back to non-discharge levels within *c*. 10 minutes of the discharge finishing.

Statistical analysis showed that, on average, the number of birds within the sampling zones was around half of the number present during continuous discharge. The reduction was clearer for two-hour discharge intervals. A previous experiment had found a further decrease in the attendance as the batch interval was increased from 30 minutes to two, four and eight hours. On this basis, it was recommended that batched discharge of waste (preferably with a discharge interval of two hours or more) be used as a mitigation measure to reduce the number of birds that are at risk of warp collisions during trawl fishing. A caveat is that the experiment used seabird counts as a proxy for the number of warp mortalities, and it remains to be demonstrated that operational use of waste batching leads to a consequent decrease in cable strikes, and with it, seabird mortalities. Similar experimental methods have been used to explore the efficacy of waste mincing as a mitigation measure, and it has been found that mincing may reduce the numbers of the great albatrosses of the genus *Diomedea* attending trawlers, but not necessarily of all ACAP-listed species.

The Working Group reaffirmed that the long-term solution to reducing seabird bycatch in trawl fisheries is related to the management of waste discharge, and welcomed the findings from New Zealand.

2.2 Review of current mitigation for trawl gear

The Working Group reviewed mitigation measures available for both demersal and pelagic trawl gear, based on published literature and expert opinion. The results of this review are attached as Annex 4. Recommended mitigation approaches have been extracted from the review and incorporated into a best-practice advice statement for trawl gear (Annex 5). It is recommended that the Advisory Committee endorses this advice and encourages Parties to use this information to guide the development of policy and practice within trawl fisheries under their jurisdictions.

2.3 Mitigation research priorities

The Working Group identified the following four research areas as the highest priorities for further reducing seabird bycatch in trawl fisheries (high priority should also be given to investigating best-practice combinations of mitigation):

a) options to reduce seabird interactions with warp cables by manipulating the time, nature and location of offal discharge, recognising size and operational differences between vessels;

b) methods to reduce seabird becoming entangled in nets during hauling;

c) methods that can be applied to various fisheries/seabird assemblages to determine relationships between seabird abundance, cable interactions and mortality; and

d) the applicability of net binding across pelagic fisheries.

The Working Group requested that the Advisory Committee encourages Parties and others to prioritise these areas of research and to keep the group informed of developments in relation to seabird mortality caused by trawl fisheries.

3. DEMERSAL LONGLINE BYCATCH MITIGATION

3.1 Mitigation research update

Agenda item 3 focused on recent advances in research relating to seabird bycatch mitigation in demersal longline fisheries. Results from two research projects were presented, brief summaries of which are included below.

BirdLife International presented the results of research conducted on the effectiveness of bird-scaring lines in reducing seabird bycatch in the Namibian demersal longline fishery (SBWG-4 Doc 17). Observed seabird bycatch in the fishery was as high as 0.63 birds/1000 hooks. Most birds killed (77%) were White-chinned Petrels. The use of single or paired bird-scaring lines reduced the mortality rate to 0.08 and 0.01 birds/1000 hooks, respectively. Use of bird scaring lines has been included in the Namibian Hake Management Plan, and is being considered for the draft NPOA – Seabirds, which specifies a reduction target for this fishery of 0.03 birds/1000 hooks. Improved line weighting regimes are also being considered for both plans.

New Zealand presented an update on a series of projects being undertaken to develop improved mitigation strategies for inshore demersal longline fisheries (SBWG-4 Doc 46). These fisheries were identified as posing risk to a number of seabird species, although mandatory mitigation requirements are already in place. Initial work focused on raising awareness among fishers and characterising the fishery, including on collecting sink-rate data with time-depth recorders (TDRs). Results illustrating the variability between vessels and gear setups were presented, showing clear differences in the availability of baited hooks to birds. Key variables influencing sink rates included the type of weighting regime and placement of line floats. More detailed results from extended work in 2010-11 will be reported shortly, including initial sea trials and development of a novel underwater line-setting device. Further work is also planned in 2011-12 and will be reported back to the group in due course.

3.2 Review of current mitigation for demersal longline gear

The Working Group noted that the results presented in SBWG-4 Doc 17 and SBWG-4 Doc 46 were consistent with ACAP's review and advice on best-practice mitigation for demersal longline operations, and that it was not necessary to update the review table (SBWG-4 Doc 18) and summary advice statement (SBWG-4 Doc 19), although the format of the review table was changed to improve presentation of the data. The current review is attached as Annex 6, and the advice as Annex 7.

3.3 Mitigation research priorities

On the basis of discussions regarding mitigation research priorities for demersal longline fisheries, the Working Group identified the development and testing of mitigation measures for small vessels as the main outstanding research priority.

4. GILLNET BYCATCH MITIGATION

No papers had been submitted under this agenda item, but it was noted that aspects of the topic would be discussed under Agenda Item 5. The distinction between drift gillnets and bottom set gillnets (which can be single or multi-layered) was emphasised, and options for

seabird bycatch mitigation in these two net types reviewed. Bycatch in gillnet fisheries is not limited to seabirds but rather is typically a multi-taxa concern (e.g. including turtles and small cetaceans in particular). Ongoing work in Peru is currently testing battery-powered light-emitting diodes (LEDs) to illuminate nets as a mitigation option for demersal gillnets. This work, although primarily focused on mitigating sea turtle bycatch, also showed promise as a potential mitigation measure to reduce seabird bycatch in demersal as well as in surface net fisheries.

It was also noted that although seabird captures per set are generally low, extrapolation of bycatch rates to these large-scale fisheries suggests that large numbers of albatrosses and petrels are taken in gillnet fisheries throughout their ranges. If deep-diving birds (such as shearwaters) become listed within ACAP the need to address seabird bycatch in gillnet fisheries will increase.

Several sea turtle bycatch mitigation trials are underway in various net fisheries and results from these trials may guide seabird bycatch mitigation work. Examples of the mitigation methods trialled include the use of nets with altered (reduced) vertical profiles ("low profile" nets), and work testing the elimination of net 'tie-downs'.

Potential gillnet mitigation measures and practices identified included time/area closures, transition to alternative fishing methods, mesh-size requirements, multi-filament vs. monofilament netting, suspender lines on drift gillnets (drop net below float line), sensory deterrents (increased visibility of netting or portions of the net, and increased acoustic 'visibility' of net, using acoustic alarms), elimination of tie-downs, low-profile nets, reduced soak time, net patrolling to release incidental catch, provision of equipment to facilitate safe release of bycatch (e.g. net cutters), fishing depth, time of day, net weighting and setting speed (as they effect net sink rate of the net and net stability on the bottom), and avoiding aggregations of seabirds. The working group recommends that the Advisory Committee encourages ACAP Parties and Range States to explore these mitigation options and carry out research to determine their effectiveness and practicality.

Given the potential for serious impacts to albatross and petrel populations from gillnet fisheries and the lack of papers on this topic, the Working Group strongly encouraged an assessment of the magnitude of gillnet fishing effort and albatross and petrel bycatch, as well as identifying research options for gillnet mitigation. Assessments should include data on the seasonality, area, and time and other environmental variables (e.g. depth, weather, time of day) and the relationship of seabird bycatch to these variables.

5. ARTISANAL FISHERIES

A comprehensive review of the characteristics of artisanal fisheries conducted by South American ACAP Parties and the occurrence of seabird bycatch within them are provided in SBWG-4 Doc 22. The document highlights the importance of artisanal fisheries in Brazil, Chile, Ecuador and Peru. A number of factors promoted the increase of artisanal fisheries in recent years to the point that in some areas fishing effort can be larger than those of industrial fisheries. The information and statistics available are very limited in part due to operational difficulties in obtaining data but also in some cases the data have been combined with that of industrial fisheries. The spatio-temporal dynamics of artisanal fisheries, and changes in target species and fishing gear used between and within seasons, makes assessment of the impact of artisanal fisheries difficult.

SBWG-4 Doc 24 reports analyses of the extent of seabird bycatch in the small-scale fisheries of Ecuador and Peru; five (out of nine surveyed) fisheries had seabird bycatch (four longline and one gillnet fishery). Information is included on fishing gear configuration, materials and other characteristics of artisanal fisheries in the South American region, all of which are essential to better understand the way these fisheries operate and the feasibility of mitigation measures.

Seabird bycatch in the demersal longline hake fishery in Ecuador was introduced in SBWG-4 Doc 23. This document shows the importance of setting operations for seabird bycatch and also describes an investigation on mitigation alternatives for this particular artisanal fleet, including the incorporation of line weighting and its effect on capture rates of target and non-target species.

Although presented in agenda item 15, SBWG-4 Doc 36 also addresses the introduction of mitigation (weighted swivels) into the small-scale longline fleet in Peru and the need to monitor the mechanisation of longline vessels that could be a future source of seabird mortality.

Seabird bycatch in these studies varied by fishery; Black-browed and Waved Albatrosses and White-chinned Petrels were the most commonly captured species. Bycatch of Waved Albatross was confirmed in both the Ecuadorian hake demersal longline and tuna pelagic longline fisheries, as well as in the Peruvian driftnet fishery for shark and rays. Other ACAP-listed species reported were Buller's, Chatham and Grey-headed Albatrosses and Black Petrels.

The Working Group recognised that considering the very large scale of the South American fisheries described (e.g. over 6,000 motorised vessels in Brazil, some 15,000 in Chile, over 15,000 in Ecuador and 10,000 in Peru) even very low mortality rates can have serious detrimental effects on species such as the Critically Endangered Waved Albatross. Due to the complexity of these fisheries, incidental mortality needs to be addressed from additional perspectives, including socio-economic factors. It will also require the development and use of alternative or adapted mitigation methods, given that those currently known to be effective can be difficult to implement in small fishing boats.

The Working Group recommended that studies characterising seabird bycatch be conducted in South American artisanal fisheries that overlap with Waved Albatross distributions, and for which little seabird bycatch data are available such as the Ecuadorian surface longline fisheries for yellowfin tuna for sharks and for dolphinfish and as well as the demersal longline fishery for hake in northern Peru. Overlap of these fisheries with other ACAP-listed species such as Black Petrel was also of concern. Further, the Working Group recommended that research be conducted to identify seabird bycatch mitigation strategies applicable to small fishing vessels, with attention given to effects on the capture rate of target species.

6. REVIEW OF BYCATCH DATA PROVIDED BY PARTIES

6.1 Review of bycatch data received from Parties as part of their Report on the Implementation of the Agreement

The Secretariat presented SBWG-4 Doc 25 reporting on progress achieved since AC5 on the use of web-based forms for submitting fisheries and bycatch information. Overall the process

worked well, with 12 Parties and Range States providing data via the web-based forms, for a total of 79 fisheries. Advice from the Working Group was sought on a number of issues identified during the first round of reporting. These included issues such as the volume of information provided in some of the inputs, and the amount of time available to complete the submission. Advice was also sought on how the submitted data should be used, the sort of analyses that would be appropriate to undertake, and a mechanism to carry out such data analyses.

The Working Group noted that the purpose of the data-collection process had been defined previously at MoP3 (MOP3 Inf 1, and AC5 Inf Doc 10). Briefly, the purpose is to review and update data on the current levels and trends of incidental mortality of ACAP-listed albatrosses and petrels in relevant fisheries and to assess the implementation and effectiveness of bycatch mitigation measures in those fisheries, and thus to assist in determining the effectiveness of the Agreement.

The Working Group recommended that the current reporting format should remain largely unmodified for the time being but that forms should be available independently of the Advisory Committee's reporting framework, to allow ongoing data updates and to enable the appropriate bodies time to collate and submit the information to the Secretariat. However, it was agreed that a deadline for submission of data (prior to an Advisory Committee meeting) be clearly defined. It was agreed that bycatch data from the High Seas need not to be submitted by Parties at present. The question of data analysis and presentation of the information to a session of the Meeting of Parties was discussed, as well as some of the difficulties and merits of centralising these data in the ACAP database. A clear way to proceed was not agreed. The Secretariat will summarise and present the collected information to MoP 4. It was also suggested that the data are investigated intersessionally to determine what analyses could be undertaken, and provide recommendations on the best possible analytical approaches. This investigation should also consider the extent to which the original objectives of the bycatch data collection and reporting process, as outlined in MOP3 Inf Doc 1 and AC5 Inf Doc 10), are able to be fulfilled by the data that are currently requested, and to provide feedback to the Working Group on any changes that may be necessary to the data that Parties are asked to submit. The Working Group established an intersessional group comprised of Barry Baker, Igor Debski, Wiesława Misiak, Ken Morgan, Kim Rivera and Anton Wolfaardt, as well as any others that are willing to participate to take this task forward.

6.2 Global seabird bycatch in longline fisheries

Members of the Working Group recognised the relevance of BirdLife's global assessment of seabird bycatch in longline fisheries (SBWG-4 Doc 30) when considering examples of how seabird bycatch data should be collated and reviewed. Despite the inevitable inadequacies and assumptions contained within such data, the published estimate indicated at least 160,000 (and potentially in excess of 320,000) seabirds are killed annually, a large proportion of which are of albatross and petrel species listed in Annex 1 of the Agreement.

Where realistic comparisons can be made with data from the 1990s, there is evidence of substantially reduced bycatch in some key fisheries. Reductions stem from decreased fishing effort (especially in Illegal, Unreported and Unregulated (IUU) fishing in the Southern Ocean), and greater and more effective use of technical mitigation measures, notably in demersal longline fisheries. Figure 1 of the document identifies the top 10 fisheries associated with the

highest levels of seabird bycatch worldwide; these include a mix of demersal and pelagic longline fisheries.

Fisheries with previously unidentified bycatch problems were also identified (e.g. the Spanish Gran Sol demersal fleet). The authors noted that significant data gaps prevent adequate assessments of the scale of the impact (e.g. in the Asian distant water fleet). Future assessments will only achieve greater precision when minimum standards of data collection, reporting and analysis are implemented by longline fishing fleets and the relevant regional fishery management organisations. Those fisheries where bycatch has been substantially reduced demonstrate that the problem of seabird bycatch can be reduced to negligible proportions by enforced implementation of appropriate best-practice mitigation devices and techniques.

7. BYCATCH DATA COLLECTION

SBWG-4 Doc 26 provides draft guidelines on data-collection requirements for RFMOs to improve knowledge of fishery impacts on ACAP-listed species. The draft guidelines built on previous work in this area, including the best-practice guidelines for the collection of bycatch data for longline fisheries contained in SBWG-4 Doc 27. The implementation of observer programmes that include the collection and management of seabird bycatch and associated data are the most effective means of monitoring fisheries performance with respect to seabird bycatch and use of mitigation measures. The main objectives of collecting seabird bycatch data are to characterize and quantify seabird bycatch within a fishery, to understand the nature of seabird bycatch, and to assess the effectiveness of seabird bycatch measures in reducing mortality. In order to fulfil these objectives a number of issues need to be addressed. These include:

a. the establishment and implementation of effective observer programmes;

b. sufficient observer coverage of the fishing effort to quantify accurately seabird bycatch and to scale up reliably observed bycatch to the whole fishery;

c. standardised collection of reliable seabird bycatch and associated data by well-trained observers; and

d. clear and standardised requirements for reporting bycatch and coordinated and preferably centralised management of bycatch data.

SBWG-4 Doc 26 provides a number of recommendations on each of these issues. When discussing the minimum level of observer coverage required, the Working Group noted that it is difficult to recommend a single or explicit minimum standard that would be suitable for all coastal state fisheries and RFMOs. Consequently, it was agreed to highlight in the guideline document that the level of observer coverage should be sufficient to assess and monitor bycatch, and not to specify a minimum level of coverage. It was also agreed that observer programmes should establish a process by which the effectiveness of the observer programme, and especially the level of observer coverage, is regularly reviewed.

Table 1 of SBWG-4 Doc 26, included as Annex 8 of this report, provides a list of recommended data to be collected in fishing operations in order to assess bycatch. The table is adapted from Table 1 of SBWG-4 Doc 27, and highlights in bold those data fields

considered to be critical. The Working Group noted that the data fields highlighted represent the minimum data collection requirements rather than those that would be considered necessary as part of a best-practice approach.

The Working Group endorsed the general principles contained in SBWG-4 Doc 26 and recommended that they be formalised into an ACAP Guidelines document that can be presented to RFMOs. In discussing whether it would be useful to develop more detailed data-collection protocols, the Working Group agreed that the current scope and format of the guidelines are sufficient. Ongoing engagement with RFMOs is necessary in order to provide advice on specific data collection and observer programmes as they arise.

8. CONSERVATION PRIORITIES

8.1 Prioritisation framework for at-sea threats

SBWG-4 Doc 28 describes a review of the prioritisation database conducted in 2010 during a South American workshop held in Buenos Aires. Argentina. Several new additions and revisions were proposed. This exercise led to the update of the at-sea prioritisation database in early 2011 as part of a secondment to the ACAP Secretariat funded by New Zealand.

SBWG-4 Doc 29 reports on a simple exercise that explored the performance of the prioritisation framework in its current form relative to expert opinion. To set the scene for a discussion of this paper, the conceptual framework for identifying land-based and at-sea priorities for conservation action was described, and it was noted that an update on progress on the framework could be found in AC6 Doc 15 and SBWG-4 Doc 28.

The preliminary results of the at-sea prioritisation framework was compared against expert opinion, using 20 random fishery-seabird interactions taken from the framework. The correlation between the results using the framework and expert opinion was quite poor and further work was necessary to understand why this may be the case. This should include further analysis to investigate the effect of combined weighting factors on the identification of priority fisheries and/or what was driving the opinions of the experts when making their assessments. The paper noted that it was possible for the results of the framework to match more closely expert opinion by using a computer-generated algorithm. However, it was still necessary to address some problems and test the algorithm further before it was ready for adoption by the Advisory Committee. It was anticipated that this could be achieved before the end of the year, in order to meet the Advisory Committee needs to report back to the Parties at MoP4.

The Seabird Bycatch Working Group:

a. noted that the prioritisation framework for at-sea threats is near completion but that an appropriate scoring and weighting regime has yet to be determined;

b. agreed that useful criteria to identify an appropriate regime are: (a) that results correlate well with expert opinion; (b) do not prioritise fisheries that use strong effective mitigation measures; and (c) demonstrate that scoring and weightings are logically consistent and defensible;

c. noted that the results from the framework will be grouped into broad priority categories but an approach to do so has yet to be agreed;

d. agreed that the Working Group and its members will contribute to intersessional work, both to complete the framework and to provide advice to the Advisory Committee on its adoption and appropriate use prior to MoP4;

e. noted that the secondary objectives of the prioritisation framework (including identifying research and capacity-building priorities) can be addressed following finalisation of the framework and are therefore not urgent at this time; and

f. agreed to support the intersessional work of the group working on priorities which will, before MoP4 (i) identify a suitable scoring and weighting regime for the at-sea framework; (ii) agree upon a scheme to present the results of the prioritisation process using a simple categorical system; and (iii) provide recommendations to the Advisory Committee for the use and maintenance of the prioritisation framework.

8.2 Proposal that addressing bycatch of Wandering Albatrosses should be considered as an ACAP priority

The Working Group considered a proposal (SWBG-4 Doc 54) that addressing bycatch of the Wandering Albatross population at South Georgia (Islas Georgias del Sur)[1] should be considered an ACAP priority. There is unequivocal evidence of a long-term decrease in this population that began in the early 1960s, and accelerated in the late 1990s to >4% a year. The document included maps highlighting the areas of greatest potential interaction of birds of all age classes with pelagic and demersal longline fisheries, based on an analysis of comprehensive tracking data and fishing effort. Given the gradual long-term improvement in breeding success (suggesting that environmental conditions have probably improved), the lack of evidence that land-based threats or disease are affecting birds, and the apparent low attendance at trawlers because of limited overlap with the fleet, the conclusion that bycatch in longline fisheries is the primary driver of the observed population decline of this population is compelling.

Because final conclusions from the ACAP at-sea prioritisation framework will not be available for some time, the Working Group acknowledged the clear advantage to highlighting particularly strong cases on which ACAP might focus its efforts in the interim. It agreed that the bycatch of the south-western Atlantic population of the Wandering Albatross be considered a high-priority threat requiring urgent and coordinated international action, including:

(i) urging ACAP Parties to immediately submit to ACAP any existing bycatch data, in order to improve assessment of bycatch of the Wandering Albatross;

(ii) urging ACAP Parties that authorise fishing in the range of this species/population to commence gathering bycatch data in relevant fisheries if they have not already done so and to submit those data to ACAP; and

(iii) ACAP specifically highlighting the conservation threat to this species/population in its engagement with RFMOs with responsibility for managing fisheries within its foraging distribution, and to request that those RFMOs implement best-practice seabird bycatch mitigation measures recommended by ACAP, gather seabird bycatch data at a species level; and promptly provide ACAP with any existing seabird bycatch data.

There was some further discussion in the Working Group about the impact of discarded hooks, which are ingested by birds when non-target fish and offal are discarded. Although this issue clearly requires attention, trauma resulting from hooks ingested in this manner was

considered not to make a major contribution to population decline, although long-term toxicological effects of the digestion of hooks by chicks was unknown. The Working Group has previously recommended action by Parties to minimise the discarding of hooks and other fishing gear (AC5 Report, paragraphs 9.1.29 and 9.1.30).

9. DEVELOPMENT OF INDICATORS

The current basis for the development of a system of indicators to measure the effectiveness of the Albatross and Petrel Agreement was set out in AC5 Inf 16 Rev1. This was the subject of intersessional work following the guidance set out in AC5 Final Report paragraphs 14.2 to 14.4.

The Working Group reviewed the comments and advice relating to indicators in AC6 Inf 07 and AC 6 Doc 27.

The Working Group recommends that the following indicators should, in the short to medium term, be further developed and implemented as ACAP indicators. These indicators include those measuring the progressive acquisition of data.

State (S)

1) Availability of data for definition of at-sea ranges of ACAP species

2) Availability of bycatch data relevant to ACAP species

Pressure (P)

1) Bycatch rates and levels of ACAP species

Response (R)

1) Implementation of seabird bycatch mitigation within EEZs

2) Engagement with RFMOs on seabird bycatch issues

3) Research and development for effective seabird mitigation measures

To develop and implement these indicators further the Working Group proposed the following actions to the extent that resources permit:

S1) ACAP Secretariat, with BirdLife International, to recommend the most appropriate formulation of one or more indicators to reflect the progressive acquisition of at-sea range data and to provide data on values for these indicators both currently and at the inception of ACAP.

S2) ACAP Secretariat to develop indicator[s] of availability of bycatch data, based on the data submitted to ACAP by Parties and collaborating non-Parties.

P1a) ACAP Secretariat to develop indicators of rates and levels of seabird bycatch, based on the data submitted to ACAP by Parties and collaborating non-Parties. This may only apply to a limited number of ACAP species/ populations at present.

P1b) SBWG to consider intersessionally which data in the recent global review of seabird bycatch in longline fisheries (AC6 Doc 30) would be appropriate as baselines for assessing trends in bycatch levels and rates, initially on a fishery-specific basis.

R1-R3) SBWG to consider intersessionally how appropriate indicators for these topics might be formulated and, if possible, to suggest how appropriate baseline values might be derived.

10. COORDINATION OF ACTIVITIES RELATING TO REGIONAL FISHERIES MANAGEMENT ORGANISATIONS

10.1 Background to ACAP focus on RFMO activities

The adoption of best-practice seabird conservation in pelagic longline fisheries is a high priority for ACAP and provides the impetus for ACAP's developing strategy for effective engagement and coordination with RFMOs. The Working Group was established by AC2 in 2006 and its Terms of Reference include: "Undertake actions that will assist in assessment, mitigation and reduction of negative interactions between fishing operations and albatrosses and petrels. Efforts to achieve this aim will include the provision of information and products to assist RFMOs and other relevant international and national bodies." (AC2 Final Report). The first Work Programme of the group included an action item initially to focus review of information on mitigation measures for pelagic longline fishing methods known to impact albatrosses and petrels. The initial priority focus on pelagic longlining was premised on an awareness that up to 84% of breeding albatrosses are distributed in areas outside the CCAMLR northern boundary, and that pelagic longline fisheries for tuna and swordfish, those managed by the five tuna RFMOs, are some of the fisheries of most concern in relation to seabird bycatch in these areas (AC3 Inf 18).

In 2007, the five tuna RFMOs (CCSBT, IATTC, ICCAT, IOTC and WCPFC) met in Kobe, Japan to address areas of joint concern requiring coordination and collaboration. The tuna RFMOs jointly committed to take urgent cooperative actions and identified key areas and challenges, including "the implementation of the precautionary approach and an ecosystem-based approach to fisheries management including improved data collection on incidental by-catch of non-target species and the establishment of measures to minimise the adverse effect of fishing for highly migratory fish species on ecologically-related species particularly sea turtles, seabirds, and sharks, taking into account the characteristics of each ecosystem and technologies used to minimise adverse effect" (Kobe I Report, Appendix 14 http://www.tuna-org.org/Documents/other/Kobe%20Report%20English-Appendices.pdf)

The 3rd Meeting of the joint tCommissions (Kobe III) met in the USA in 2011 and was preceded by a meeting of the Joint Technical Working Group (Kobe JTWG) which recommended that the Working Group meet electronically every three months and to meet in person whenever possible in conjunction with Kobe meetings or in the absence of a Kobe meeting, every three years.

Over the next several years the Kobe JTWG proposed the following work plan:

- Harmonisation of data collection;
- Development of harmonised identification guides and release protocols;
- Identify and recommend research priorities;
- Prioritisation of collaborative work;
- Progress Bycatch Management Information Service (BMIS) information sharing website;
- Funding sources; and

- Compliance with data reporting requirements.

This recommendation was adopted by Kobe III.

10.2 Overview of RFMO operations

For the benefit of those members who do not attend meetings of RFMOs an overview was provided of how they operate.

There are five tuna RFMOs responsible for the management of longline tuna fisheries on the high seas. Each tuna commission holds up to four meetings of potential relevance to ACAP's work each year, some of which may run for two weeks. All the tuna RFMOs are highly politicised and operate on a consensus voting basis, which makes the adoption of new conservation measures challenging to achieve, with compromise usually a necessity.

10.3 ACAP activities at RFMO meetings

The Agreement has four tuna RFMO Coordinators: Anton Wolfaardt - International Commission for the Conservation of Atlantic Tuna (ICCAT); Barry Baker - Indian Ocean Tuna Commission (IOTC), Marco Favero - Inter-American Tropical Tuna Commission (IATTC); and Warren Papworth - Western and Central Pacific Fisheries Commission (WCPFC). Both Barry Baker and Warren Papworth cover the Commission for the Conservation of Southern Bluefin Tuna (CCSBT).

The tRFMO Coordinators have provided reports on progress made in the tuna RFMOs over the past year (SBWG-4 Docs 47-53). The Working Group noted the significant progress made over the past year by several of the tuna RFMOs and thanked the tuna RFMO Coordinators for their work in progressing ACAP's work in these fora. The Working Group also expressed its appreciation to Dr Cleo Small of BirdLife International for her ongoing contribution to this work and to France for its voluntary contribution which has allowed this work to be undertaken. Following advice from the RFMO Coordinators on the possibility of advancing ACAP's objectives in the tuna RFMOs over the coming year, the Working Group prioritised actions to be taken in the tuna RFMOs.

It was agreed that the two-column approach used in most tuna RFMO seabird conservation measures no longer reflects best practice advice, given the results of recent research on bycatch mitigation measures. In view of the significant advances made recently in mitigation research the Working Group decided that additional resources should be devoted to achieving changes in the tuna RFMOs to ensure conservation measures reflect current best practice. It was agreed that priority should be given to affecting changes in conservation measures in the ICCAT and IOTC tuna RFMOs in 2011, with priority moving to the other tuna RFMOs in subsequent years.

To achieve these changes it was recognised that more work would be required to liaise with relevant stakeholders and to prepare meetings documents etc. As the capacity of the tuna RFMO Coordinators was already stretched it was agreed that additional resources in the order of $30,000 a year should be sought to provide the capacity to undertake this work.

In relation to advancing acceptance of line weighting within tuna RFMOs it was noted that definitive research findings should be made available on the safety of line-weighting techniques. Without this evidence, it will be very difficult to gain support for the adoption of this mitigation measure in some fisheries.

10.4 Framework for seabird conservation measures and their revision

It was noted that current tuna RFMO seabird conservation measures are deficient in some respects and that the following framework and broad headings for conservation measures should be adopted for use in tuna RFMOs in the year ahead, subject to advice from the SBWG on best-practice pelagic longline mitigation.

PURPOSE

To reduce to the lowest possible level the incidental mortality of seabirds by preventing their access to baited hooks.

WHAT IT WILL DO

Prevent seabird access to baited hooks by:

weighting of branch lines;

setting longlines at night;

deployment of bird-scaring lines; and

development of mechanical devices that can prevent seabird access to baited hooks.

AREA OF APPLICATION

The area of application should be determined on the best available information, taking into account the precautionary principle. Ecological risk assessments, observer and scientific data should be used to define these areas. Area of application would include considerations for spatial/temporal closures.

PROCESS FOR REVIEW

To be reviewed when new data become available warranting changes to technical specifications, or the area of application.

TECHNICAL SPECIFICATIONS

Technical specifications should be adopted that are based on the recommendations of the Working Group as endorsed by the Advisory Committee.

In relation to the area of application it was noted that most fisheries had insufficient information available to identify 'hotspots' of seabird mortality and that the precautionary principle should be applied when determining them. It was also noted that there was a need to be practical in the application of mitigation measures in order to gain their acceptance by fishers and that it would be necessary to define areas where they are necessary. A review mechanism based on observer and other data would be essential to ensure the area of application was appropriate.

In relation to mechanical devices that take baited hooks to depths of 10 m, it was noted that devices that sink the hooks to less than 10 m may be effective in preventing seabird bycatch. There was a concern that constraining advice to devices that work beyond 10 m depth may exclude some useful devices currently under development.

After taking into account comments from Working Group members, the framework for seabird conservation measures was recommended for adoption by the Advisory Committee.

10.5 Development of a draft seabird conservation measure

A draft seabird conservation measure for possible adoption in tuna RFMOs (SBWG-4 Doc 56) was presented to the meeting with the intent of prompting the development of specific ACAP advice on recommended best practices for seabird bycatch mitigation. Following discussion of various aspects of the draft conservation measure it was agreed that the draft seabird conservation measure would provide a useful tool to guide the work of the tuna RFMOs. It was noted that the draft conservation measure would need to be amended to reflect the best-practice advice determined by the Working Group and that this may need to be undertaken intersessionally, possibly incorporating the views of experts not present at the meeting. It was agreed that the draft conservation measure should also follow the framework adopted above.

10.6 Ecological risk assessments

The Working Group noted that seabird ecological risk assessments had been developed for ICCAT, IOTC and WCPFC. It was acknowledged that these are useful tools for guiding conservation and management actions in tuna RFMOs and that support should be provided for their development by the CCSBT and IATTC. Further discussion on the use of ecological risk assessments for management of seabird interactions in fisheries was held under Agenda Item 13.

10.7 Data collection and observer programmes

It was noted that the Working Group has not yet agreed on data protocols for recording seabird bycatch. Consequently, RFMO Coordinators are unable to advise tuna RFMOs on the information that should be collected by their observer programmes. This issue has been addressed further under Item 7 of this report.

In relation to the development of seabird identification guides for use in observer programmes, it was agreed that guides designed to identify bird corpses were of much greater use for aiding the identification of seabirds caught at sea than those based on live birds. It was noted that such guides had been developed in Canada, Ecuador, Japan and the United States. It was agreed that the Secretariat would take the lead on the development of seabird identification guides, with the support of interested members of the Working Group.

10.8 RFMO priorities

In regard to action to be taken within specific tuna RFMOs and other international organisations over the next year the WG recommended that the following priorities be:

RFMO/ OTHER ORGANISATION		Action Proposed for 2011-2012
WCPFC	1	Seek amendment of CMM 2007-04 to accord with ACAP best-practice scientific advice. (to be undertaken in 2012 subject to progress in other tRFMOs;
	2	Identify seabird bycatch hotspots making use of information from the seabird ecological risk assessment and observer data (2012);
	3	Review data on the effectiveness of mitigation measures being used by WCPFC (2011 & 2012);

	4	Seek adoption of seabird data collection protocols (2012).
IOTC	1	Assist in development of further seabird ecological risk assessments;
	2	Review effectiveness of mitigation measures being used in IOTC and amend Resolution 10-06 to accord with ACAP best scientific advice, as appropriate;
	3	Seek adoption of seabird data collection protocols (2012), including a seabird identification guide.
CCSBT	1	Lower priority as mitigation measures applied in relevant ocean basins adopted by CCSBT fisheries;
	2	Work with New Zealand in development of a Level-2 Risk Assessment.
IATTC	1	Refine and ensure adoption of a revised conservation measure;
	2	Improve communication between ACAP Parties to ensure consistent positions are put forward to IATTC meetings;
	3	Seek adoption of seabird data collection protocols (2012);
	4	Address the needs of artisanal fisheries in relation to mitigation.
ICCAT	1	Assist in adoption of a revised seabird conservation measure based on results of the existing ecological risk assessment.
CCAMLR	1	Low priority – Incidental Mortality Arising from Fishing Working Group (IMAF now meets biennially, next meeting October 2011, and seabird bycatch reduced substantially in most fisheries.
Kobe Bycatch Technical Working Group		Coordinate the development of a seabird identification guide for use by the tRFMOs; Provide input into the discussions of the Technical Working Group to assist with the harmonisation of best-practice seabird conservation measures between the tRFMOs.

11. FAO IPOA/NPOA-SEABIRDS

11.1 FAO International Guidelines on Bycatch Management and Reduction of Discards

In December 2010 the Food and Agricultural Organisation of the United Nations (FAO) held a Technical Consultation to develop guidelines on bycatch and discarding (SBWG-4 Doc 50). The consultation reviewed and adopted a set of International Guidelines on Bycatch Management and Reduction of Discards. A key outcome of the development of the text was the agreement that the guidelines should complement appropriate bycatch measures addressed in the International Plan of Action for Reducing Incidental Catch of Seabirds in Longline Fisheries (IPOA-Seabirds) and its Best Practice Technical Guidelines, the International Plan of Action For the Conservation and Management of Sharks (IPOA-Sharks), and Guidelines to Reducing Sea Turtle Interactions and Mortality in Marine Capture Fisheries.

The Guidelines were subsequently adopted by the FAO at the 29th Session of its Committee on Fisheries held in Rome, Italy in January 2011, and published as Appendix E in the report of the meeting (*FAO Fisheries and Aquaculture Report* No. 957 — SBWG-4 Doc 33).

11.2 Review on NPOA implementation

It was intended that a paper reviewing the implementation effectiveness of the IPOA/NPOA process in the conservation of seabirds in RFMOs and coastal States be presented at the meeting. This paper will now be prepared for SBWG5. In the absence of the paper the Convenor called for information from Working Group members on progress in developing new NPOAs and reviewing existing plans.

WWF strongly encouraged Parties to develop effective NPOA -Seabirds that closely follow the FAO IPOA Technical Guidelines and that are underpinned by robust time-bound implementation plans. They expressed particular interest in the review of existing NPOA-Seabirds and requested that this information be made available to the Agreement intersessionally, given that the next Advisory Committee meeting might be held as much as 18 months away.

As asked by the Convenor, Argentina[2] reported to the Parties that Argentina`s Plan of Action was only approved in 2010, so an implementation report has still to be developed. This is scheduled for late 2011 – early 2012. A number of scientific and technical projects were being carried out in different fisheries, particularly in trawl fisheries, some of which were presented at the meeting under other agenda items. Triggered by the First South American Observers Workshop, a national group comprising observer program leaders, NGOs, scientists, provincial authorities from our five coastal provinces: Buenos Aires, Río Negro, Chubut, Santa Cruz and Tierra del Fuego, Antártida e Islas del Atlántico Sur, and national authorities has been established to review bycatch data. The first task for this group was to identify and characterise Argentina's fisheries according to the interaction with seabirds on a vessel by vessel basis. This has permitted precise and complete information of bycatch data to be included in Argentina's national report. It was noted that the Second South American Observers Workshop, to be held later this year, will provide further support for capacity building in the region.

Brazil's NPOA-Seabirds was published in 2006. Earlier this year the Chico Mendes Institute for Biodiversity Conservation (ICMBio) held an expert consultation in order to assess the level of implementation of the Plan. A revision of the NPOA is planned to be made next year. One of the objectives of this revision is to harmonise, as much as possible, the objectives, goals and activities of Brazil's NPOA-Seabirds with those of the ACAP Plan of Action in order to optimise efforts and ensure compliance with both documents.

[2] "Argentina recalls that upon its ratification of the Agreement on the Conservation of Albatross and Petrels, it rejected the United Kingdom's pretended territorial extension of the Agreement to the Malvinas Islands, South Georgias and South Sandwich Islands, since those archipelagos and the surrounding maritime areas are an integral part of the Argentine national territory. The British presence in those archipelagoes and the surrounding maritime areas constitute and illegitimate occupation, which is rejected by the Argentine Republic, as well as any unilateral act from it emanated. The Argentine Government rejects any reference to pretended illegitimate authorities of the Malvinas Islands, South Georgias and South Sandwich Islands and the presentation of the afore mentioned archipelagoes detenting an international status that they do not have."

The Chilean NPOA–Seabirds, established mitigation measures to be used by the pelagic longline fleets that target swordfish. Since 2009, an intensive monitoring programme was established to assess the use of five mitigation measures. The use of bird-scaring lines and night setting had low levels of compliance, whereas the other remaining three measures (line weighting, no offal discharge within 30 minutes of setting, and disposal of offal on the opposite side to the haul area) achieved 100% compliance; thereby reducing seabird bycatch in this fleet. These mitigation measures were only effective for boats of under 30 m in total length.

New Zealand released its NPOA-Seabirds in 2004. While effective in some fisheries, New Zealand's Minister of Fisheries requested that the NPOA be reviewed to ensure that it was effective across all fisheries with a seabird problem. New Zealand has also introduced a number of mandatory seabird mitigation measures in trawl and longline fisheries, including streamer lines, night setting and line weighting. A draft seabird bycatch policy was released by the New Zealand Ministry of Fisheries for public comment in May 2011. A number of public comments was received, the majority of which raised issues that required further consideration. New Zealand's Ministry of Fisheries and Department of Conservation are now working together on a revised policy document. It is intended that the revised policy will be released for further public comment. Input on the revised document was welcomed from members of the Working Group, who were encouraged to participate in the public consultation process.

BirdLife International welcomed the information from New Zealand on the current status of its evaluation of revision of the 2004 version of its NPOA-Seabirds. BirdLife and its New Zealand Partner, the Forest and Bird Protection Society of New Zealand, have been considerably concerned at the content of, and consultation process over, the 2011 draft Policy Document on this topic. BirdLife hoped that the next version would take full account of the earlier comments, contain full details of recent levels of seabird bycatch associated with fisheries in the NZ EEZ and result in the development of a new NPOA-Seabirds, fully consistent with the FAO Technical Guidelines.

Uruguay adopted its NPOA-Seabirds to reduce incidental mortality in Uruguayan fisheries in 2007. Following its adoption multiple research activities had been undertaken in line with the objectives of the NPOA. One of the most relevant achievements has been the development and testing of bird-scaring lines, results of which were presented in SBWG-4 Doc 45. It is intended that the NPOA-Seabirds will be reviewed in 2012.

Canada released its NPOA-Seabirds in March 2007. In late 2010, several Environment Canada employees met with staff of the Department of Fisheries and Oceans Canada to initiate the process of updating the NPOA. At the meeting, Environment Canada expressed the opinion that the updated NPOA should be expanded to include other fisheries (e.g., gillnetting).

The UK reported that there are two NPOA-Seabirds in place in the Falkland Islands (Islas Malvinas)[1], one for longline fisheries and the other for trawl fisheries. The Longline NPOA is currently under review, and the revised version, which is close to completion, has followed the FAO Technical Guidelines. No bird mortalities were recorded from 2007 to July 2011. These exceptional results were due to effective implementation of mitigation measures on vessels within the jurisdictional waters of the Falkland Islands (Islas Malvinas)[1], and included correct line-weighting regimes, correctly designed and effective bird-scaring lines, the use of the 'Brickle Curtain' and the removal of hooks from bycatch and discards. The Trawl NPOA

was also introduced in 2004. Efforts in the Falkland Islands (Islas Malvinas)[1] to reduce seabird mortality due to trawl fisheries have been in continuous progress thanks to the collaboration of all stakeholders, including fishing industry, government and NGOs. The trawl NPOA was reviewed in 2009, the revised version of which has continued to consolidate the efforts by stakeholders.

The European Union launched a consultation on the possible contents of an EU NPOA-Seabirds between June and August 2010 (see http://ec.europa.eu/fisheries/partners/consultations/seabirds/index_en.htm and appended document). This was responded to by a number of individuals, organisations and governments (http://ec.europa.eu/fisheries/partners/consultations/seabirds/contributions/index_en.htm). It is uncertain as to when further progress will occur. ACAP provided a formal submission to this process in which it highlighted the importance of the FAO's Technical Guidelines to Reduce Incidental Catch of Seabirds in Capture Fisheries.

BirdLife International commented on the on-going utility of the FAO's Technical Guidelines to Reduce Incidental Catch of Seabirds in Capture Fisheries and noted that the guidelines had been influential in shaping several emerging NPOA-Seabirds, including the draft Namibian text, which is currently being finalised. All ACAP Parties were encouraged to apply the FAO Technical Guidelines to strengthen existing plans or develop new robust plans for longline, trawl and where feasible, gillnet fisheries.

12. MITIGATION FACT SHEETS

12.1 Review and update mitigation fact sheets

SBWG-4 Doc 37 updated the Working Group on progress with the translation of the ACAP/BirdLife International Mitigation Fact Sheets. BirdLife informed the group that translations were complete for Spanish, Portuguese and French editions and are available in pdf format, and good progress has been made with a Japanese version. Translators for Mandarin and Korean languages are in the process of being contracted and it is planned to have the full set of fact sheets translated into these two languages in the first half of 2012.

The Working Group highlighted some improvements to be made to the branding and presentation of the Fact Sheets. The group reviewed the schedule developed at SBWG-3 and, based on papers tabled this year, agreed that the fact sheets that required updating were those entitled: Introduction; pelagic longline; line weighting; pelagic bird-scaring line; and trawl warp strike.

The Working Group was informed that progress with the FAO on co-branding was slow as the FAO required a joint Memorandum of Understanding with BirdLife and ACAP, which needed further discussion.

13. GLOBAL PROCELLARIFORM TRACKING DATABASE

The report from BirdLife (AC6 Doc 57), who manage this database, highlighted the following items of particular relevance to ACAP:

a) Major improvements to database access and functionality were completed in 2010. Subsequently, in collaboration with the ACAP Secretariat, the tracking data are now linked to the ACAP colony register, enabling easy assessment and review of tracking coverage by site, as well as by stage of annual and life cycle;

b) In 2011, substantial new data have been submitted to the database, including for 11 ACAP species, the latter especially from the New Zealand region. Tracking data are now available for every ACAP species, at least for some part of their annual cycle.

c) In addition to the use of tracking data for applications relating to ACAP's interactions with RFMOs, many Working Group members are working with BirdLife on projects using tracking and other data to identify seabird hotspots in the marine environment at a variety of scales (e.g. global, regional, national), including for submission to the initiative of the Convention on Biological Diversity which is identifying Ecologically and Biologically Sensitive Areas for priority conservation and management attention.

AC6 Doc 57 contains an important narrative gap analysis, which also identifies potential key priorities for future data collection. It was recommended that, in consultation with the Working Group, the assessment be translated into tabular form and the indicative priorities circulated for comment. Once agreed, Parties should be encouraged to undertake appropriate studies to collect these data.

In addition to the collection and submission of new data, Parties were urged to submit existing data as soon as possible.

14. RISK ASSESSMENT

SBWG-4 Doc 44 reports results of a Productivity and Susceptibility Analysis (PSA) and an assessment of Potential Biological Removals (PBR) to determine the relative impact of bycatch in the Uruguayan pelagic longline fishery on several seabird populations. A risk ranking was obtained for 11 of the 15 species under consideration, and a PBR was estimated for the eight species at greatest risk. Although it was not straightforward to assess the impact of fishing from bycatch rates, the results nevertheless indicated that great albatrosses and Atlantic Yellow-nosed Albatross are more affected than some species that are caught more frequently (Black-browed Albatross and White-chinned Petrel). Wandering Albatross from South Georgia (Islas Georgias del Sur)[1] were likely to be most affected by the Uruguayan fleet. This work should be seen as a case study of the fisheries operating in the south-western Atlantic Ocean. Assessing the overall impact of pelagic longline fleets operating in this region should therefore be considered a high priority.

SBWG-4 Doc 34 reports on the assessment by the International Commission for the Conservation of Atlantic Tunas (ICCAT) of the threat from its fisheries to all seabirds that breed or forage within its area of jurisdiction. Methods were developed to assess the potential consequences of fishing for 68 populations of seabirds. The assessment framework involved the identification of at-risk populations using a PSA approach, overlap analyses, estimation of total bycatch, and an evaluation of the impact of the bycatch on key selected populations for which there were sufficient data on bird distribution and demography. These were the Wandering and Black-browed Albatrosses of South Georgia (Islas Georgias del Sur)[1], and the Atlantic Yellow-nosed and Tristan Albatrosses of the Tristan da Cunha and

Gough Islands. The ERA showed unequivocally that ICCAT longline fisheries catch substantial numbers of seabirds, with potentially significant conservation implications.

SBWG-4 Doc 35 reviews ecological risk assessments (ERAs) for the effects of fishing on seabirds carried out in recent years. The document highlights the need for and purposes of ERAs, which can help identify the seabird species most at risk from bycatch (a minimum requirement), the data gaps and research priorities, and potentially also the key areas, fisheries and seasons in which bycatch occurs. Several aspects of the ERA methodology for seabirds are still in development, including the most appropriate way to estimate the overlap between seabird distribution and fisheries, the role of bycatch data, the best measure of productivity, and the handling of data gaps. Other issues to be considered when undertaking an ERA include the appropriate selection of species or populations, the definition of risk, the appropriate spatial and temporal resolution for the analysis, and establishing links between the ERA analysis and management responses. There are several benefits of undertaking ERAs. They identify key areas and seasons in which bycatch may be occurring, highlight data gaps, and can be used to incorporate precautionary approaches and decision-making on bycatch into a broader fisheries management framework. However, experience so far highlights several methodological issues that need further consideration, and the possibility that an ERA may draw attention away from existing responsibilities and commitments to reduce bycatch *per se*. When selecting the best approach, it is vital to balance desired outputs against the availability of data for the assessment, and to deal with data gaps in a precautionary manner.

The Working Group discussed the relative merits of fully quantitative ERAs, which typically involve models evaluating the impact of bycatch on selected populations using available information on demography, distribution and fishing effort, and the more complex methods used in some approaches to a Level-2 PSA. Although acknowledging the advantages of detailed models in that they may provide better estimates of current and potentially historical impacts on populations, and spatial and temporal trends in bycatch estimates, the Working Group noted that data on bycatch rates across all relevant fisheries and on demographic parameters were often inadequate and that such assessments required considerable time and modelling expertise. The Working Group concluded that a pragmatic approach to ERAs should be adopted where possible, and that it should not be necessary to place the burden of proof on the ERA to demonstrate population-level impacts before action is taken to reduce bycatch. Hence, the initial priority should be given to ensuring management responses after Level-1 and Level-2 ERAs, potentially including sensitivity analyses to demonstrate the robustness of conclusions despite uncertainties in parameter values or exact rankings. In addition, the Working Group recommended that SBWG-4 Doc 35, incorporating any updates, be included in the series of ACAP Conservation Guidelines

15. REVIEW OF PROGRESS REPORTS FOR ACAP FUNDED PROGRAMMES

The Executive Secretary referred Working Group Members to AC6 Inf 08 and AC6 Inf 09 which provide a summary of outcomes and progress achieved with projects funded through the Advisory Committee's grants scheme in 2009 and 2010. Working Group Members were asked to note the progress made with these projects and to advise whether they had any comments on them.

Mr Jorge Azocar reported on the outcomes achieved in ACAP Project 09/09, Chilean Observer Programme, and noted that this work would not have been possible without the support of the ACAP grant.

The Working Group noted the good progress made with projects funded through the ACAP grants scheme and expressed its support for the grants scheme's operations.

16. SBWG WORK PROGRAMME

The work programme was considered and a draft Revision of Section Four of the Advisory Committee Work Programme 2013-2015, prepared for consideration by the Advisory Committee (Annex 9).

17. MEMBERSHIP

Current membership of the Seabird Bycatch Working Group is listed in Annex 1. It should be noted that not all Parties are officially represented on the group. Nominations of Working Group members by Brazil, Chile, Ecuador, France and interested Range States would be very welcome.

Membership of the Working Group was briefly discussed, with detailed discussion deferred to AC6 Agenda Item 3 Rules of Procedure.

18. OTHER BUSINESS

Dr Julia Hsiangwen Huang from Chinese Taipei provided a summary of three published research papers describing seabird bycatch in an Asian Distant Water Taiwanese Fishery to contribute to discussions on pelagic longline bycatch and fishing effort information and to fill existing data gaps. The Working Group thanked Dr Huang for her presentation and attendance at the meeting.

Mr Hisao Masuko from the Japan Tuna Fisheries Cooperative Association addressed the Working Group and reported on the collaboration occurring between Japanese fishers and researchers on seabird bycatch mitigation. He noted the highly successful outcomes of this collaboration in the South African tuna pelagic longline fisheries that was undertaken with Dr Ed Melvin. He advised that agreement had also been reached recently with a researcher from Universidad del Mar in Chile to undertake similar research in the high seas west of Chile.

The Working Group expressed its strong appreciation and support for the collaboration being undertaken with Japan Tuna and thanked Mr Masuko for his attendance at the meeting.

The Executive Secretary provided a brief report on a meeting he had attended in Japan recently with representatives from the Japanese Government and tuna industry. He reported that an offer was made to collaborate on the analysis of seabird bycatch observer data from the Japanese southern bluefin tuna fishery and encouraged the Working Group to examine options for facilitating this work.

The Working Group was provided with an update on mitigation projects undertaken by the Southern Seabirds Solutions Trust. The Trust has established an International Mitigation

Mentoring Programme to mentor the development of new techniques that have the potential to reduce seabird bycatch in fisheries. The scope of mentoring will include feedback on design, guidance on development and testing and advice on potential collaborators or funders. The Trust has appointed Mr Barry Baker as the programme's mentor. A referral group of 10 members has been established to lend their expertise to the development process. In future, the project will provide a coordinating hub and networking point for inventors and others including through the Trust's Mitigation Development Pathway Programme. More project information is available at http://www.southernseabirds.org.

19. CLOSING REMARKS AND ACKNOWLEDGEMENTS

The Convenor noted that it would be some 18 months before the next scheduled meeting of the Working Group, and that there may be need for a small intersessional meeting to address urgent items that may arise in the meantime. A potential opportunity existed to hold a short meeting around the time of the 5th International Albatross and Petrel Conference, which is to be held in Wellington, New Zealand, over 13-17 August 2012. There would be cost benefits to the Agreement if many Working Group members were planning to attend the conference. The group's member from New Zealand advised that he thought it would be possible to provide a venue for an *ad hoc* meeting of the Group if the Agreement felt it was necessary to hold a meeting then. It was agreed that this matter should be further discussed at the meeting of the Advisory Committee.

The Convenor and Vice Convenor of the Working Group thanked the Members and Observers for their valuable contributions to the meeting and in developing the report, and the authors of the excellent papers submitted for consideration. They also thanked Ecuador, Unipark Hotel and the ACAP Secretariat for providing an excellent venue and facilities for the meeting; Marco Favero, Ian Hay, Ed Melvin, Richard Phillips, Graham Robertson, Ben Sullivan, Mark Tasker and Warren Papworth for their assistance during both the intersessional period and the meeting; John Cooper, Luke Finley and Wiesława Misiak for administrative and technical assistance during the meeting; and Adriana Caminiti de Perez and JC Lloyd-Southwell for interpretation services.

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

The Convenor then closed the meeting.

LIST OF ANNEXES

ANNEX 1: LIST OF PARTICIPANTS

Abraham, Edward	NZ
Alfaro, Joanna	Pro Delphinus
Arata, Javier	Chile
Azócar, Jorge	Chile
Baker, Barry	Convenor
Baquero, Andrés	ABC/Ecuador
Bird, Rebecca	WWF
Brickle, Paul	UK
Brothers, Nigel	Humane Society International
Caminiti de Perez, Adriana	Interpreter
Cheng, Charles	Chinese Wild Bird Federation
Clubb, Spencer John	NZ
Cooper, John	Secretariat
Crawford, Rob	South Africa
Croxall, John	BirdLife International
Darquea, Jodi	Ecuador
Debski, Igor	NZ
de Goede, Johan	South Africa
Diaz, David	Aves & Conservación (BirdLife en Ecuador)
Domingo, Andres	Uruguay
Espinoza, Eduardo	Ecuador
Favero, Marco	AC Chair
Finley, Luke	Secretariat
Flint, Elizabeth	USA
Frere, Esteban	BirdLife International
Gales, Rosemary	Australia
Garcia Alvarado, Marcelo	Chile
Heredia,Borja	Convention on Migratory Species
Herrera, Marco	Ecuador
Huang, Hsiangwen (Julia)	Chinese Taipei
Jimenez, Sebastian	Uruguay
Jiménez-Uzcátegui. Gustavo	Ecuador
Lloyd-Southwell, JC	Interpreter
Mangel, Jeffrey	Pro Delphinus
Masuko, Hisao	Japan
Medina, Robert	GSP – ATF Ecuador
Melvin, Ed	USA
Menard, Marlene	USA
Misiak, Wiesława	Secretariat
Morgan, Ken	Canada
Nakamura, Masaaki	Japan
Naranjo Leon, Sixto	Ecuador
Navarro, Gabriela	Argentina
Neves, Tatiana	Projeto Albatroz
Papworth, Warren	Secretariat
Parr, Michael	ABC
Phillips, Richard	UK
Rivera, Kim	USA

Robertson, Graham	Australia
Saa Vera, Ingrid	Ecuador
Samaniego, Jorge	Aves & Conservación (BirdLife en Ecuador)
Sullivan, Ben	BirdLife International
Tasker, Mark	UK
van der Merwe, Estelle	ASOC
Weimerskirch, Henri	France
Wolfaardt, Anton	UK – Vice- convenor
Yates, Oliver	BirdLife International

ANNEX 2: REVIEW OF SEABIRD BYCATCH MITIGATION MEASURES FOR PELAGIC LONGLINE FISHERIES

Weighted branchlines, bird scaring streamer lines and night setting are best practice mitigation in pelagic longline fisheries. ACAP-SBWG has comprehensively reviewed the scientific literature dealing with seabird bycatch mitigation in pelagic fisheries and this document is a distillation of that review.

BEST PRACTICE MEASURES	
1.	Branchline weighting
2.	Night setting
3	a). Bird scaring streamer lines for vessels > 35m in total length
3	b). Bird scaring streamer lines for vessels <35m in total length
OTHER CONSIDERATIONS	
4.	Side setting with line weighting and bird curtain
5.	Blue dyed bait
6.	Line shooter
7.	Bait caster
8.	Underwater setting chute
9.	Management of offal discharge
10.	Live bait
11.	Bait thaw status
12.	Area closures

BEST PRACTICE MEASURES

1. Branchline weighting

Scientific evidence for effectiveness in pelagic fisheries

PROVEN AND RECOMMENDED. Should be used in combination with night setting and bird scaring lines. Brothers 1991; Boggs 2001; Sakai *et al*. 2001; Brothers *et al*. 2001; Anderson & McArdle 2002; Gilman *et al*. 2003a, Hu *et al*. 2005.

Caveats /Notes

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).

Need for combination

Should be combined with bird scaring lines and night setting

Research needs

Mass and position of weight both affect sink rate. Further research on the effect of a range of weighting regimes on seabird mortality and catch rates of target and non-target fishes is needed (as has been completed for demersal [Spanish system) fisheries). Continued work to identify branchline weighting configurations (mass, placement, shape, number of leads, and materials) that are effective at reducing seabird bycatch with and without other mitigation, and that are safe and practical. Effect of propeller turbulence on baited hook sink rate and seabird mortality need to be quantified.

Minimum standards

Current minimum standards for branchline weighting configurations are:

Greater than 45 g attached within 1 m of the hook or;

Greater than 60 g attached within 3.5 m of the hook or;

Greater than 98 g weight attached within 4 m of the hook.

Positioning weight farther than 4 m from the hook is not recommended.

These regimes have been adopted in the Hawaiian (45 g at 1 m) and Australian (60 g at 3.5 m and 98 g at 4 m) pelagic longline fisheries and latter two regimes have been adopted by the Western and Central Pacific Fishing Commission (the WCPFC provisions also include the option of branchlines being configured with weights of 45 g to 60 g within 1 m of the hook). NB. The 98 g weights specified in the Australian fishery pertain to the line weighting experiment of Robertson et al. 2010. The commercially available leaded swivels used in the experiment weighed 98 g (not 100 g).

Implementation monitoring

Coastal state fisheries (vessels <35 m total length): Line weights crimped into branch lines technically very difficult to remove at sea. Inspection before departure from port of all gear bins on vessels considered an acceptable form of implementation monitoring.

Distant water fisheries (vessels >35 m total length): Technically possible to remove and/or re-configure gear at sea. Implementation monitoring by monitoring line sets using appropriate methods (e.g. observer inspection of line setting operations; video surveillance; at-sea compliance checks). Video surveillance conditional on mainline setter being fitted with motion sensors to trigger cameras.

2. Night setting

Scientific evidence for effectiveness in pelagic fisheries

PROVEN AND RECOMMENDED. Should be used in combination with weighted branch lines and bird scaring lines. Duckworth 1995; Brothers *et al*. 1999; Gales *et al.* 1998; Klaer & Polacheck 1998; Brothers *et al*. 1999; McNamara *et al*. 1999; Gilman *et al*. 2005; Baker & Wise 2005; Jiménez *et al*. 2009.

Caveats /Notes

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).

Need for combination

Should be used in combination with bird scaring lines and weighted branch lines

Research needs

Determine effectiveness of bird scaring lines and branchline weighting at night by characterising seabird behaviour at night using thermal or night vision technologies.

Minimum standards

Night defined as between nautical twilight and nautical dawn.

Implementation monitoring

Requires VMS (satellite transmitter) or fishery observers. Vessel speed and direction vary between transiting, line setting, line hauling and when vessels are stationary on fishing grounds. VMS-derived assessment of vessel activity in relation to time of nautical dawn and dusk considered acceptable for implementation monitoring. Alternatively VMS-linked sensors fitted to mainline setting and hauling drum could be used to indicate compliance, as could sensors to trigger video surveillance cameras. This facility is currently unavailable and requires development.

3 a). Bird scaring streamer lines for vessels > 35m in total length

Scientific evidence for effectiveness in pelagic fisheries

PROVEN AND RECOMMENDED. For vessels > 35 m in length two streamer lines is considered best practice. Streamer lines with the appropriate aerial extent can be more easily rigged on large vessels. Two streamer lines are considered to provide better protection of baited hooks in crosswinds (Melvin *et al*. 2004; Melvin *et al.* 2011). Hybrid tori lines (with long and short streamers) were more effective than short tori lines (only short streamers) in deterring diving seabirds (white-chinned petrels) (Melvin *et al*. 2010; Melvin *et al.* 2011).

Caveats /Notes

Potentially increased likelihood of entanglement, particularly if attachment points on davits (tori poles) are insufficiently outboard of vessels. Development of a towed device to prevent tangling with fishing gear essential to improve adoption and compliance.

Diving species increase vulnerability of surface foragers (albatrosses) due to secondary interactions.

Need for combination

Should be used with appropriate line weighting and night setting.

Research needs

Compare the effectiveness of one versus two bird scaring lines, including with respect to both primary and secondary interactions; develop methods that create drag to maximise aerial extent while minimising entanglements of the in-water portion of bird scaring lines with longline floats; and compare the effectiveness of bird scaring lines with different steamer lengths, configurations, and materials.

Minimum standards

Vessels should deploy bird scaring lines with a minimum aerial extent of 100 m. Streamers should be: brightly coloured, a mix of long and short streamers, placed at intervals of no more than 5 m, and long streamers attached to the line with swivels that prevent streamers from wrapping around the line. All streamers should reach the sea-surface in calm conditions.

If large vessels use only one streamer line it should be set to windward of sinking baits. If baited hooks are set outboard of the wake, the streamer line attachment point to the vessel should be positioned several meters outboard of the side of the vessel that baits are deployed.

Baited hooks shall be deployed within the area bounded by the two streamer lines. Bait-casting machines shall be adjusted so as to land baited hooks within the area bounded by streamer lines

Implementation monitoring

Requires fisheries observers, video surveillance or at-sea surveillance (e.g. patrol boats or aerial over-flights).

3 b). Bird scaring streamer lines for vessels <35m in total length

Scientific evidence for effectiveness in pelagic fisheries

PROVEN AND RECOMMENDED. 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. For vessels < 35 m in length a single BSL in combination with night setting and appropriate line weighting has been found effective for mixed and short streamer bird-scaring lines (ATF 2011; Domingo *et al.,* Gianuca *et al.* 2011).

Caveats /Notes

Development of a towed device to prevent tangling with fishing gear essential to improve adoption and compliance.

Diving species increase vulnerability of surface foragers (albatrosses) due to secondary interactions.

Need for combination

Should be used with appropriate line weighting and night setting.

Minimum standards

Vessels should deploy bird scaring lines with a minimum aerial extent 75 m. Streamers should be brightly coloured. Short streamers (>1 m) should be placed at 1 m intervals along the length of the aerial extent. Two designs have been shown to be effective: a mixed design that includes long streamers placed at 5 m intervals over the first 55 m of the bird scaring line and a design that does not include long streamers. Bird scaring lines should be the lightest practical strong fine line. Lines should be attached to the vessel with a barrel swivel to minimise rotation of the line from torque created as it is dragged behind the vessel.

Towed devices to create drag can tangle with float lines leading to interruptions in vessel operations and in some cases lost fishing gear. Short streamers can be tied into the line to bristle the line and create a bottlebrush like configuration to generate drag while minimising the chance of fouling streamer lines on float lines. Breakaways should be incorporated into the streamer line in-water extent to minimise safety and operational problems should a longline float foul or tangle with the in-water extent of a streamer line.

Implementation monitoring

Requires fisheries observers, video surveillance, or at-sea surveillance (e.g. patrol boats or aerial over-flights).

OTHER CONSIDERATIONS

4. Side setting with line weighting and bird curtain

Scientific evidence for effectiveness in pelagic fisheries

UNPROVEN AND NOT RECOMMENDED FOR SOUTHERN HEMISPHERE FISHERIES. Brothers & Gilman 2006; Yokota & Kiyota 2006.

Caveats /Notes

Only effective if hooks are sufficiently below the surface by the time they reach the stern of the vessel and protected by a bird curtain. In Hawaii, side-setting trials were conducted with bird curtain and 45-60 g weighted swivels placed within 0.5 m of hooks. Japanese research concludes must be used with other measures (Yokota & Kiyota 2006). Not tested in southern hemisphere fisheries and cannot be recommended at this time.

Need for combination

Lines set from the side of vessels must be appropriately weighted and protected by an effective bird curtain. Requires thorough testing in southern hemisphere fisheries.

Research needs

Currently untested in southern hemisphere fisheries against assemblages of diving seabirds (e.g., *Procellaria* sp. Petrels and *Puffinus* sp. Shearwaters) and albatrosses - urgent need for research.

Minimum standards

Clear definition of side setting is required. As noted, side setting trials in Hawaii were conducted in conjunction with a bird curtain and 45-60 g leaded swivel < 1 m of the baited hook. Hawaiian definition is a minimum of only 1 m forward of the stern, which is likely to reduce effectiveness. The distance forward of the stern refers to the position from which baits are manually deployed. Baited hooks must be thrown by hand forward of the bait deployment location if they are to be afforded “protection” by being close to the side of the vessel.

Implementation monitoring

Requires fisheries observers or video surveillance.

5. Blue dyed bait

Scientific evidence for effectiveness in pelagic fisheries

UNPROVEN AND NOT RECOMMENDED. Boggs 2001; Brothers 1991; Gilman *et al*. 2003a; Minami & Kiyota 2001; Minami & Kiyota 2004; Lydon & Starr 2005.Cocking *et al*. 2008.

Caveats /Notes

New data suggests only effective with squid bait (Cocking *et al*. 2008). Onboard dyeing requires labour and is difficult under stormy conditions. Results inconsistent across studies.

Need for combination

Must be combined with bird scaring lines or night setting

Research needs

Need for tests in Southern Ocean.

Minimum standards

Mix to standardised colour placard or specify (e.g. use 'Brilliant Blue' food dye (Colour Index 42090, also known as Food Additive number E133) mixed at 0.5% for minimum 20 minutes)

Implementation monitoring

The current practice of dyeing bait on board vessels at sea requires observer presence or video surveillance to monitor implementation. Assessment of implementation in the absence of on-board observers or video surveillance requires baits be dyed on land and monitored through port inspection of all bait on vessels prior to departure on fishing trips.

6. Line shooter

Scientific evidence for effectiveness in pelagic fisheries

UNPROVEN AND NOT RECOMMENDED. Robertson *et al*. 2010.

Caveats /Notes

Mainline set into propeller turbulence with a line shooter without tension astern (e.g. slack) as in deep setting significantly slows the sink rates of hooks (Robertson *et al*. 2010). Use of a line shooter to set gear deep cannot be considered a mitigation measure.

Need for combination

Not Applicable.

Research needs

Not Applicable.

Minimum standards

Use of this measure is not recommended as a mitigation measure.

Implementation monitoring

Not Applicable.

7. Bait caster

Scientific evidence for effectiveness in pelagic fisheries

UNPROVEN AND NOT RECOMMENDED. Duckworth 1995; Klaer & Polacheck 1998.

Caveats /Notes

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. Current machines (without variable power control) likely to deploy baited hooks well beyond the streaming position of streamer lines, increasing risks to seabirds. Few commercially-available machines have variable power control. Needs more development.

Need for combination

Not recommended as a mitigation measure at this time.

Research needs

Develop (and implement) casting machine with a variable power control.

Minimum standards

Not recommended as a mitigation measure

Implementation monitoring

Not Applicable

8. Underwater setting chute

Scientific evidence for effectiveness in pelagic fisheries

UNPROVEN AND NOT RECOMMENDED. Brothers 1991; Boggs 2001; Gilman *et al*. 2003a; Gilman *et al*. 2003b; Sakai *et al*. 2004; Lawrence *et al*. 2006.

Caveats /Notes

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).

Need for combination

Not recommended for general application at this time.

Research needs

Design problems to overcome.

Minimum standards

Not yet established

Implementation monitoring

Not Applicable.

9. Management of offal discharge

Scientific evidence for effectiveness in pelagic fisheries

UNPROVEN. McNamara *et al*. 1999; Cherel *et al*. 1996.

Caveats /Notes

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.

Need for combination

Must be combined with other measures.

Research needs

Further information needed on opportunities and constraints in pelagic fisheries (long and short term).

Minimum standards

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.

Implementation monitoring

Requires offal discharge practices and events to be monitored by fisheries observers or video surveillance.

10. Live bait

Scientific evidence for effectiveness in pelagic fisheries

LIVE BAIT NOT RECOMMENDED. Trebilco *et al*. 2010; Robertson *et al*. 2010.

Caveats /Notes

Live fish bait sinks significantly slower than dead bait (fish and squid), increasing the exposure of baits to seabirds. Use of live bait is associated with higher seabird bycatch rates.

Need for combination

Use of live bait is not a mitigation measure.

Research needs

Not Applicable.

Minimum standards

Live bait is not a mitigation measure.

Implementation monitoring

Not Applicable.

11. Bait thaw status

Scientific evidence for effectiveness in pelagic fisheries

NOT RECOMMENDED. Brothers 1991; Duckworth 1995; Klaer & Polacheck; Brothers *et al*.1999; Robertson & van den Hoff 2010.

Caveats /Notes

Baits cannot be separated from others in frozen blocks of bait, and hooks cannot be inserted in baits, unless baits are partially thawed (it is not practical for fishers to use fully frozen baits). Partially thawed baits sink at similar rates to fully thawed baits.

Need for combination

Not a mitigation measure

Research needs

Not Applicable.

Minimum standards

Not recommended as a mitigation measure.

Implementation monitoring

Not Applicable.

12. Area closures

Scientific evidence for effectiveness in pelagic fisheries

PROVEN AND RECOMMENDED. Avoiding fishing at peak areas and during periods of intense foraging activity has been used effectively to reduce bycatch in longline fisheries.

Caveats /Notes

An important and effective management response, especially for high risk areas, and when other measures prove ineffective**.** Highly effective for target locations/seasons but may displace fishing effort into adjacent or other areas which may not be as well regulated, thus leading to increased incidental mortality elsewhere.

Need for combination

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.

Research needs

Further information about the seasonal variability in patterns of species abundance around fisheries.

Minimum standards

No work done but highly recommended.

Implementation monitoring

Vessels equipped with VMS and activities monitored by appropriate management authority is considered appropriate monitoring. Areas/seasons should be patrolled to ensure effectiveness if IUU activities are suspected.

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ANNEX 3: SUMMARY ADVICE STATEMENT FOR REDUCING IMPACT OF PELAGIC LONGLINE GEAR ON SEABIRDS

Goal: Reduce the bycatch of seabirds to the lowest possible level.

Summary

Recognising that most (84%) breeding albatrosses overlap with the pelagic longline fisheries for tuna and swordfish managed by the five tuna RFMOs, the adoption of best practice seabird conservation in these fisheries is a high priority for ACAP (AC3 Info 18, 2007).

A combination of weighted branchlines, bird scaring lines and night setting are best practice mitigation in pelagic longline fisheries. These measures should be applied in high risk areas such as the high latitudes of southern hemisphere oceans and lower to mid-latitude fisheries of both the northern and south east Pacific to reduce the incidental mortality to the lowest possible levels. Other factors such as safety, practicality and the characteristics of the fishery should also be recognised.

Currently, no single mitigation measure can reliably prevent the incidental mortality of seabirds in most pelagic longline fisheries. The most effective approach is to use the above measures in combination.

Introduction

The incidental mortality of seabirds, mostly albatrosses and petrels, in longline fisheries continues to be a serious global concern and was major reason for the establishment of the Agreement on the Conservation of Albatrosses and Petrels (ACAP). In longline fisheries seabirds are killed when they become hooked and drowned while foraging for baits on longline hooks as the gear is deployed. They also can become hooked as the gear is hauled; however, many of these seabirds can be released alive with careful handling. Although most mitigation measures are broadly applicable, the application and specifications of some will vary with local longlining methods and gear configurations. For example, most scientific literature on seabird bycatch mitigation in pelagic fisheries relates to larger vessels, with little research attention to smaller vessels and the gear configuration and methods of artisanal fleets; seabird bycatch mitigation advice is under development. ACAP has comprehensively reviewed the scientific literature dealing with seabird bycatch mitigation in pelagic fisheries and this document is a distillation of that review (AC6 Doc14 Rev4 Annex 2).

Best practice measures

1. Branchline weighting

Branchlines should be weighted to sink the baited hooks rapidly out of the diving range of feeding seabirds. Weighted lines sink faster and more consistently, resulting in dramatic

reductions in seabird attacks on baited hooks and seabird mortality; no negative effect has been demonstrated on the catch rate of fishes. Continued refinement of line weighting configurations (mass, number and position of weights and materials) through controlled research and application in fisheries, is encouraged to find configurations that are most safe, practical and effective.

Scientific studies have demonstrated that branchline weighting configurations with more mass close to the hook, sinks the hooks most rapidly and consequently is most effective at reducing seabird interactions and mortalities. Current recommended minimum standard for branchline weighting configurations are the following:

Greater than 45 g attached within 1 m of the hook or;

Greater than 60 g attached within 3.5 m of the hook or;

Greater than 98 g weight attached within 4 m of the hook.

Positioning weight farther than 4 m from the hook is not recommended.

2. Night setting

Setting longlines at night, between nautical twilight and nautical dawn, is highly effective at reducing incidental mortality of seabirds because the majority of vulnerable seabirds are inactive at night.

3. Bird scaring lines

Properly designed and deployed bird scaring lines deter birds from sinking baits, thus dramatically reducing seabird attacks and related mortalities. A bird scaring line is a line that runs from a high point at the stern to a device or mechanism that creates drag at its terminus. As the vessel moves forward, drag lifts the section of line closest to the vessel from the water into the air. Brightly coloured streamers hanging from the aerial extent of the line scare birds from flying to and under the line preventing them from reaching the baited hooks. It is the aerial extent (out of water) section with suspended streamers that scares birds from the sinking baits.

Bird scaring lines should be the lightest practical strong fine line. Lines should be attached to the vessel with a barrel swivel to minimize rotation of the line from torque created as it is dragged behind the vessel.

Towed objects, applied to increase drag, and with it bird scaring line aerial extent, are prone to tangling with float lines leading to lost bird scaring lines, interruptions in vessel operations and in some cases lost fishing gear. Alternatives, such as adding short streamers to the in-water portion of the line, can enhance drag while minimizing tangles with float lines. Weak links (breakaways) should be incorporated into the in-water portion of the line safety and operational problems should lines become tangled.

Given operational differences in pelagic longline fisheries due to vessel size and gear type, bird scaring lines specifications have been divided into recommendations for vessels greater than 35 metres and those less than 35 metres.

3. (a) Recommendations for vessels >35 m total length

Simultaneous use of two bird scaring lines, one on each side of the sinking longline, provide maximum protection from bird attacks under a variety of wind conditions and are recommended as best practice for larger vessels.

Bird scaring lines should include the following specifications:

Bird scaring lines should be deployed to maximize the aerial extent. Aerial extent is a function of vessel speed, height of the attachment point to the vessel, drag, and weight of bird scaring line materials.

Vessels should deploy bird scaring lines with a minimum aerial extent of 100 m.

Streamers should be: brightly coloured, a mix of long and short streamers, placed at intervals of no more than 5 m, and long streamers attached to the line with swivels that prevent streamers from wrapping around the line. All streamers should reach the sea-surface in calm conditions.

Baited hooks shall be deployed within the area bounded by the two bird scaring lines. Bait-casting machines shall be adjusted so as to land baited hooks within the area bounded by the bird scaring lines.

If large vessels use only one bird scaring line, the bird scaring line should be deployed windward of sinking baits. If baited hooks are set outboard of the wake, the bird scaring line attachment point to the vessel shall be positioned several meters outboard of the side of the vessel that baits are deployed. This position is best achieved using a purpose build davit (tori pole) located as close to the stern and as far aft as practical. Proper outboard positioning also minimizes the likelihood of bird scaring lines tangling on float lines.

3. (b) Recommendations for vessels <35 m total length

A single bird-scaring line using either long and short streamers, or short streamers only, has been found effective on smaller vessels.

Streamers should be brightly coloured. Short streamers (>1 m) should be placed at 1 m intervals along the length of the aerial extent. Two designs have been shown to be effective: a mixed design that includes long streamers placed at 5 m intervals over the first 55 m of the bird scaring line and a design that does not include long streamers.

Vessels should deploy bird scaring lines with a minimum aerial extent 75 m.

Other Considerations

Area and seasonal closures: The temporary closure of important foraging areas (e.g. areas adjacent to important seabird colonies during the breeding season when large numbers of aggressively feeding seabirds are present) to fishing will eliminate incidental mortality of seabirds in that area.

Mainline tension: Setting mainline, branch lines and baited hooks into propeller turbulence (wake) slows sink rates and should be avoided.

Live vs. dead bait: Use of live bait should be avoided. Individual live baits can remain near the water surface for extended periods (e.g. up to 120 seconds), thus increasing the likelihood of seabird captures.

Bait hooking position: Baits hooked in either the head (fish), or tail (fish and squid), sink significantly faster than baits hooked in the mid-back or upper mantle (squid).

Offal and discard discharge management: Seabirds are attracted to discards, offal and used baits. Used baits should be retained during line hauling. Ideally offal and used baits should be discharged on the side of the vessel opposite of line hauling. Offal and discards should not be discharged during line setting. All hooks should be removed and retained on board before discards are discharged from the vessel.

New Technologies

New technologies that set or release baited hooks at depth (underwater setting device) or disarm hooks to specific depths, which have the potential to prevent seabird access to baits, are currently under development and undergoing sea trials.

Mitigation Technologies that are Not Recommended

Line shooters: There is no experimental evidence that line shooters reduce seabird bycatch in pelagic longline fisheries; therefore, they should not be considered a seabird bycatch mitigation option.

Olfactory deterrents: Olfactory deterrents (fish oils) have not been demonstrated to prevent or reduce seabird mortalities in pelagic longline fisheries.

Hook size and design: Changes to hook size and design may reduce the chance of seabird mortality in longline fisheries, but have not been sufficiently researched.

Side setting: Although side setting (defined as setting station a minimum of one metre forward of the stern and in combination with branchline weighting and a bird curtain) is being used in the Hawaiian surface longline fishery, it has not been tested in other fisheries, including southern hemisphere fisheries, consequently it cannot be recommended at this time.

Blue dyed bait: Blue dyed squid bait has been insufficiently researched and cannot be recommended.

Bait thaw status: In practical terms the thaw status of baits has no effect on the sink rate of baited hooks set on weighted lines.

ANNEX 4: REVIEW OF SEABIRD BYCATCH MITIGATION MEASURES FOR TRAWL FISHERIES.

To monitor implementation of all trawl mitigation measures the presence of fisheries observers and/or electronic monitoring is recommended.

1. Nets

1.1. Net binding

Scientific evidence for effectiveness in trawl fisheries

Shown to be a highly effective mitigation measure in CCAMLR icefish trawl fishery, reducing seabird bycatch to minimal levels (Sullivan 2010 submitted).

Caveats /Notes

Sisal string has been used to bind the sections of the net which pose the greatest threat seabirds prior to shooting (Sullivan et al. 2004). Bindings are simply tied onto the net to prevent the net from lofting and the mesh opening as the tension created by the vessel speed of between 1-3 knots is lost due to waves and swell action. Once shot-away the net remains bound on the surface until it sinks. Once the trawl doors are paid away and the net has sunk beyond the diving depth of seabirds the force of the water moving the doors apart is sufficient to break the bindings and the net spreads into its standard operational position.

Need for combination

Recommend combination with net cleaning and net weights to minimise the time the net is on the surface (Sullivan *et al*. 2010 submitted).

Research needs

Not needed.

Minimum standards / Recommendation

Recommended for reducing bycatch when shooting gear in pelagic gear.

3–ply sisal string (typical breaking strength of c.110 kg), or a similar inorganic material should be applied to the net on the deck, at intervals of approximately 5 m to prevent net from spreading and lofting at the surface. Net binding should be applied to mesh ranging from 120–800 mm as these are known to cause the majority of seabird entanglements (Sullivan et al 2010). When applying string, tie an end to the net to prevent string from slipping down the net and ensure it can be removed when net is hauled.

1.2. Net weights

Scientific evidence for effectiveness in trawl fisheries

Evidence suggests net weighting on or near the cod end increases the rate of ascent of the net during hauling operations, thus reducing the time the net is on the water's surface. All attempts should be made to retrieve the net as quickly as possible. Good deck practices to minimise the time that the net is on the water's surface have been the key factors in reducing seabird entanglements during hauling in South Atlantic trawl fisheries (Hooper *et al.* 2003; Sullivan 2010 submitted).

Caveats /Notes

None identified.

Need for combination

Recommend combination with net binding and net cleaning to minimise the time the net is on the water's surface during both setting and hauling (Sullivan 2010 submitted).

Research needs

Development of minimum standards for amount and placement of weight (cod end, wings, footrope, mouth, belly), to build on work to date in CCAMLR trawl fisheries (Sullivan *et al*. 2010 submitted).

Minimum standards / Recommendation

None established.

Recommended for reducing bycatch during both shooting and hauling of gear (Sullivan *et al*. 2010).

Suitable for both pelagic and demersal gear.

1.3. Net cleaning

Scientific evidence for effectiveness in trawl fisheries

Removal from nets of all fish 'stickers' and other material is a critical step to reducing net entanglement during shooting (Hooper *et al*. 2003; Sullivan *et al.* 2010 submitted).

Caveats /Notes

None identified.

Need for combination

Recommend combination with net binding and net weights to minimise the time net is on water's surface during both setting and hauling (Sullivan 2010 submitted).

Research needs

None identified.

Minimum standards / Recommendation

Remove all stickers from net prior to shooting gear.

Recommended for reducing bycatch during both shooting and hauling of gear.

Suitable for both pelagic and demersal gear.

1.4. Reduced mesh size

Scientific evidence for effectiveness in trawl fisheries

Roe (2005) reported on the use of reduced mesh size from 200 to 140 mm in the pelagic icefish fishery in CCAMLR waters, but did not quantify effectiveness of the measure.

Caveats /Notes

Measure may be impractical. Reduced mesh size was believed to have caused severe damage to the net because of increased water pressure during trawling (Roe 2005), although the use of chain weights in the net may also have been influential.

Need for combination

None identified.

Research needs

Thorough testing in a range of fisheries required if measure is practical.

Minimum standards / Recommendation

None. Insufficient evidence to recommend this measure, although theoretically should be effective in reducing seabird entanglement in nets.

1.5. Net jackets

Scientific evidence for effectiveness in trawl fisheries

Free-floating panels of net attached to the most dangerous mesh sizes have been trialled in CCAMLR's icefish trawl fishery, with efficacy uncertain (Sullivan *et al*. 2010 submitted).

Caveats /Notes

Found to cause serious drag and subsequent damage to the net. Drag also slows vessel speed and increases fuel consumption (Sullivan *et al*. 2010 submitted).

Need for combination

None identified.

Research needs

Efficacy of measure not quantified.

Minimum standards / Recommendation

Not recommended.

Currently detrimental to fishing efficiency and mitigation efficacy uncertain.

1.6. Acoustics

Scientific evidence for effectiveness in trawl fisheries

The use of acoustic 'scaring' devices on nine vessels in CCAMLR trawl fisheries indicated that loud noises (bells and flares/fireworks) had limited effect and birds quickly became habituated to the sound, no longer causing an aversion response (Sullivan *et al*. 2010).

Caveats /Notes

May be a useful back-up measure for circumstances when another measure is needed immediately (Sullivan *et al*. 2010 submitted).

Need for combination

None identified.

Research needs

None identified.

Minimum standards / Recommendation

None. Insufficient evidence to recommend this measure.

2. Cables

2.1. Offal discharge[3] and fish discard management

The most important factor influencing contacts between seabirds and warp cables is the presence of discharge (Wienecke & Robertson 2002; Sullivan *et al.* 2006a). Methods used to reduce the attractiveness of vessels to seabirds through management of offal discharge and fish discards include mealing (the conversion of waste into fish meal waste reducing discharge to sump water), mincing waste to a nominal maximum particle size of 25 mm diameter prior to discharge, batching (storage or controlling release of discards / discharge during fishing operations). Where practicable the full retention of all waste material is recommended.

2.1.1. Mealing

Scientific evidence for effectiveness in trawl fisheries

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

Mealing resulted in significant reduction in the number of seabirds species feeding behind vessels, relevant to the discharge of unprocessed fish waste (Abraham 2009; Wienecke & Robertson 2002; Favero *et al*. 2010) or minced waste (Melvin *et al.* 2010).

Caveats /Notes

Good evidence in global fisheries that fish meal processing and reducing discharge to stick / sump water is highly effective in reducing seabird bycatch.

Need for combination

None identified.

Research needs

None.

Minimum standards / Recommendation

Suitable for both pelagic and demersal trawl gear.

2.1.2. Mincing

Scientific evidence for effectiveness in trawl fisheries

Mincing reduced the number of large albatrosses (*Diomedea* spp) attending vessels but had no effect on other groups of seabirds (Abraham *et al*. 2009; Abraham 2010).

Caveats /Notes

Bottom trawled material, such as rocks, may impact the feasibility of mincing.

Need for combination

Should be used in combination with other mitigation methods.

Research needs

At present only effective against large *Diomedea* spp albatrosses. Efficacy with *Thalassarche* spp albatrosses needs to be proven before measure can be recommended (Abraham *et al*. 2009).

Minimum standards / Recommendation

Insufficient evidence to recommend this as a primary measure at present, although reduced bird abundance should reduce cable impacts and mortality for larger albatross species.

2.1.3. Batching

Scientific evidence for effectiveness in trawl fisheries

Batching (storage or controlling release of discards / discharge during) has been trialed in New Zealand and was shown to significantly reduce the number of seabirds associated with vessels (Pierre *et al*. 2010; SBWG-4 Doc14 Rev1).

Caveats /Notes

Effectiveness of batching relies on efficient (fast) dumping of batched material.

Need for combination

Should be used in combination with other mitigation methods.

Research needs

Robust trialling to investigate the extent to which reduced seabird abundance affects seabird interaction rates.

Minimum standards / Recommendation

Recommended when full retention or mealing not possible. Batch waste for at least 2 hours, preferably 4 hours or longer.

2.1.4. Full retention

Scientific evidence for effectiveness in trawl fisheries

Repeated studies have shown in the absence of offal discharge / fish discards seabirds interactions and mortality levels are negligible (Sullivan *et al*. 2006; Watkins *et al*. 2008; Melvin *et al*. 2010; SBWG-3 Doc 14 Rev 1; Abraham & Thompson 2009)**.** Storage of all fish discard and offal, either for processing or for controlled release when cables are not in the water, resulted in a significant reduction in the attendance of all groups of seabirds (Abraham et al 2009).

Caveats /Notes

None.

Need for combination

None identified.

Research needs

None identified.

Minimum standards / Recommendation

Suitable for both pelagic and demersal trawl gear.

2.2. Bird Scaring Lines (BSL or Streamer lines) for warp cables

Scientific evidence for effectiveness in trawl fisheries

Attachment of a Bird Scaring Line to both the port and starboard sides of a vessel, above and outside of the warp blocks, greatly reduces the access of birds to the danger zone where warps enter the water (Watkins *et al.* 2006; Reid & Edwards 2005; Melvin *et al*. 2010). An offsetting towed device has been demonstrated to improve BSL performance (BirdLife 2010).

Caveats /Notes

Effectiveness reduced in strong cross winds and rough seas, when BSLs are deflected away from warps (Sullivan & Reid 2003; Crofts 2006a, 2006b). This can be alleviated in part by towing a buoy or cone attached to the end of lines to create tension and keep lines straight (Sullivan *et al*. 2006a). Semi rigid streamers have been demonstrated to perform better.

Need for combination

None identified.

Research needs

Further research is required on the effectiveness on the design and performance of an off-setting towed device under operational conditions.

Minimum standards / Recommendation

BSL are recommended even when appropriate offal discharge and fish discard management practices in place (Melvin *et al*. 2010).

Suitable for both pelagic and demersal trawl gear.

2.3. Warp scarers

Scientific evidence for effectiveness in trawl fisheries

Warp scarers (weighted devices attached to each warp with clips or hooks, allowing the device to slide up and down the warp freely and stay aligned with each warp) create a protective area around the warp (see Bull 2009, Fig.2; Sullivan *et al*. 2006a).

Warp scarers have been shown to reduce contact rates but not to significant levels, and were not as effective as BSLs (Sullivan *et al*. 2006b, Abraham *et al*., cited in Bull 2009).

Caveats /Notes

Attachment to the warp eliminates problems associated with crosswinds as they do not behave independently of warps. Warp scarers cannot be deployed while the warp cable is being set, or remain in place during hauling, leaving periods when warps are not protected.

Concerns have been raised regarding associated practicality and safety issues (Sullivan *et al.* 2006a; Abraham *et al.*, cited in Bull 2009).

Need for combination

None identified.

Research needs

None identified.

Minimum standards / Recommendation

None. Insufficient evidence to recommend this measure.

2.4. Bird bafflers

Scientific evidence for effectiveness in trawl fisheries

Bird bafflers comprise two booms attached to both stern quarters of a vessel. Two of these booms extend out from the sides of the vessel and the other two extend backwards from the stern. Dropper lines are attached to the booms, to create a curtain to deter seabirds from the warp–sea interface zone (see Bull 2009, Fig.3; Sullivan *et al.* 2006a).

Generally bird bafflers are not regarded as providing as much protection to the warp cables as BSLs or warp scarers (Sullivan *et al.* 2006a).

Caveats /Notes

Various designs exist including the Brady Baffler and the Burka.

While bafflers where designed to minimise warp interactions, the Brady Baffler has been used (inappropriately) within CCAMLR Icefish fisheries to mitigate net entanglements where they have been found to be consistently ineffective (Sullivan *et al*. 2010).

The great variability in the design and deployment of bird bafflers may influence their effectiveness.

Need for combination

None identified.

Research needs

The effectiveness of the Burka has not been experimentally tested. Needs to be trialled in a range of fisheries and areas to demonstrate efficacy.

Minimum standards / Recommendation

None. Insufficient evidence to recommend this measure.

2.5. Cones on warp cables

Scientific evidence for effectiveness in trawl fisheries

A plastic cone attached to each warp cable prevented birds from entering the warp/water interface in Argentine Hake Trawl Fishery by 89% and no seabirds were killed (Gonzalez-Zevallos *et al.* 2007).

Caveats /Notes

Applicable for small vessels.

Need for combination

None identified.

Research needs

Needs to be trialled in a range of fisheries and areas to demonstrate efficacy.

Minimum standards / Recommendation

None. Insufficient evidence to recommend this measure.

2.6. Warp boom

Scientific evidence for effectiveness in trawl fisheries

A boom with streamers extending to the water forward of the stern can divert birds feeding on offal away from the warps (Melvin *et al.* 2010).

Caveats /Notes

Results did not identify a statistically significant reduction is seabird interactions with the warp.

Need for combination

None identified.

Research needs

Longer-term studies required to identify effectiveness. Work also required to identify configuration and materials.

Minimum standards / Recommendation

None.

2.7. Snatch block

Scientific evidence for effectiveness in trawl fisheries

A snatch block, placed on stern of a vessel to draw the third-wire close to the water to reduce its aerial extent, reduced seabird strikes, although performance varied by vessel (Melvin *et al*. 2010).

Caveats /Notes

Melvin *et al.* (2010) were confident that third-wires can be pulled closer to the water or submerged at the stern to make this measure highly effective, but noted that, as third-wires are fragile and expensive, any snatch block-like system should aim to minimise cable wear.

Need for combination

Should be used in combination with other mitigation methods.

Research needs

Needs to be trialled in a range of fisheries and areas to further demonstrate efficacy.

Development of technical specification required.

Minimum standards / Recommendation

None.

Recommended on the basis that shortening aerial extent of monitoring cables will, intuitively, reduce seabird strikes.

3. General measures

3.1. Area closures

Scientific evidence for effectiveness in trawl fisheries

Avoiding fishing at peak areas and during periods of intense foraging activity has been used effectively to reduce bycatch in longline fisheries. The principles are directly transferrable to trawl and other net fisheries.

In some studies, longline-associated mortality has been almost exclusively within the breeding season of seabirds. Several studies have also shown that proximity to breeding colonies is an important determinant of seabird bycatch rates (Moreno *et al.* 1996; Nel *et al*. 2002) and temporal closures around breeding areas contributed to a substantial reduction in seabird bycatch (Croxall & Nicol 2004).

Caveats /Notes

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.

Need for combination

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.

Research needs

Further information about the seasonal variability in patterns of species abundance around trawl fisheries.

Minimum standards / Recommendation

No work done but highly recommended.

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ANNEX 5

ANNEX 5: SUMMARY ADVICE STATEMENT FOR REDUCING IMPACT OF PELAGIC AND DEMERSAL TRAWL GEAR ON SEABIRDS

The causes of mortality in trawl fisheries are varied and dependent on the nature of the fishery (pelagic or demersal), the species targeted and fishing area. Mortalities may be categorised into two broad types: (1) cable-related mortality, including collisions with net-monitoring cables, warp cables and paravanes; and (2) net-related mortality, which includes deaths caused by net entanglements. Seabird interactions have been demonstrated to be significantly reduced by the use of mitigation measures that include protecting the warp cable, managing offal discharge and discards, and reducing the time the net is exposed on the surface of the water. The following measures have been demonstrated to be effective at reducing seabird bycatch in trawl fisheries and are recommended:

Cable strike

1. Deploy bird-scaring lines while fishing to deter birds away from warp cables and net monitoring cable.

2. Install a snatch block at the stern of a vessel to draw the net monitoring cable close to the water to reduce its aerial extent.

Net entanglement

1. Clean nets after every shot to remove entangled fish (“stickers”) and benthic material to discourage bird attendance during gear shooting;

2. Minimise the time the net is on the water surface during hauling through proper maintenance of winches and good deck practices; and

3. For pelagic trawl gear, apply net binding to large meshes in the wings (120–800 mm), together with a minimum of 400-kg weight incorporated into the net belly prior to setting.

In all cases the presence of offal and discards is the most important factor attracting seabirds to the stern of trawl vessels, where they are at risk of cable and net interactions. Managing offal discharge and discards while fishing gear is deployed has been shown to reduce seabird attendance. The following management measures are recommended:

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

Further measures include avoiding peak areas and periods of seabird foraging activity. It is important to note that there is no single solution to reduce or avoid incidental mortality of seabirds in trawl fisheries, and that the most effective approach is to use the measures listed

above in combination. Net entanglements during the haul remain the most difficult interactions to mitigate.

Context

The FAO Best Practice Guidelines for IPOA/NPOA-Seabirds were recently amended to include trawl fisheries in addition to longline fisheries (FAO 2009), demonstrating increased serious concern and awareness of seabird mortality on global trawl fisheries.

ACAP has comprehensively reviewed the scientific literature dealing with seabird bycatch mitigation in trawl fisheries and this document is a distillation of the review (AC6 Doc 14 Rev4 Annex 4).

ANNEX 6: REVIEW OF SEABIRD BYCATCH MITIGATION MEASURES FOR DEMERSAL LONGLINE FISHERIES

This annex summarises the results of studies that have been carried out to develop, test and improve seabird mitigation measures in demersal longline fisheries. A comprehensive range of technical and operational mitigation methods have been designed or adapted for use in demersal and semi-pelagic longline fisheries. These methods aim to reduce incidental mortality of seabirds by avoiding peak areas and periods of seabird foraging activity, reducing the time baited hooks are near the surface and thus available to birds, actively deterring birds from baited hooks, and making the vessel less attractive to birds and minimising the visibility of baited hooks. Apart from being technically effective at reducing seabird bycatch, mitigation methods need to be easy and safe to implement, cost effective, enforceable and should not reduce catch rates of target species. There is no single solution that will eliminate seabird bycatch; the most effective approach is to use a combination of measures. The suite of measures available may vary in their feasibility and effectiveness depending on the area, seabird assemblages involved, fishery and vessel type and gear configuration. Some of the mitigation methods are now well established and explicitly prescribed in longline fisheries. However, other measures are relatively recent and require further testing and refinements, and there is a need to ensure that the collaborative approach to research and monitoring that has characterised field of seabird bycatch mitigation continues.

BEST PRACTICE GUIDELINES	
1.	Night setting
2.	Area and seasonal closures
3.	Externally weighted lines: a) Spanish system
4.	Externally weighted lines: b) Chilean method (drop lines with nets)
5.	Externally weighted lines: c) Autoline
6.	Integrated weighting of lines
7.	Single bird scaring line
8.	Paired or multiple bird scaring lines
9.	Haul bird exclusion devices
OTHER CONSIDERATIONS	
10.	Side setting
11.	Underwater setting funnel/chute
12.	Line setter/shooter
13.	Thawing bait
14.	Olfactory deterrents
15.	Strategic management of offal discharge
16.	Blue-dyed bait
17.	Hook size and shape

BEST PRACTICE GUIDELINES

1. Night setting

Scientific evidence for effectiveness in demersal fisheries

PROVEN AND RECOMMENDED. Recommend combination with bird scaring lines and/or weighted lines, especially to reduce incidental mortality of birds that forage at night (Ashford *et al*. 1995; Cherel *et al*. 1996; Moreno *et al*. 1996; Barnes *et al*. 1997; Ashford & Croxall 1998; Klaer & Polacheck 1998; Weimerskirch *et al*. 2000; Belda & Sánchez 2001; Nel *et al*. 2002; Ryan & Watkins 2002; Sánchez & Belda 2003; Reid *et al*. 2004; Gómez Laich *et al.* 2006).

Minimum standards

Night defined as the period between the times of nautical twilight (nautical dark to nautical dawn).

Caveats /Notes

Bright moonlight and deck lights reduce the effectiveness of this mitigation measure. 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. In order to maximise effectiveness of this mitigation measure, deck lights 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 of white-chinned petrels

Research needs

Effect of night setting on catch rates of target species for different fisheries.

Implementation monitoring

Via VMS and fishery observers.

2. Area and seasonal closures

Scientific evidence for effectiveness in demersal fisheries

PROVEN AND RECOMMENDED. 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. 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 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.

Caveats /Notes

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.

Research needs

Further information about the seasonal variability in patterns of species abundance, and particularly how these interact with the spatial and temporal characteristics of fishing effort, especially for high risk areas (e.g. adjacent to important breeding colonies). In some studies, incidental mortality has been greatest during the chick-rearing period (Nel et al. 2002; Delord et al. 2005), whereas others have reported highest mortality during the incubation period (Reid et al. 2004). This difference likely relates to where the birds are foraging in relation to fishing effort at the time, and highlights the importance of understanding this interaction. Research is also required to determine the regional impact of closures on catches of target species.

Minimum standards

Currently, the area around South Georgia (Islas Georgias del Sur)[1] (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).

Implementation monitoring

Via VMS or fishery observers within national economic zones, and via aerial and at-sea surveillance if IUU fishing is suspected.

3. Externally weighted lines:
a) Spanish system

Scientific evidence for effectiveness in demersal fisheries

PROVEN AND RECOMMENDED. Must be combined with other measures, especially effective bird scaring lines, judicious offal management and/or night setting (Agnew *et al.* 2000; Robertson 2000; Robertson *et. al*. 2008a; 2008b; Melvin *et al*. 2001; Moreno *et al*. 2006; Moreno *et al*. 2008).

Caveats /Notes

Spanish system longlines are buoyant and weights must be attached to sink gear to fishing depth. Longlines with externally added weights sink unevenly, faster at the weights than at the midpoint between weights. Although gear configuration and setting speed influence the sink profiles of the hook lines (Seco Pon *et al*. 2007), the principle determinants of sink rates

are the mass of the weights and the distance between weights (Robertson *et al*. 2008a). It is critical that tension astern is eliminated to ensure the smooth flow of hooks from gear baskets. This can be done by ensuring the correct packing of lines and snoods in baskets, preventing hooks snagging on snood baskets and by ensuring that weights are released from the vessel before line tension occurs (Robertson *et al*. 2008a,b). Weights must be attached and removed for each set-haul cycle, which is onerous and potentially hazardous for crew members. Weights comprised of rocks enclosed in netting bags and concrete blocks deteriorate and require ongoing maintenance/replacement and monitoring to ensure weights are the required mass (Otley 2005); weights made of solid steel are preferred, in terms of mass consistency, handling, minimal-to-no maintenance and compliance (Robertson *et al*. 2008b).

Research needs

Sink rates and profiles of line weighting regimes may vary according to vessel type, setting speed and deployment position in relation to propeller turbulence. It is important that the sink rate relationships of different line weighting regimes are understood for a particular fishery (or fishery method) and that the effectiveness of the line weighting regime and the sink profile in reducing seabird mortality is tested.

Minimum standards

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.

Implementation monitoring

Fishing gear is deployed manually. Weights are attached by hand during line setting and removed during line hauling. Distance between weights and the mass of the weight used may vary in accordance with fishing strategy and for operational reasons. Observer presence on vessel is required to assess implementation.

4. Externally weighted lines:
b) Chilean method (drop lines with nets)

Scientific evidence for effectiveness in demersal fisheries

PROVEN AND RECOMMENDED. Prudent to use in combination with a single bird scaring streamer line. This recently developed method (first tested on large longline vessels in 2005) is a variant of the traditional Spanish method of longlining and was developed to minimise tooth whale depredation of toothfish. This system makes use of net sleeves or ‘cachaloteras’ which envelop captured fish during hauling. Hooks are clustered on “droppers” to which weights are attached, resulting in very fast sink rates in the first 15-20 m (the length of the droppers) of water column. Has the capacity to reduce seabird mortality to negligible levels (Moreno *et al*. 2006; Moreno *et al*. 2008; Robertson *et al*. 2008b). Because of its effectiveness in reducing impacts of toothed whales, this method is currently used in many longline fleets operating in South American waters (Moreno *et al*. 2008), as well as in the south west Atlantic.

Caveats /Notes

This is a new system and should be monitored and possibly refined further. Concern has been raised about the excessive discarding of fish bycatch (e.g. grenadiers) with embedded hooks and the ingestion of these hooks by albatrosses following vessels (Phillips *et al*. 2010). The solution to this problem is to stop hooks from being discarded in the first place. This is best achieved by banning the discarding of hooks as part of the licence conditions, as is already done in many fisheries, and also increasing awareness amongst fishers, observers and operators to facilitate compliance with such a ban. Another concern is that vessels can switch between Spanish method and Chilean method within fishing trips and even within sets of the longline.

Research needs

Effective as a solitary measure against albatrosses and most likely effective against *Procellaria* sp petrels due to the very rapid sink rates to depths beyond the known dive range of this group of seabirds. Research is required to determine effectiveness against *Puffinus* sp shearwaters.

This is a relatively new fishing method and may be in the process of refinement. It is important to monitor changes to gear design, especially those likely to affect the sink rates of baited hooks.

Minimum standards

No global standards yet.

Implementation monitoring

Hook-bearing droppers require weights be attached in order to sink. However, alternating between this fishing method and the traditional Spanish method within fishing trips is problematic. While this capacity exists the requirements for the Spanish system should apply (see “a”, above).

5. Externally weighted lines:
c) Autoline

Scientific evidence for effectiveness in demersal fisheries

PROVEN AND RECOMMENDED. Must be used in combination with an effective bird scaring streamer line. In the Southern Hemisphere evidence pertains to effect of added external weights on longline sink rates, not effectiveness in deterring seabirds. Attachment of 5 kg weights at no more than 40 m intervals increased mean sink rate from 0.1 m/s (unweighted gear) to 0.3 m/s on the section of longline mid-way between line weights (Robertson 2000). This rate exceeds that of integrated with longlines, which have been thoroughly tested against seabirds (see below). Attachment of external weighs necessary in Antarctic toothfish fisheries to comply with the minimum sink rate (0.3 m/s) required by CCAMLR operating in high latitude areas in summer, where it was not possible to set lines at night.

Caveats /Notes

As for the Spanish system it is important that external weights be released from vessels in a manner that avoids tension astern (tension astern may lift sections of the longline already deployed out of the water).

Research needs

Likely to be effective in deterring albatrosses and *Procellaria* sp seabirds. Evidence is lacking for effectiveness against *Puffinus* sp shearwaters.

Minimum standards

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 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.

Implementation monitoring

Weights are attached to longlines manually. Observer presence on vessel is required to assess implementation.

6. Integrated weighting of lines

Scientific evidence for effectiveness in demersal fisheries

PROVEN AND RECOMMENDED. Should be used in combination with bird scaring lines, judicious offal management and/or night setting. 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).

Caveats /Notes

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). Use of IW lines is likely to increase the portion of the line on the seafloor, and may lead to increases in the bycatch of vulnerable fish, shark and ray species. This may be mitigated by placing a weight and a float on a 10m line at the point of the dropper line attachment, thus ensuring the line sinks rapidly to 10m, out of reach of vulnerable seabirds, but remains off the seabed (Petersen 2008).

Research needs

The relationship between line-weighting regime, setting speed, sink rates/profiles and the seabird access window should be investigated for other fisheries (i.e. those that haven't

already been tested –Bering Sea, Alaska, and New Zealand ling fishery) including with additional mitigation measures (particularly bird scaring lines); these investigations would be useful in determining the necessary aerial extent of the bird scaring lines.

Minimum standards

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.

Implementation monitoring

Weight (lead core) integrated into fabric of longline, so compliance is intrinsic in this measure. It is expensive and time consuming to alter longline when at sea, including for vessels with long transit times to fishing grounds (e.g., Antarctic and sub Antarctic fisheries). Port inspection of all longline on board prior to embarkation on fishing trips considered adequate for assessment of compliance.

7. Single bird scaring line

Scientific evidence for effectiveness in demersal fisheries

PROVEN AND RECOMMENDED. Effectiveness is increased when using multiple bird scaring lines and when used in combination with other measures – e.g. night setting, appropriate weighting of line and judicious offal management. 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).

Caveats /Notes

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 effective mitigation measure, and efforts should be directed to improving further their design and use so that their effectiveness can be improved further.

Research needs

The use and specifications/performance standards are fairly well established in demersal longline fisheries. However, there is scope to improve further the effectiveness and practical use of bird scaring lines on individual vessels or vessel type.

Minimum standards

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 according to the size of the vessel.

Implementation monitoring

Bird scaring lines are usually deployed and retrieved on a set-by-set basis (they are not a fixed part of fishing gear/operations). Requires fisheries observers, video surveillance or at-sea surveillance (e.g. patrol boats or aerial over-flights).

8. Paired or multiple bird scaring lines

Scientific evidence for effectiveness in demersal fisheries

PROVEN AND RECOMMENDED. Effectiveness is increased when used in combination with other measures – e.g. night setting, appropriate weighting of line and judicious offal management. 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).

Caveats /Notes

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.

Research needs

Further trialling in fisheries which currently only use single streamer lines.

Minimum standards

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)

Implementation monitoring

Bird scaring lines are usually deployed and retrieved on a set-by-set basis (they are not a fixed part of fishing gear/operations). Requires fisheries observers, video surveillance or at-sea surveillance (e.g. patrol boats or aerial over-flights).

9. Haul bird exclusion devices

Scientific evidence for effectiveness in demersal fisheries

PROVEN AND RECOMMENDED as a haul mitigation measure. Must be used in combination with other mitigation measures – bird scaring lines at setting, line weighting, night setting and judicious offal management. The use of a bird exclusion device such as a Brickle curtain can effectively reduce the incidence of birds becoming foul hooked when the line is being hauled (Brothers *et al.* 1999; Sullivan 2004; Otley *et al*. 2007; Reid *et al*. 2010, Snell *et al.* in prep.).

Caveats /Notes

Some species, such as the black-browed albatross and cape petrel, 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).

Minimum standards

A device designed to discourage birds from accessing baits during hauling operations is required in high risk CCAMLR areas (exact design not specified, but it is required that they fulfil two operational characteristics: 1) deter birds from flying into the area where the line is being hauled, and 2) prevents birds that are sitting on the surface from swimming into the hauling bay area). Also required in the Falkland Islands[1] (Islas Malvinas) longline fishery, where the Brickle Curtain is recommended (Snell *et al*. in prep).

Implementation monitoring

Bird exclusion devices are usually deployed and retrieved on a haul-by-haul basis (they are not a fixed part of fishing gear/operations. Requires fisheries observers, video surveillance or at-sea surveillance.

OTHER CONSIDERATIONS

10. Side setting

Scientific evidence for effectiveness in demersal fisheries

NOT RECOMMENDED AT THIS TIME. Must be used in combination with other mitigation measures, especially the use of a bird curtain (Gilman *et al*. 2007), and bird scaring lines. 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.

Caveats /Notes

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.

Research needs

Largely untested in the demersal fisheries, especially in the Southern Ocean, where the seabird assemblages include proficient diving seabirds. Research urgently needed.

Minimum standards

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.

Implementation monitoring

Requires longline be set with the aid of a device(s) (e.g. autobaiter, line shooter) from a fixed position on vessels that is crucial to the operational effectiveness of line setting. Port inspection of line deployment set-up considered to be adequate to assess implementation.

11. Underwater setting funnel/chute

Scientific evidence for effectiveness in demersal fisheries

NOT RECOMMENDED AT THIS TIME. Must be used in conjunction with other mitigation measures – bird scaring lines, weighted lines, night setting and judicious offal management. 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).

Caveats /Notes

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).

Research needs

Need to investigate improvements to the current design to increase the depth at which the line is set, especially during rough seas. Should also be tested with integrated weight lines to determine whether this improves bycatch reduction. Also need to investigate optimal use of device together with other mitigation measures (bird scaring lines and weighted lines).

Minimum standards

Not yet established.

Implementation monitoring

On-board monitoring, such as full-time observer coverage, video surveillance or at-sea inspection is recommended to monitor implementation.

12. Line setter/shooter

Scientific evidence for effectiveness in demersal fisheries

NOT RECOMMENDED AT THIS TIME. Must be combined with other measures, such as bird scaring lines, night setting, weighted lines and judicious offal management. Less used in demersal long-line fisheries; variation in the precise method of operation is cause of variation in efficacy. In Norway, no statistical differences were detected in catch rates of northern fulmars between sets with and without a line shooter (Løkkeborg & Robertson 2002; Løkkeborg 2003). In Alaska, use of a line shooter increased seabird bycatch (Melvin *et. al*. 2001). However, the reasons for this finding are unclear.

Caveats /Notes

Robertson *et al.* (2008c) found no significant difference between the sink rates of integrated weight longlines of autoline vessels that were set with and without a line setter in the Ross Sea, and were doubtful that the use of line setters would lead to substantial reductions in interactions between seabirds and longlines. Unequivocal evidence of effectiveness in reducing seabird bycatch is lacking. In need of further refinement.

Research needs

Need to investigate whether refinement/modification of the device will be able to overcome the problem of propeller wash and ensure consistently rapid sink rates and significantly reduced seabird mortality. Not considered a mitigation measure at this time.

Minimum standards

Not considered a mitigation measure at this time.

13. Thawing bait

Scientific evidence for effectiveness in demersal fisheries

NOT RECOMMENDED AS A PRIMARY MITIGATION MEASURE. Not as much of an issue compared with pelagic longlining. For autoliners, the bait must be at least partially thawed before they can be sliced by the automated baiting system; in the Spanish system, the interval between manually baiting the hooks and setting the lines is sufficiently long to allow for thawing (except in very low ambient temperatures); and the line weighting regime overcomes most of the problems with frozen bait (Brothers *et al.* 1999).

Caveats /Notes

Effect is likely to be very minor. Not a primary measure.

Research needs

No priority research needs.

14. Olfactory deterrents

Scientific evidence for effectiveness in demersal fisheries

NOT RECOMMENDED AS A MITIGATION MEASURE AT THIS TIME. 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. 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).

Caveats /Notes

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).

Research needs

Testing should be extended to candidate/suitable species of conservation concern, such as white-chinned petrels and sooty shearwaters. Research is also required to identify the key ingredients in the shark oil that are responsible for deterring seabirds, and the mechanism by which the birds are deterred. The potential “pollution” effects also need to be investigated.

Minimum standards

None yet.

Implementation monitoring

Monitoring of line setting operations by observer placement or video surveillance is required to assess implementation.

15. Strategic management of offal discharge

Scientific evidence for effectiveness in demersal fisheries

NOT RECOMMENDED AS A PRIMARY MITIGATION MEASURE. Must be used in combination with other mitigation measures – bird scaring lines. line weighting, and night setting. 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).

Caveats /Notes

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 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.

Research needs

Further information needed on opportunities to manage offal more effectively – considering both practical aspects and seabird bycatch mitigation – in the short and long term.

Minimum standards

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[1] (Islas Malvinas), South Africa and New Zealand).

Implementation monitoring

Requires offal discharge practices and events to be monitored by fisheries observers or video surveillance.

16. Blue-dyed bait

Scientific evidence for effectiveness in demersal fisheries

NOT RECOMMENDED AS A PRIMARY MEASURE AT THIS TIME. Must be used in combination with other mitigation measures – bird scaring lines. line weighting, night setting and judicious offal management 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.

Caveats /Notes

New data suggests that this measure is only effective with squid bait (Cocking *et al.* 2008). It has not been tested in demersal fisheries, possibly due to larger number of hooks deployed and thus the need for considerably more bait (Bull 2007). There is no commercially available dye. Onboard dyeing is practically onerous, especially in inclement weather. In the long-term birds may become habituated to blue-dyed bait.

Research needs

Need for tests of efficacy and practical feasibility in demersal longline fisheries, especially in the Southern Ocean to determine its effectiveness as a long-term mitigation measure. Research would also need to determine the effect of dyed bait on catches of target species.

Minimum standards

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).

Implementation monitoring

The current practice of dyeing bait on board vessels at sea requires observer presence or video surveillance to monitor implementation. Assessment of implementation in the absence of on-board observers or video surveillance requires baits be dyed on land and monitored through port inspection of all bait on vessels prior to departure on fishing trips.

17. Hook size and shape

Scientific evidence for effectiveness in demersal fisheries

NOT RECOMMENDED AS A PRIMARY MITIGATION MEASURE. Must be used in combination with other mitigation measures – bird scaring lines. line weighting, night setting and judicious offal management 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)

Caveats /Notes

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.

Research needs

Determine impact on seabird bycatch and on catch of target species.

Minimum standards

No global standard

Implementation monitoring

Port inspection of all hooks on board considered adequate for monitoring implementation.

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ANNEX 7: SUMMARY ADVICE STATEMENT FOR REDUCING IMPACT OF DEMERSAL LONGLINES ON SEABIRDS

Summary

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

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

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

Introduction

The incidental mortality of seabirds, mostly albatrosses and petrels, in longline fisheries has been of growing global concern. This was a major reason for the establishment of the Agreement on the Conservation of Albatrosses and Petrels (ACAP). A large number of mitigation methods to reduce and eliminate seabird bycatch has been developed and tested over the last 10 to 15 years, especially for demersal longline fisheries. Within demersal longlining, there are different systems – the autoline system, the Spanish double line system, and more recently the Chilean system. Although most mitigation measures will be broadly applicable, the feasibility, design and effectiveness of some measures will be influenced by the type of longlining method and gear configuration used. In particular it should be noted that most scientific literature relates to fleets of larger vessels, with longline usage from artisanal fleets receiving less attention. Some of this advice may need to be modified for smaller vessels. ACAP has comprehensively reviewed the scientific literature dealing with seabird bycatch mitigation in demersal fisheries and this document is a distillation of the review (AC6 Doc 14 Rev4 Annex 6).

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

1. Best practice measures - general

1.1 Area and seasonal closures

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

2. Best practice measures - line setting

2.1. Line weighting

Lines should be weighted to get the baited hooks rapidly out of the range of feeding seabirds. Weights should be deployed before line tension occurs to ensure that the line sinks rapidly out of reach of seabirds.

2.2. Weighted lines for Spanish gear

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

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

2.3. Weighted lines for autoline gear

Integrated weight longlines (IWL) are designed with lead core of 50g/m. Their key characteristic is that they sink with a near-linear profile from the surface (minimal lofting in propeller turbulence) and are effective at sinking quickly out of reach of foraging seabirds. IWL should average ≥ 0.24 to 10 m depth.

Where it is practical to use IWL gear in a fishery, IWL is preferred over externally weighted alternatives because of its linear sink profile from the surface and consistent ability to achieve the minimum sink rate.

When using external weights on non-IWL autoline gear, the minimum average sink rate should be 0.3 m/s to 10 m depth. A faster sink rate is necessary with this configuration to minimise the lofting of sections of line between line weights in propeller turbulence. The sink rate can be achieved with a minimum of 5kg at no more than 40m intervals.

2.4. Night setting

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

2.5. Bird scaring lines

Bird scaring lines are designed to provide a physical deterrent over the area where baited hooks are sinking.

Two bird scaring lines should be used.

The design of the bird scaring lines should include the following specifications:

The attachment height should be at least 7m above sea level.

The lines should be at least 150m long to ensure the maximum possible aerial extent.

Streamers should be brightly coloured and reach the sea-surface in calm conditions, and placed at intervals of no more than 5m.

A suitable towed device should be used to provide drag, maximise aerial extent and maintain the line directly behind the vessel during crosswinds.

2.6. Offal and discard discharge management

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

3. Best practice measures - line hauling

3.1. Bird exclusion device (BED)/Brickle curtain

During hauling operations birds can accidentally become hooked as gear is retrieved. A BED consists of a horizontal support several metres above the water that encircles the entire line hauling bay. Vertical streamers are positioned between the support and water surface. The seabird deterrent effectiveness of this streamer line configuration can be increased by deploying a line of floats on the water surface and connecting this line of floats to the support with downlines. This configuration is the most effective method to prevent birds entering the area around the hauling bay, either by swimming or by flying.

3.2. Offal and discard discharge management

Ideally offal should be retained onboard, but if that is not possible offal and discards should be either, preferably, retained on board during hauling or released on the opposite side of the vessel to the hauling bay.

All hooks should be removed and retained on board before discards are discharged from the vessel.

4. Other considerations

4.1. Chilean method

The Chilean method of longline fishing was designed to prevent toothed whale depredations of fish. Because weights are deployed directly below the hooks, and because hook-bearing lines sink with a vertical profile in the seabird foraging depths (not horizontally, as in the traditional Spanish method), lines sink rapidly, making it an effective method for avoiding bycatch of foraging seabirds.

To eliminate the ingestion of hooks by seabirds during line hauling operations, care must be taken to retain all hooks onboard and not discard them overboard, either as unwanted hooks or as hooks embedded in discarded fish.

5. Not recommended

The following mitigation options are NOT recommended best practice:

Hook design – insufficiently researched

Olfactory deterrents – insufficiently researched

Underwater setting chutes - insufficiently researched.

Side setting - insufficiently researched and operational difficulties.

Blue-dyed bait, thawed bait - not relevant in demersal longline gear

Use of a line setter - not relevant in demersal longline gear.

ANNEX 8: RECOMMENDED DATA TO BE COLLECTED FROM LONGLINE FISHERIES

Recommended data to be collected from longline fisheries (adapted from Dietrich *et al*. 2007, FAO 2009 and Anderson *et al*. 2010). These data will be recorded for each set and haul observed. Data considered critical for assessing seabird bycatch are highlighted in bold.

Category	Variables
Temporal	**Date gear deployed**
	Start time of gear deployment
	End time of gear deployment
	Date gear retrieved
	Start time of gear retrieval
	End time of gear retrieval
Spatial	**Latitude at beginning of gear deployment**
	Longitude at beginning of gear deployment
	Latitude at beginning of gear retrieval
	Longitude at beginning of gear retrieval
	Latitude at end of gear retrieval
	Longitude at end of gear retrieval
Physical and environmental	Sea state (Beaufort Scale)
	Moon phase
	Wind strength and direction
	Depth fished (average/target depth)
	Cloud cover (important for night setting)
Fishing operation	Unique vessel identifier
	Unique observer identifier
	Vessel length
	Setting speed (knots)
	Total number of hooks deployed
	Total number of hooks observed (crucial for calculating seabird bycatch levels)[1]
	Target species[2]
	Bait species
	Composition of bait used (%)
	Bait status (live/fresh/frozen/thawed/whole/cut)
	Mass of added weight (describe size and position of weight, e.g. 60g 2m from the hook)

Category	Variables
Fishing gear	Groundline/mainline length[3]
	Branchline/ganglion length
	Distance between weight and hook on ganglion (when used)
	Distance between branchlines
	Line setter used (Y/N)
	Line setter speed (knots)
	Hook size
	Hook type
Catch	Total catch, actual or estimated (number and/or weight)
	Catch by species (number and/or weight)
Mitigation measure	**Tori line used (yes/no)**
	Side of tori line deployment (port or starboard or both)
	Number of tori lines used
	Length of tori line (m)
	Aerial coverage achieved (m)
	Attachment height (m above water line)
	Number of streamers
	Distance between streamers
	Dumping of bait/offal (yes/no; also describe if dumping of offal took place during setting and hauling and whether offal was dumped on the opposite side of the hauling bay)
	Deck lighting astern of the vessel (yes/no)
	Bait caster used (yes/no)
	Other mitigation measures used (provide details)
Bycatch	**Species identification**
	Number of each species captured
	Type of interaction (hooking/entanglement)
	Disposition (dead/alive/injured)
	Description of condition/viability of animal upon release (if released alive)
Other	Seabird abundance counts

1 – Important to record the numbers of hooks observed specifically for seabirds. If the observer is in the factory or collecting information elsewhere they may miss seabirds being hauled aboard. Therefore it is important to be able to relate the number of birds caught to the number of hooks observed.

2 – Target species may be derived in some programmes from the catch composition

3 – Groundline/mainline length is rarely an exact measurement, due to the length of the line. Instead it is either derived (by multiplying distance between floats by number of floats) estimated by the observer, or reported by the vessel.

ANNEX 9: SEABIRD BYCATCH WORKING GROUP WORK PROGRAMME 2013 - 2015

This table is based on the relevant section from the table in AC6 Doc 19 with yellow text indicating recommended changes.

1. Seabird Bycatch						
4.1	Continue to implement the interaction plan for ACAP (ACx, Doc y) and relevant Parties to engage and assist RFMOs and other relevant international bodies in assessing and minimising bycatch of albatrosses and petrels	Individual RFMO co-ordinators, Secretariat, SBWG and AC	2013-2015	a) 18 weeks pa b) 18 week pa c) 2 week pa	a)+b) AUD $30,000 each pa AUD $0	a) Travel etc. costs for attendance at selected RFMO meetings (less if Party can contribute directly) b) RFMO co-ordinator activities c) Review of process and recommend changes (SBWG)
4.2	Review availability of albatross and petrel tracking/distribution data to ensure representativeness of species/age classes. Prioritise gaps and encourage studies to fill gaps.	SBWG, AC, Parties and BirdLife International	2013-2015	1 week pa	AUD $5,000	Review status at AC8
4.3	Update analysis of overlaps of distributions and albatrosses and petrels with fisheries managed by RFMOs	BirdLife / ACAP	2013	4 weeks	AUD $20,000	~~*Review if updated overlap analyses required (AC6)*~~
4.4	Continue to develop materials (both generic and specific) to assist RFMOs and other relevant international and national bodies in reducing seabird bycatch and to maximise effective participation and consideration of issues relevant to ACAP	SBWG Convenor with other SBWG consultation to review needs (Secretariat)	2013-2015	*1 week*	<more detail needed>	*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.* ~~*2) Summary of risk assessment methods and key contacts in this area.*~~ ~~*Priority decided inside the RFMO interaction plan.*~~ ID guide for drowned birds, including protocol for photographing dead birds Guidance on handling of hooked live birds – may be available from CCAMLR or other sources

4.5	Continue to review and utilise available information on foraging distribution, fisheries and seabird bycatch to aid prioritisation of actions to reduce the risk of fishing operations to ACAP species in waters subject to national jurisdiction.	SBWG and Parties	2013-2015	1) 8 weeks 2) 2 weeks	AUD $0	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. (AUD $0) 2) Assess needs for waters subject to national jurisdiction and any capacity building requirements
4.6	Maintain bibliography of relevant bycatch information	BirdLife/SBWG (Secretariat)	2013-2015	1 week pa	AUD $0	Includes both published and unpublished literature
4.7	Based on new information, update ACAP/BirdLife fact sheets on mitigation measures for fishing methods known to impact albatrosses and petrels (trawl, pelagic longline, demersal longline)	SBWG/BirdLife	2013-2015	1 week per fact sheet	AUD $5000	Costs are for translation. Leads - Trawl: New Zealand Pelagic longline: Australia Demersal longline: UK General: BirdLife
4.8	*Produce report on lessons from mitigation success stories in commercial fisheries*	*BirdLife/ Australia/ Convenor SBWG*	*2010-2012*	*3 weeks*	*AUD $0*	*Should be completed within current triennium – target audience is fisheries managers*
4.9	*Prepare review of knowledge on deliberate take/killing of ACAP species at sea*	*Australia/ Brazil/ New Zealand/ Peru/ UK/ WWF/ SBWG*	*2010*	*4 weeks*	*AUD $0*	*Review to describe current knowledge (much from unpublished literature) and causes of any deliberate take and to consider possible take reduction strategies. Should be completed within current triennium using secondee to Secretariat*
4.10	Review results of any research on seabird bycatch issues, particularly that funded by ACAP	SBWG	2013-2015	2 weeks pa	AUD $0	Draw conclusions and make recommendations to AC as appropriate
4.11	Maintain review of research needs and priorities for bycatch research and mitigation development	SBWG	2013-2015	2 weeks	AUD $0	

4.12	Provide and consider ~~annual~~ reports to each AC on WG activities	SBWG and AC	2013-2015	1 week	AUD $0	
4.13	*Estimate mortality in previously unobserved fisheries in range of Waved albatross*	*Ecuador and Peru, BirdLife, AC, American Bird Conservancy*	*2010*	*4 weeks*	*AUD $20,000*	*Part of implementation from Waved Albatross Action Plan Awaits outcomes from Waved albatross workshop*
4.a1	Improve access to relevant data (e.g. from observers) held by others	SBWG	2013-2015			Need compilation of meta-data e.g. observer data
4.a2	Collaborative analysis of bycatch data with Japanese researchers	SBWG	2013-2015	6 months	AUD $50,000	Might be best done by an appropriate experienced secondee. Costings difficult to make
4.a3	Analysis of bycatch data from other fishing nations as information becomes available	SBWG	2013-2015	6 months	AUD $50,000	This is a contingency cost; we are not yet sure how much and when data might become available
4.a4	Identification of hot spots for temporal/spatial management	RFMO coordinators/ Canada/ BirdLife/ SBWG	2013-2014	Postdoc for 2 years	AUD $10,000 AUD $50,000	AUD $10,000 is a contribution to a potential Canadian/BirdLife/ACAP project in the North Pacific that could be done in the 2010-12 triennium. A total global cost might be in the order of AUD $50,000
4.a5	Provide advice on suitable analyses of bycatch data	SBWG	2013-2015	3 months	$20,000	Statistical advice may be required

ANNEX 10: SCIENTIFIC NAMES OF SPECIES MENTIONED IN THE REPORT

Birds

Tristan Albatross *Diomedea dabbenena*

Wandering Albatross *Diomedea exulans*

Waved Albatross *Phoebastria irrorata*

Atlantic Yellow-nosed Albatross *Thalassarche chlororhynchos*

Black-browed Albatross *Thalassarche melanophris*

Buller's Albatross *Thalassarche bulleri*

Chatham Albatross *Thalassarche eremita*

Grey-headed Albatross *Thalassarche chrysostoma*

Black Petrel *Procellaria parkinsoni*

Grey Petrel *Procellaria cinerea*

White-chinned Petrel *Procellaria aequinoctialis*

Great Shearwater *Puffinus gravis*

Fish

Albacore Tuna *Thunnus alalunga*

Southern Bluefin Tuna *Thunnus maccoyii*

Yellowfin Tuna *Thunnus albacares*

Broad-billed Swordfish *Xiphias gladius*

Dolphin Fish *Coryphaena hippurus*

Alfonsino *Beryx decadactylus*

Hake *Merluccius* spp.

Hoki *Macronurus novaezelandiae*

ANNEX 11: STATEMENT BY ARGENTINA

"The Argentine Delegation to the Sixth Meeting of the Advisory Committee of the Agreement on the Conservation of Albatross and Petrels (ACAP) presents its compliments to the aforementioned Committee and in relation to the documents AC6 Inf. 15, SBWG-4 Doc. 55 y Joint BSWG4/STWG6 Doc.6 presented by the United Kingdom of Great Britain and Northern Ireland, recalls that upon its ratification of the Agreement on the Conservation of Albatross and Petrels, Argentina rejected the United Kingdom's pretended territorial extension of the Agreement to the Malvinas Islands, South Georgias and South Sandwich Islands, since those archipelagos and the surrounding maritime areas are an integral part of the Argentine national territory.

The Argentine Government rejects the references made to alleged illegitimate authorities of the Malvinas Islands, South Georgias and South Sandwich Islands and the presentation of these archipelagos detenting an international status that they do not have.

The British presence in those archipelagos and the surrounding maritime areas constitutes an illegitimate occupation, which is rejected by the Argentine Republic, as so are any unilateral acts from it emanated. The Argentine Republic reaffirms its sovereignty rights over the Malvinas Islands, South Georgias and South Sandwich Islands, and the surrounding maritime areas, which are an integral part of the Argentine national territory and that, being illegitimately occupied by the United Kingdom, are object of a sovereignty dispute, recognized by the United Nations.

The Argentine Delegation to the Sixth Meeting of the Advisory Committee of the Agreement on the Conservation of Albatross and Petrels avails itself of this opportunity to renew to the aforementioned Committee the expressions of its most distinguished consideration."

ANNEX 12: STATEMENT BY THE UNITED KINGDOM

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

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

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

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

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