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Analysis of Seabird Measures

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BirdLife International Global Seabird Programme[1]

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BirdLife International Global Seabird Programme

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Purpose:

To respond to the request for information from the WCPFC secretariat "that the WCPFC Secretariat seek advice from other RFMOs on the wording of CMM-2007-04. see WCPFC4 Summary Report, Attachment O, Annex 1, 1 a) (iv) and 1 b) (iv)] to ensure that tori lines include branch streamers along the aerial extent of the line and that in 1 a) (iv), the branch streamers are of a length that ensures that they would touch the surface of the water in the absence of wind and swell."

Introduction:

BirdLife has reviewed the existing seabird mitigation measures for RFMOs, and provides comments on their ability to substantially reduce seabird bycatch. In addition, BirdLife has recently published the BirdLife Mitigation Fact Sheets (BirdLife International 2009 a-h), which provide specifications for best-practice for mitigation measures. These will provide guidance on wording and application of measures currently considered effective at reducing seabird mortality.

Here we reviewed the existing seabird conservation measures for four surface-longline commissions IOTC, ICCAT, SEAFO and WCPFC with respect to eventual revisions of the WCPFC measure CMM2007-04. CCAMLR manages demersal fisheries, but over the last 10-15 years, CCAMLR has developed comprehensive and effective measures to reduce seabird bycatch, and is therefore also considered. We have not reviewed the CCSBT measure (included for completeness in Appendix I) as it was based on information available several years ago, has not been revised in the interim period, and is considered less than optimal in its description of effective streamer line specification.

Measures have been formulated differently between the four tuna commissions reviewed here. In contrast, CCAMLR measures are more prescriptive than those of the other agreements. The measures for IOTC and WCPFC are similar in that they propose a range of options to States, including additional voluntary measures. The detail as to how these measures are to be implemented is relatively brief in the tuna commission measures.

In 2006, when CMM2007-04 was first adopted, it was widely recognised that this was an interim measure, and would be subject to further refinement. Some elements of Column B were proposed as provisional items, pending further research. Also, small vessels in the Northern Hemisphere were excluded from the measure. This was based on pragmatic reasons during the 2006 negotiations, in order that the measure be adopted with limited time left. There is no evidence to suggest these vessels do not catch seabirds. There is therefore a need to include these small vessels within the measure.

In terms of the form of measures, the more detailed and technical descriptions, such as those for CCAMLR, lead to less ambiguity and improve the ease with which compliance can

be monitored. Further research also needs to be done to achieve optimal design for seabird bycatch mitigation measures for pelagic fisheries. We recommend that more detailed technical specifications and descriptions of the operational deployment of measures are developed through the WCPFC's Ecosystem and Bycatch SWG. With this requirement in mind, BirdLife International has produced a set of 14 BirdLife Mitigation Fact Sheets which set out recommended best practice for all known effective forms of seabird mitigation for pelagic longline fisheries[1] (BirdLife International 2009 a-h). These fact sheets include technical descriptions of measures, suitable for adoption by fisheries organisations in defining their mitigation requirements.

In addition, the FAO-COFI has recently adopted Best Practice Guidelines for implementation of IPOA-Seabirds, which included a recommended framework for RFMOs to use in addressing bycatch. This framework will be of great use to the Ecosystem and Bycatch SWG. Inclusion of performance standards (rather than standards relating to materials) helps to ensure that the measures are used in as the most effective way possible.

Some additions and re-wording are suggested, which would assist in developing a more effective and less ambiguous measure for seabird mitigation for the WCPFC CMM2007-04.

Analysis:

This analysis is supported by two appendices: The first contains references to the seabird measures for WCPFC, IOTC, ICCAT and CCAMLR. The second contains excerpts from recent research and reviews specific to research on optimal streamer line configuration.

Review of effectiveness of measures

Research into the effectiveness of mitigation measures is variable in quality and extent, with only a few studies having an experimental design that enables an assessment of efficacy of a measure in isolation, compared to a control treatment of no mitigation (Lokkeborg 2008).

Reviews of mitigation effectiveness, and the studies examining them, have recently been produced by the FAO (Lokkeborg 2008; Gilman et al. 2007), ACAP (ACAP 2008) and through a publication of recommended best practice measures for reducing seabird mortality (BirdLife International 2009a-h). Among a broad suite of measures reviewed, the following are considered effective at significantly reducing seabird mortality, but were most effective when used in combination (Lokkeborg 2008).

- Night setting with minimum deck lighting - Nautical twilight is considered necessary (ACAP 2008), and is required as many seabirds have been demonstrated to be most active around dawn and dusk. It should be noted that while this measure is highly effective for reducing incidental mortality of albatrosses, it is not as effective for some petrel species, and its effectiveness is often reduced during periods around the full moon.

- Increased sink rates (for pelagic longline fisheries, this is best achieved through branch line weighting) – testing with various configurations shows this to be an

[1] BirdLife International Mitigation Fact Sheets are available for 13 mitigation methods across trawl, demersal longline and pelagic longline fisheries.

effective measure, however, the distance of the weight to the hook is critical with distance of around 1-2 metres required to achieve a sink profile that will significantly reduce seabird bycatch.

- Bird-scaring lines – twin streamer lines are demonstrated to be more effective than single ones for demersal longline fisheries (Melvin et al. 2004, Dietrich et al. 2008). There is no obvious reason why this should not also apply to pelagic longline fisheries, and they are recommended by Lokkeborg (2008), in combination with weighted branch lines. The optimum configuration of streamer lines for pelagic longline fisheries remains to be determined, and is an active area of research (Lokkeborg 2008, ACAP 2008, Melvin et al. 2009, see Annex II). The best practice recommendation for streamer line configuration follows that of the demersal longline fisheries in the BirdLife Mitigation Fact Sheet 7, derived from the CCAMLR model with adjustments relating to latest research. This requires long streamers placed at roughly 5 m intervals, starting within 5-10 m of the stern of the vessel along the aerial section (first 80-100m of the streamer line). Guidance to this effect is given by Melvin et al. (2009) following recent experimental work on streamer lines in pelagic fisheries: They note "Another critical element of tori line design is the placement of the first streamer relative to the stern. In order to protect birds, especially when a bait-casting machine is used, the first streamer should be within 10 m of the stern to protect baits as they land and are most exposed to depredation". Their recommendation was for streamers that reached within 1 m of the surface of the ocean along the aerial section o f the line.

Measures proven effective in specific situations:

- Side setting – this method has been effective in the Hawaiian tuna fishery, where it is commonly used in combination with bird curtains and line weighting. However, anecdotal information suggests it may not be applicable throughout the WCPFC region. ACAP (2008) expressed concern that the group of seabirds present around the Hawaiian Islands (mainly shallow diving petrel species and surface feeding albatrosses) does not include petrels with advanced diving capacity; therefore, the method would likely not work as well in higher latitudes. Lokkeborg (2008) notes that side setting is a 'promising' rather than a demonstrated mitigation technique, noting that it requires further research.

Other measures can be considered 'potentially effective' but require further testing in operational conditions:

- Line-shooting devices – conflicting results are reported from different studies (see ACAP 2008 for a summary) with some studies indicating either no mitigating effect in demersal longline fishing (Robertson et al. 2008) or an increase in bird catch (Melvin et al. 2001). Line shooting devices are therefore not recommended as a 'mitigation measure'.

- Blue-dyed squid bait – it is still unknown to what extent birds habituate to blue-dyed squid bait. There are unresolved operational issues with dyeing baits at sea, making commercial-scale use unfeasible at present; therefore it may not be a viable mitigation measure in practical terms.

- Offal discharge control (strategic offal dumping) – opinions are divided in the research community as to whether strategic offal dumping is an effective mitigation method. This has been used in Hawaii fisheries. ACAP review of this measure recommends that offal management measures require 'reduction' or elimination of offal discharge and not 'strategic dumping', which can attract birds and lead to increases in catch. The measure is applied in CCAMLR fisheries via prohibition of discharge during setting.
- Underwater setting devices – This heading includes a range of devices/measures, and works on the premise that baits released at depth are inaccessible and not visible to seabirds at the surface. These methods are currently under development.

Recommendations for an improved WCPFC measure

WCPFC Conservation and Management Measure 2007-04 requires vessels fishing south of 30 degrees South and north of 23 degrees North and over 24 m in overall length to use two mitigation measures, which must include one of the following: Night setting, streamer line, weighted branch line, side setting with bird curtain and weighted branch lines.

Other measures which may be used in combination with those above include streamer lines, weighted branch lines, blue-dyed bait, deep-setting line shooter, underwater setting chute, management of offal discharge.

The WCPFC seabird measure could be strengthened by:

- Improving the prescription of the streamer line configuration:
    - Including a performance measure of aerial extent of at least 100m
    - Adding a requirement for a towed object (e.g. buoy or length of line) to ensure that the line tension is retained
    - Adding a requirement for streamers to be of sufficient length to enable them to reach the surface of the sea in the absence of wind or swell
    - Specifying the distance that the first streamer needs to be fitted from the stern of the vessel (e.g. less than 5 m) and specify the minimum number of streamers (20 for a 100m line spaced at 5m, and starting 5 m from the stern).
- Relying on robust scientific results to assist with the refinement of streamer line specifications. This is because the different models currently in use may be of varying efficacy, yet a solid scientific basis for determining which work better is currently lacking. With data gathering during operations, specifying the streamer line configuration in use, information to help refine best-practice prescriptions can be gathered and through time can be included in conservation measures. Note that there remains considerable debate over the effectiveness of 'light' tori lines.
- Including paired (rather than single) streamer lines as the available option

- Ensuring minimisation of offal discharge and removing the wording that allows for strategic offal dumping
- Requiring the side-setting prescription to apply to limited spatial areas where its use has been shown to be effective (e.g. in tropical areas of the North Pacific where seabird assemblages are similar to those around Hawaii).
- Improving the prescription of line-sink rate increase (line weighting) so that it contains performance related measures (measures of sink rate, not of line weight). This is because several factors have an influence on the rate of sinking of lines; in particular: the distance between the weighted swivel and the hook vessel speed, snood and float spacing, line materials, and bait type. The effective element is the rate at which lines sink, therefore it makes sense to include this as part of the prescription. A minimum sink rate of 0.3m/s is recommended.
- Requiring a minimum sink rate for baits to be measured on a periodic basis during the fishing operation and to be specified as a performance measure
- In high risk areas requiring a combination of three or more measures, which would ideally be night setting, line weighting, and paired streamer lines, given current knowledge of efficacy of measures.
- Prohibiting the discharging of hooks in factory wash or in processed fish waste.
- Applying the measure to all vessels in areas where seabird interactions are likely, including vessels of less than 24 m length.

IOTC measure

IOTC Resolution 2008/03 prescribes two measures, which must be different, and include one of the following: Night setting, bird-scaring lines, and weighted branch lines.

The measure could be strengthened by:

- Removing blue-dyed bait and line shooting devices from the options
- Ensuring minimisation of offal discharge and removing the wording that allows for strategic offal dumping
- Including paired (rather than single) streamer lines as the available option
- Requiring a combination of three or more measures in high risk areas of night setting, line weighting, and paired streamer lines
- Prohibiting the discharging of hooks in factory wash or in processed fish waste
- Improving the prescription of line-sink rate increase (line weighting) so that it contains performance related measures (measures of sink rate, not of line weight). See comments on the WCPFC measure in respect of this element.

- Requiring a minimum sink rate for baits to be measured on a periodic basis during the fishing operation and to be specified as a performance measure
- Improving the prescription of the streamer line configuration:
    - Include a performance measure of aerial extent of at least 100m,
    - Adding a requirement for streamers to be of sufficient length to enable them to reach the surface of the sea in the absence of wind or swell
    - Specifying the distance that the first streamer needs to be fitted from the stern of the vessel (e.g. less than 5 m) and specify the minimum number of streamers (20 for a 100m line spaced at 5m, and starting 5 m from the stern).

ICCAT measure

ICCAT Recommendation **07-07 Recommendation by ICCAT on reducing incidental by-catch of seabirds in longline fisheries** applies to all longline fishing south of 20^0S and requires that all vessels deploy streamer lines (bird-scaring lines or tori poles). A second streamer line is encouraged and back-up streamer lines are a requirement. Swordfish vessels using monofilament line are excluded from this requirement, provided that they set their lines at night and use weighted swivels within 3 m of the hook. A guideline for streamer line configuration is given.

The measure could be strengthened by:

- Ensuring minimisation of offal discharge
- Requiring the use of paired (rather than single) streamer lines
- Requiring a combination of three or more measures in high risk areas of night setting, line weighting, and paired streamer lines
- Prohibiting the discharging of hooks in factory wash or in processed fish waste
- Improving the prescription of line-sink rate increase (line weighting) so that it contains performance related measures (measures of sink rate, not of line weight). A minimum sink rate of 0.3m/s is recommended.
- Requiring a minimum sink rate for baits to be measured on a periodic basis during the fishing operation and to be specified as a performance measure
- Changing the guideline on streamer line configuration to a requirement, and Improving the prescription of the streamer line configuration:
    - Include a performance measure of aerial extent of at least 100m,
    - Adding a requirement for streamers to be of sufficient length to enable them to reach the surface of the sea in the absence of wind or swell

- Specifying the distance that the first streamer needs to be fitted from the stern of the vessel (e.g. less than 5 m) and specify the minimum number of streamers (20 for a 100m line spaced at 5m, and starting 5 m from the stern).

SEAFO measure

SEAFO Conservation Measure 05/06 on Reducing Incidental By-catch of Seabirds In the SEAFO Convention Area requires that all longline vessels fishing south of 30^{o}S carry and use streamer lines, use night setting, and not discharge offal during line setting and hauling.

The measures provides detailed information about deployment and configuration of streamer lines, including line length (minimum 150 m), requirement that streamers be positioned above the hook line, and that any bait-casting machine be adjusted to ensure that baits fall inside the area of protection of the streamer lines. Streamers are required to be of sufficient length that they hang 'just clear of the water', and are spaced a maximum 5-7 m apart.

The measure could be strengthened by:

- Requiring a combination of three or more measures in high risk areas of night setting, line weighting, and paired streamer lines
- Prohibiting the discharging of hooks in factory wash or in processed fish waste
- Including a third measure, with prescription of line-sink rate requirement (line weighting), which contains performance related measures (measures of sink rate, not of line weight). A minimum sink rate of 0.3m/s is recommended.
- Requiring a minimum sink rate for baits to be measured on a periodic basis during the fishing operation and to be specified as a performance measure

CCAMLR measures

CCAMLR provides a detailed description of its mitigation requirements in Conservation Measures 24-02 and 25-02, which are designed to ensure that compliance with measures can be thoroughly assessed by observers and compliance officers. Other CCAMLR measures (e.g. relating to discharge of plastics, hooks and waste) also apply to seabird conservation, but are not covered here.

The CCAMLR management system includes a risk assessment process that defines a five-point risk ranking for each fishery area. Here we discuss only specifications for high-risk areas.

The CCAMLR measures require night setting, minimum line sink rate of 0.3m/s, streamer lines and prohibit offal discharge during setting.

- Line weighting measure - **CONSERVATION MEASURE 24-02 (2005) Longline weighting for seabird conservation** –
    - This measure is extremely prescriptive, and is based on the performance measure of line sink rate.
    - Recommendations on how the sink rate be achieved, and a detailed description of how it should be measured are included in the description.
    - A sink rate of 0.3m/s is required from all vessels, except in the special circumstances where integrated weighted line is deployed, when a rate of 0.2m/s is allowed.
    - The adoption of this measure was supported by several years of detailed research, and its widespread use coincided with the near total elimination of seabird mortality in CCAMLR longline fisheries where summer fishing is not allowed (excludes the French EEZ fishery).
- Streamer line and offal discharge measures - **CONSERVATION MEASURE 25-02 (2007) 1,2 Minimisation of the incidental mortality of seabirds in the course of longline fishing or longline fishing research in the Convention Area**.
    - This measure is highly prescriptive, and covers detailed compliance and operational aspects of the deployment of streamer lines and/or offal management. It is supported by several years of research, operational information and feedback from observers and researchers on performance in relation to offal discharge and streamer lines.
    - The offal management component prohibits offal discharge during line setting, and limits it to the opposite side of the vessel from the hauling area during hauling.
    - Haul curtains are prescribed although not precisely worded as to how they should be configured.
    - The CCAMLR streamer line could be improved by stating a minimum aerial extent of 100m and requiring paired streamer lines.

Recommendations for improvements to WCPFC CMM2007-04

Implementation of the recommendations set out in the section above would improve the efficacy of the seabird measures for WCPFC at reducing seabird mortalities and be applicable throughout the WCPFC Convention Area.

Specifically with regard to the number and length of streamer lines, available information suggests that streamers that do not come near to the sea-surface, and that are not deployed close to the vessel stern are likely to lead to bycatch of birds, sometimes at extraordinary rates (Melvin and Walker 2008, see Annex II). Clear experimental results are lacking on this aspect (Lokkeborg 2008) and previous experimental work has uncertain or confounded results (ACAP 2008).

More generally, we recommend that CMM2007-04 be revised. These revisions could include removal from the list of available measures those options for which there is little scientific evidence of their ability to significantly reduce bycatch. The BirdLife recommendation, following review of recent research and material presented by the FAO and ACAP is that the list of mandatory elements should be limited to:

- line weighting – include performance measures into the requirement, e.g. 0.3m/s sink rate.
- Streamer lines – recommend that the prescription in the BirdLife International Mitigation Fact sheet is followed to specify this measure (BirdLife International 2009 c).
- Night setting – ensure that the time on which night setting is based is local time, and that the observer data are recorded in such a manner that the time relative to nautical twilight can be verified (i.e. specify whether the time recorded is UT, local time or some other).

Research strongly indicates that combinations of these measures are required for most effect. WCPFC needs to consider whether two measures only, used in combination, are sufficient to avoid seabird population effects in areas of high risk. Consideration should be given to using up to three measures simultaneously in some conditions, as a minimum requirement.

Other, potential or promising measures that have a demonstrable effect on reducing seabird mortality should be encouraged as additional, voluntary measures to further reduce seabird mortality. Currently among the listed measures in CMM2007-04, only side setting and minimisation of offal discharge would fit this description.

Other measures may be recommended for addition to the available options through time, once they have been proven to effectively reduce seabird bycatch significantly in experimental and operational settings.

Further to this, differentiating zones within the WCPFC area in which seabird mitigation can be applied at an appropriate level is recommended. This approach is used within the CCAMLR zone, with a full set of measures (night setting, line weighting, prohibition of offal discharge at setting, prohibition of discharge of waste including plastics and hooks, use of

haul curtain) used only in high-risk zones (4 out of 17 fishery areas). The research conducted under the Ecological Risk Assessment for seabirds for the WCPFC in 2009 is likely to provide guidance as to where zones of more intensive mitigation may be required.

BirdLife International recommends that a combination of all known effective mitigation techniques, applicable for general application (i.e. night setting, weighted lines and streamer lines) be used in highest risk areas simultaneously. This is because high-risk areas within the WCPFC Convention Area contain assemblages of threatened seabird species and species for which it is difficult to mitigate mortalities (e.g. nocturnal feeding petrel species with advanced diving capacity).

In medium to low risk areas, some relaxation of these measures might be considered.

Consideration should be given to allowing for seasonal area closures to be an option if seabird bycatch is at unacceptable levels in spite of implementation of measures.

Conclusions:

The comparison of measures from IOTC, CCAMLR and WCPFC highlights some deficiencies in the WCPFC seabird conservation measures. BirdLife Global Seabird Programme has recommended some specific improvements that could be promoted to ameliorate the CMM2007-04. Reinforcing use of known effective measures – night setting, line weighting and streamer lines with long streamers (paired) would improve the performance of the measure, and the application of all of these measures during fishing in areas of high risk of seabird interaction is recommended.

References

ACAP 2008. Agreement on the Conservation of Albatrosses and Petrels - Seabird Bycatch Working Group. Seabird bycatch mitigation measures for pelagic longline fishing. ACAP, Hobart.

BirdLife International 2009a. Bycatch Mitigation. Practical information on seabird bycatch mitigation measures. Introduction: Seabird bycatch mitigation measures. BirdLife International, Cambridge.

BirdLife International 2009b. Bycatch Mitigation FACT-SHEET 5. Practical information on seabird bycatch mitigation measures. Demersal and Pelagic Longline: Night-setting. BirdLife International, Cambridge.

BirdLife International 2009c. Bycatch Mitigation FACT-SHEET 7. Practical information on seabird bycatch mitigation measures. Pelagic Longline: Streamer lines. BirdLife International, Cambridge.

BirdLife International 2009d. Bycatch Mitigation FACT-SHEET 8. Practical information on seabird bycatch mitigation measures. Pelagic Longline: Line weighting. BirdLife International, Cambridge.

BirdLife International 2009e. Bycatch Mitigation FACT-SHEET 9. Practical information on seabird bycatch mitigation measures. Pelagic Longline: Side-setting. BirdLife International, Cambridge.

BirdLife International 2009f. Bycatch Mitigation FACT-SHEET 10. Practical information on seabird bycatch mitigation measures. Pelagic Longline: Blue-dyed bait (squid). BirdLife International, Cambridge.

BirdLife International 2009g. Bycatch Mitigation FACT-SHEET 11. Practical information on seabird bycatch mitigation measures. Pelagic Longline: Bait caster and line shooter. BirdLife International, Cambridge.

BirdLife International 2009h. Bycatch Mitigation FACT-SHEET 12. Practical information on seabird bycatch mitigation measures. Demersal and Pelagic Longline: Haul mitigation. BirdLife International, Cambridge.

Dietrich, K.S., Melvin, E.F. and Conquest, L. 2008. Integrated weight longlines with paired streamer lines – Best practice to prevent seabird bycatch in demersal longline fisheries. Biological Conservation 141: 1793-1805.

Gilman, E., Moth-Poulsen, T., and Bianchi, G. 2007. Review of measures taken by intergovernmental organizations to address sea turtle and seabird interactions in marine capture fisheries. Food and Agriculture Organization of the United Nations, Rome.

Lokkeborg, S. 2008. Review and assessment of mitigation measures to reduce incidental catch of seabirds in longline, trawl and gillnet fisheries. FAO Fisheries and Aquaculture Circular No. 1040 FIIT/C1040/. Food and Agriculture Organization of the United Nations, Rome.

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Melvin, E.F., Sullivan, B., Robertson, G. and Wienecke, B. 2004. A review of the effectiveness of streamer lines as a seabird by-catch mitigation technique in longline fisheries and CCAMLR streamer line requirements. CCAMLR Sci. 11: 189-201.

Melvin, E. and Walker, N. 2008. Optimizing tori line designs for pelagic tuna longline fisheries Report of work under New Zealand Ministry of Fisheries Special Permit 355.

Melvin, E. Heinecken, C. and Guy, T. 2009. Optimizing Tori Line Designs for Pelagic Tuna Longline Fisheries: South Africa. Washington Sea Grant, Washington.

Robertson, G.,Williamson, J, McNeill, M., Candy, S, and Smith, N. 2007. Autoliners and seabird bycatch: Do line setters increase the sink rate of integrated weight longlines? CCAMLR WG-FSA-07/13.

Annex I – Technical Specifications of Seabird Measures from Fisheries Agreements and Mitigation Fact Sheets from BirdLife International. Documents attached in a separate file.

a) CCAMLR Measures 24-02, 25-02

b) SEAFO Conservation Measure 05/06

c) ICCAT Recommendation 07-07

d) IOTC seabird measure - Resolution 2008-03.

e) WCPFC seabird measure - CMM2007-04

f) CCSBT Measure – attachment 6.

g) BirdLife International Mitigation Fact Sheets 5, 7-12 and Introduction.

Annex II – Excerpts from reviews of mitigation effectiveness relevant to CMM2007-04.

Excerpt 1. Lokkeborg 2008. Review and assessment of mitigation measures to reduce incidental catch of seabirds in longline, trawl and gillnet fisheries. FAO Fisheries and Aquaculture Circular No. 1040 FIIT/C1040/. Food and Agriculture Organisation of the United Nations, Rome. Pp. 13-14.

EVALUATION OF MITIGATION MEASURES IN LONGLINE FISHERIES

Streamer line

CCAMLR was the first management body to implement a conservation measure that required all longline vessels fishing in its convention area to use a streamer line while setting longlines (Conservation Measure 29/X adopted by CCAMLR in 1991). The streamer line has since then become the most commonly applied seabird mitigation measure in longline fisheries throughout the world (Melvin *et al*., 2004).

All studies applying an experimental approach to test the performance of streamer lines have shown that this mitigation device is very efficient in reducing seabird bycatch and seabird attacks on bait both in demersal (Table 3; Løkkeborg, 1998, 2001; Melvin *et al*., 2001; Løkkeborg and Robertson, 2002) and pelagic longline fisheries (Brothers, 1991; McNamara *et al*., 1999 (cited in Gilman, Brothers and Kobayashi, 2005); Boggs, 2001). Several works testing streamer lines are inconclusive, however, these studies were based on observer data, as opposed to a rigourous experimental design, and consequently confounded by a wide array of factors (Murray *et al*., 1993; Ashford *et al*., 1994, 1995; Ashford and Croxall, 1998; Klaer and Polacheck, 1998; Brothers, Gales and Reid, 1999).

When proper and consistent streamer line design and performance were ensured, this mitigation measure reduced the mortality of surface-foraging seabirds by as much as 96-100percent compared to a control of no deterrent (Løkkeborg 1998; 2001; Melvin *et al*., 2001; Løkkeborg and Robertson, 2002).

In an experiment in the Alaskan Pacific cod fishery, the streamer line completely eliminated the bycatch of surface-foraging birds, and the only seabird caught were the short-tailed shearwater, which is a diving bird (Melvin *et al*., 2004). Streamer lines are likely to be less efficient in reducing bycatch of diving seabirds as birds may still reach baited hooks beyond the aerial portion of streamer lines.

This deficit may be solved or at least significantly reduced by using weighted longlines in combination with streamer lines. Paired streamer lines in combination with integrated weight lines were shown to reduce bycatch of short-tailed shearwaters by 97 percent compared to control lines of no mitigation measure (Dietrich, Melvin and Conquest, 2008).

Streamer lines can also be less efficient when operated in strong crosswinds (Løkkeborg 1998; Brothers, Gales and Reid, 1999; Melvin *et al*., 2001). Under such conditions, the streamer line can be blown to the side of the longline leaving baited hooks exposed to seabirds. Reduced efficiency under crosswind conditions may partly be counteracted by attaching the streamer line to the windward side of the vessel or by using paired streamer lines. Although differences in seabirds catch rates between single and paired streamer lines were small and not significant, Melvin *et al*., 2001 recommended the use of paired streamer lines in the Alaska and Bering Sea demersal fisheries. This recommendation was based on behavioural evidence demonstrating that paired streamer lines resulted in virtually no albatross attacks on baits, whereas single streamer lines failed to eliminate albatross attacks. Paired streamer lines are, however, not operationally practical on small tuna longliners because the longer branchlines frequently tangle with the streamer lines.

Accordingly, aerial distance and position relative to sinking hooks are the most critical components of streamer line performance. The former is related to seabird foraging and diving behaviour, and the latter is affected by wind direction and wind speed. How these two components affect streamer line performance and efficiency should be given a research priority and given special attention when prescribing streamer line performance standards.

Excerpt 2. Melvin, E. and Walker, N. 2008. Optimizing tori line designs for pelagic tuna longline fisheries Report of work under New Zealand Ministry of Fisheries Special Permit 355. Pp 8-9.

Seabird Bycatch Mitigation Performance

Clearly the seabird bycatch mitigation tools – dual tori lines and 12 g leads on each hook – failed during daylight hours, killing 20 birds in 138 minutes. This failure was due to the bait casting machine delivering baited hooks 2-3 m outside the port tori line and the first streamer of the tori line being over 25 m astern3. Together these factors left a 20 m span that seabirds could exploit baited hooks at will. When the first streamer of the port tori line was moved to within 11 m of the stern on the second day, the capture rate dropped from 0.30 birds per min to 0.08 birds per min. Although an improvement, this rate of seabird mortality is unacceptable….

…Observations here strongly suggest that the distance between the first streamer of the tori line and the stern is very important to scaring birds from baited hooks. In this case 25 m plus distance was clearly too far and moving it to 11 m improved performance slightly. The 5 m required distance in the NZ gazetted rules are a likely best distance, in that birds were observed to take machine-casted baits at 10 m with the 11 m stern spacing.

Although tori line designs could not be compared quantitatively, the multiple packaging straps passed through the twist of the line making up the streamers and the line making up the backbone as used on this vessel could make these lines look bigger especially if the color were changed to red or orange. It is extremely difficult to imagine that a tori line with only packing straps passed through the backbone and devoid of streamers could be effective at scaring birds. We were poised to compare the performance of tori lines with and without streamers; however, the extreme seabird mortality seen during daylight hours preempted that comparison."

Excerpt 3. Melvin, E. Heinecken, C. and Guy, T.2009. Optimizing Tori Line Designs for Pelagic Tuna Longline Fisheries: South Africa. Washington Sea Grant, Washington. Pp11.

With regard to tori lines, an optimal design emerged that incorporates most lessons learned (Figure 10). This design proposes that tori lines be broken into two components – a "protection" section and a "drag" section. The "protection" section includes a light, high-tensile strength floating backbone with clip-on streamers and woven in packing-strap material. Streamers are used in the span where the backbone is more than 1 m above the surface, and packing-strap material is used for the span where the backbone is less than 1 m above the surface. Streamers would be of several designs — branched orange tubing, reflective tape woven into branched monofilament twist. Combinations of the two should be alternated at a minimum spacing of 5 m. Packing-strap material would alternate bright, high-contrast colors like orange and luminescent green in a single section or alternate different-colored sections….

…Crucial to effective use of tori lines is a strong attachment point to the vessel. The center mast of the *Fukuseki Maru No. 5* certainly met this criterion, but the tori pole did not. We believe that there is a need to redesign the traditional Japanese tori pole to a structure that can support the drag necessary to create an aerial extent that protects birds out to the point that gear sinks to 10 m and that can sustain the force of fouling on a longline float at 10 to 12 knots. The outboard extent of the port tori pole must also be aligned with the location that baits land when thrown by the bait-casting machine...

…Another critical element of tori line design is the placement of the first streamer relative to the stern. In order to protect birds, especially when a bait-casting machine is used, the first streamer should be within 10 m of the stern to protect baits as they land and are most exposed to depredation. At a setting speed of 9.5 knots, baits hit the water at 4 to 7 m from the stern. A first streamer at 5 m is not recommended, because it could lead to tangling branchlines with the first streamer under some sea conditions.

Excerpt 4. Agreement on the Conservation of Albatrosses and Petrels - Seabird Bycatch Working Group 2008. Seabird bycatch mitigation measures for pelagic longline fishing.

"The Seabird Bycatch Working Group recommended that its advice on current best practice mitigation, including the application of combinations of measures (Table 2) be provided to the IATTC and other relevant RFMOs.

It should be noted that many of the mitigation measures currently adopted by fishers and fisheries managers have little empirical support as to their efficacy. This applies to measures such as side setting, light tori lines, bait casting machines, blue-dyed bait and line-shooter effect on mainline tension.

At SBWG— 2 there was considerable discussion on the use of light tori or bird scaring lines, a variation on the conventional tori line. This measure has recently been proposed by Japan as an effective mitigation measure for pelagic longline fisheries. The Working Group noted that there was conflicting information on the effectiveness of this measure. Light tori lines (short streamers and no drag) have been used by the foreign Asian fleet operating in South African waters where substantial seabird bycatch has been reported (0.44 birds killed per 1000 hooks). As a result of improved compliance in 2008, these vessels began using conventional tori lines and seabird bycatch was reduced to 0.05 birds per 1000 hooks. This is likely to be due to a number of factors, but anecdotal evidence suggests that the improved tori line design is a substantial contributor.

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

SBWG members found the evidence for effectiveness in the Japanese study to be unconvincing because of the small number of sets (18) in one experiment and the fact that no albatrosses were caught when either bird scaring line type was in use. In a second experiment, although a significantly difference in seabird mortality between the two types of bird scaring lines was detected, the confidence limits around the mean values of both treatments overlapped extensively. The SBWG concluded that thorough comparative experimental assessment of light and conventional bird scaring lines needs to be undertaken against Southern Ocean assemblages of diving seabirds (e.g., Procellaria sp petrels and Puffinus sp. shearwaters) and albatrosses, with research based on larger sample sizes and more transparent methodologies before the measure could be applied with any confidence."

Excerpt 5: Agreement on the Conservation of Albatrosses and Petrels - Seabird Bycatch Working Group 2008. Seabird bycatch mitigation measures for pelagic longline fishing. Extract from Table 2 detailing information about efficacy of mitigation for streamerlines for pelagic longlining.

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

ANNEX 24-01/B

TAXA-SPECIFIC SCHEDULE FOR NOTIFICATION OF RESEARCH VESSEL ACTIVITY

Taxon	Expected Catch
(a) Thresholds for finfish taxa	
Dissostichus spp.	10 tonnes
Champsocephalus gunnari	50 tonnes
(b) Non-finfish taxa for which a catch threshold of 0.1% of the catch limit for a given area would apply	
Krill	
Squid	
Crabs	

CONSERVATION MEASURE 24-02 (2005)
Longline weighting for seabird conservation

Species	seabirds
Area	selected
Season	all
Gear	longline

In respect of fisheries in Statistical Subareas 48.6, 88.1 and 88.2 and Statistical Divisions 58.4.1, 58.4.2, 58.4.3a, 58.4.3b and 58.5.2, paragraph 4 of Conservation Measure 25-02 shall not apply only where a vessel can demonstrate its ability to fully comply with one of the following protocols.

Protocol A (for vessels monitoring longline sink rate with Time-Depth Recorders (TDRs) and using longlines to which weights are manually attached):

A1. Prior to entry into force of the licence for this fishery and once per fishing season prior to entering the Convention Area, the vessel shall, under observation by a scientific observer:

(i) set a minimum of two longlines with a minimum of four TDRs on the middle one-third of each longline, where:

(a) for vessels using the auto longline system, each longline shall be at least 6 000 m in length;

(b) for vessels using the Spanish longline system, each longline shall be at least 16 000 m in length;

(c) for vessels using the Spanish longline system, with longlines less than 16 000 m in length, each longline shall be of the maximum length to be used by the vessel in the Convention Area;

(d) for vessels using a longline system other than an autoline or Spanish longline system, each longline shall be of the maximum length to be used by the vessel in the Convention Area.

(ii) randomise TDR placement on the longline, noting that all tests should be applied midway between weights;

(iii) calculate an individual sink rate for each TDR when returned to the vessel, where:

(a) the sink rate shall be measured as an average of the time taken for the longline to sink from the surface (0 m) to 15 m;

(b) this sink rate shall be at a minimum rate of 0.3 m/s;

(iv) if the minimum sink rate is not achieved at all eight sample points (four tests on two longlines), continue the testing until such time as a total of eight tests with a minimum sink rate of 0.3 m/s are recorded;

(v) all equipment and fishing gear used in the tests is to be to the same specifications as that to be used in the Convention Area.

A2. During fishing, for a vessel to be allowed to maintain the exemption to night-time setting requirements (paragraph 4 of Conservation Measure 25-02), regular longline sink monitoring shall be undertaken by the CCAMLR scientific observer. The vessel shall cooperate with the CCAMLR observer who shall:

(i) attempt to conduct a TDR test on one longline set every twenty-four hour period;

(ii) every seven days place at least four TDRs on a single longline to determine any sink rate variation along the longline;

(iii) randomise TDR placement on the longline, noting that all tests should be applied halfway between weights;

(iv) calculate an individual longline sink rate for each TDR when returned to the vessel;

(v) measure the longline sink rate as an average of the time taken for the longline to sink from the surface (0 m) to 15 m.

A3. The vessel shall:

(i) ensure that all longlines are weighted to achieve a minimum longline sink rate of 0.3 m/s at all times whilst operating under this exemption;

(ii) report daily to its national agency on the achievement of this target whilst operating under this exemption;

(iii) ensure that data collected from longline sink rate tests prior to entering the Convention Area and longline sink rate monitoring during fishing are recorded in

the CCAMLR-approved format[1] and submitted to the relevant national agency and CCAMLR Data Manager within two months of the vessel departing a fishery to which this measure applies.

Protocol B (for vessels monitoring longline sink rate with bottle tests and using longlines to which weights are manually attached):

B1. Prior to entry into force of the licence for this fishery and once per fishing season prior to entering the Convention Area, the vessel shall, under observation by a scientific observer:

(i) set a minimum of two longlines with a minimum of four bottle tests (see paragraphs B5 to B9) on the middle one-third of each longline, where:

(a) for vessels using the auto longline system, each longline shall be at least 6 000 m in length;

(b) for vessels using the Spanish longline system, each longline shall be at least 16 000 m in length;

(c) for vessels using the Spanish longline system, with longlines less than 16 000 m in length, each longline shall be of the maximum length to be used by the vessel in the Convention Area;

(d) for vessels using a longline system other than an autoline or Spanish longline system, each longline shall be of the maximum length to be used by the vessel in the Convention Area;

(ii) randomise bottle test placement on the longline, noting that all tests should be applied midway between weights;

(iii) calculate an individual sink rate for each bottle test at the time of the test, where:

(a) the sink rate shall be measured as the time taken for the longline to sink from the surface (0 m) to 10 m;

(b) this sink rate shall be at a minimum rate of 0.3 m/s;

(iv) if the minimum sink rate is not achieved at all eight sample points (four tests on two longlines), continue the testing until such time as a total of eight tests with a minimum sink rate of 0.3 m/s are recorded;

(v) all equipment and fishing gear used in the tests is to be to the same specifications as that to be used in the Convention Area.

B2. During fishing, for a vessel to be allowed to maintain the exemption to night-time setting requirements (paragraph 4 of Conservation Measure 25-02), regular longline sink rate monitoring shall be undertaken by the CCAMLR scientific observer. The vessel shall cooperate with the CCAMLR observer who shall:

(i) attempt to conduct a bottle test on one longline set every twenty-four hour period;

(ii) every seven days conduct at least four bottle tests on a single longline to determine any sink rate variation along the longline;

(iii) randomise bottle test placement on the longline, noting that all tests should be applied halfway between weights;

(iv) calculate an individual longline sink rate for each bottle test at the time of the test;

(v) measure the longline sink rate as the time taken for the longline to sink from the surface (0 m) to 10 m.

B3. The vessel shall:

(i) ensure that all longlines are weighted to achieve a minimum longline sink rate of 0.3 m/s at all times whilst operating under this exemption;

(ii) report daily to its national agency on the achievement of this target whilst operating under this exemption;

(iii) ensure that data collected from longline sink rate tests prior to entering the Convention Area and longline sink rate monitoring during fishing are recorded in the CCAMLR-approved format[1] and submitted to the relevant national agency and CCAMLR Data Manager within two months of the vessel departing a fishery to which this measure applies.

B4. A bottle test is to be conducted as described below.

Bottle Set Up

B5. 10 m of 2 mm multifilament nylon snood twine, or equivalent, is securely attached to the neck of a 500–1 000 ml plastic bottle[2] with a longline clip attached to the other end. The length measurement is taken from the attachment point (terminal end of the clip) to the neck of the bottle, and should be checked by the observer every few days.

B6. Reflective tape should be wrapped around the bottle to allow it to be observed in low light conditions and at night.

Test

B7. The bottle is emptied of water, the stopper is left open and the twine is wrapped around the body of the bottle for setting. The bottle with the encircled twine is attached to the longline[3], midway between weights (the attachment point).

B8. The observer records the time at which the attachment point enters the water as t_1 in seconds. The time at which the bottle is observed to be pulled completely under is recorded as t_2 in seconds[4]. The result of the test is calculated as follows:

Longline sink rate = $10 / (t_2 - t_1)$.

B9. The result should be equal to or greater than 0.3 m/s. These data are to be recorded in the space provided in the electronic observer logbook.

Protocol C (for vessels monitoring longline sink rate with either (TDR) or bottle tests, and using internally weighted longlines with integrated weight of at least 50 g/m and designed to sink instantly with a linear profile at greater than 0.2 m/s with no external weights attached):

C1. Prior to entry into force of the licence for this fishery and once per fishing season prior to entering the Convention Area, the vessel shall, under observation by a scientific observer:

(i) set a minimum of two longlines with either a minimum of four TDRs, or a minimum of four bottle tests (see paragraphs B5 to B9) on the middle one-third of each longline, where:

(a) for vessels using the auto longline system, each longline shall be at least 6 000 m in length;

(b) for vessels using the Spanish longline system, each longline shall be at least 16 000 m in length;

(c) for vessels using the Spanish longline system, with longlines less than 16 000 m in length, each longline shall be of the maximum length to be used by the vessel in the Convention Area;

(d) for vessels using a longline system other than an autoline or Spanish longline system, each longline shall be of the maximum length to be used by the vessel in the Convention Area;

(ii) randomise TDR or bottle test placement on the longline;

(iii) calculate an individual sink rate for each TDR when returned to the vessel, or for each bottle test at the time of the test, where:

(a) the sink rate shall be measured as an average of the time taken for the longline to sink from the surface (0 m) to 15 m for TDRs and the time taken for the longline to sink from the surface (0 m) to 10 m for bottle tests;

(b) this sink rate shall be at a minimum rate of 0.2 m/s;

(iv) if the minimum sink rate is not achieved at all eight sample points (four tests on two longlines), continue the testing until such time as a total of eight tests with a minimum sink rate of 0.2 m/s are recorded;

(v) all equipment and fishing gear used in the tests is to be to the same specifications as that to be used in the Convention Area.

C2. During fishing, for a vessel to be allowed to maintain the exemption to night-time setting requirements (paragraph 4 of Conservation Measure 25-02), regular longline sink rate monitoring shall be undertaken by the CCAMLR scientific observer. The vessel shall cooperate with the CCAMLR observer who shall:

(i) attempt to conduct a TDR or bottle test on one longline set every twenty-four hour period;

(ii) every seven days conduct at least four TDR or bottle tests on a single longline to determine any sink rate variation along the longline;

(iii) randomise TDR or bottle test placement on the longline;

(iv) calculate an individual longline sink rate for each TDR when returned to the vessel or each bottle test at the time of the test;

(v) measure the longline sink rate for bottle tests as the time taken for the longline to sink from the surface (0 m) to 10 m, or for TDRs the average of the time taken for the longline to sink from the surface (0 m) to 15 m.

C3. The vessel shall:

(i) ensure that all longlines are set so as to achieve a minimum longline sink rate of 0.2 m/s at all times whilst operating under this exemption;

(ii) report daily to its national agency on the achievement of this target whilst operating under this exemption;

(iii) ensure that data collected from longline sink rate tests prior to entering the Convention Area and longline sink rate monitoring during fishing are recorded in the CCAMLR-approved format[1] and submitted to the relevant national agency and CCAMLR Data Manager within two months of the vessel departing a fishery to which this measure applies.

[1] Included in the scientific observer electronic logbook.
[2] A plastic water bottle that has a 'stopper' is needed. The stopper of the bottle is left open so that the bottle will fill with water after being pulled under water. This allows the plastic bottle to be re-used rather than being crushed by water pressure.
[3] On autolines attach to the backbone; on the Spanish longline system attach to the hookline.
[4] Binoculars will make this process easier to view, especially in foul weather.

CONSERVATION MEASURE 25-02 (2007)[1,2]
Minimisation of the incidental mortality of seabirds in the course of longline fishing or longline fishing research in the Convention Area

Species	seabirds
Area	all
Season	all
Gear	longline

The Commission,

Noting the need to reduce the incidental mortality of seabirds during longline fishing by minimising their attraction to fishing vessels and by preventing them from attempting to seize baited hooks, particularly during the period when the lines are set,

Recognising that in certain subareas and divisions of the Convention Area there is also a high risk that seabirds will be caught during line hauling,

Adopts the following measures to reduce the possibility of incidental mortality of seabirds during longline fishing.

1. Fishing operations shall be conducted in such a way that hooklines[3] sink beyond the reach of seabirds as soon as possible after they are put in the water.

2. Vessels using autoline systems should add weights to the hookline or use integrated weight (IW) hooklines while deploying longlines. IW longlines of a minimum of 50 g/m or attachment to non-IW longlines of 5 kg weights at 50 to 60 m intervals are recommended.

3. Vessels using the Spanish method of longline fishing should release weights before line tension occurs; traditional weights[4] of at least 8.5 kg mass shall be used, spaced at intervals of no more than 40 m, or traditional weights[4] of at least 6 kg mass shall be used, spaced at intervals of no more than 20 m, or solid steel weights[5] of at least 5 kg mass shall be used, spaced at intervals of no more than 40 m.

4. Longlines shall be set at night only (i.e. during the hours of darkness between the times of nautical twilight[6])[7]. During longline fishing at night, only the minimum ship's lights necessary for safety shall be used.

5. The dumping of offal is prohibited while longlines are being set. The dumping of offal during the haul shall be avoided. Any such discharge shall take place only on the opposite side of the vessel to that where longlines are hauled. For vessels or fisheries where there is not a requirement to retain offal on board the vessel, a system shall be implemented to remove fish hooks from offal and fish heads prior to discharge.

6. Vessels which are so configured that they lack on-board processing facilities or adequate capacity to retain offal on board, or the ability to discharge offal on the opposite side of the vessel to that where longlines are hauled, shall not be authorised to fish in the Convention Area.

7. A streamer line shall be deployed during longline setting to deter birds from approaching the hookline. Specifications of the streamer line and its method of deployment are given in the appendix to this conservation measure.

8. A device designed to discourage birds from accessing baits during the haul of longlines shall be employed in those areas defined by CCAMLR as average-to-high or high (Level of Risk 4 or 5) in terms of risk of seabird by-catch. These areas are currently Statistical Subareas 48.3, 58.6 and 58.7 and Statistical Divisions 58.5.1 and 58.5.2.

9. Every effort should be made to ensure that birds captured alive during longlining are released alive and that wherever possible hooks are removed without jeopardising the life of the bird concerned.

10. Other variations in the design of mitigation measures may be tested on vessels carrying two observers, at least one appointed in accordance with the CCAMLR Scheme of International Scientific Observation, providing that all other elements of this conservation measure are complied with[8]. Full proposals for any such testing must be notified to the Working Group on Fish Stock Assessment (WG-FSA) in advance of the fishing season in which the trials are proposed to be conducted.

[1] Except for waters adjacent to the Kerguelen and Crozet Islands
[2] Except for waters adjacent to the Prince Edward Islands

[3] Hookline is defined as the groundline or mainline to which the baited hooks are attached by snoods.
[4] Traditional weights are those made from rocks or concrete.
[5] Solid steel weights shall not be made from chain links. They should be made in a hydrodynamic shape designed to sink rapidly.
[6] The exact times of nautical twilight are set forth in the Nautical Almanac tables for the relevant latitude, local time and date. A copy of the algorithm for calculating these times is available from the CCAMLR Secretariat. All times, whether for ship operations or observer reporting, shall be referenced to GMT.
[7] Wherever possible, setting of lines should be completed at least three hours before sunrise (to reduce loss of bait to/catches of white-chinned petrels).
[8] The mitigation measures under test should be constructed and operated taking full account of the principles set out in WG-FSA-03/22 (the published version of which is available from the CCAMLR Secretariat and website); testing should be carried out independently of actual commercial fishing and in a manner consistent with the spirit of Conservation Measure 21-02.

APPENDIX TO CONSERVATION MEASURE 25-02

1. The aerial extent of the streamer line, which is the part of the line supporting the streamers, is the effective seabird deterrent component of a streamer line. Vessels are encouraged to optimise the aerial extent and ensure that it protects the hookline as far astern of the vessel as possible, even in crosswinds.

2. The streamer line shall be attached to the vessel such that it is suspended from a point a minimum of 7 m above the water at the stern on the windward side of the point where the hookline enters the water.

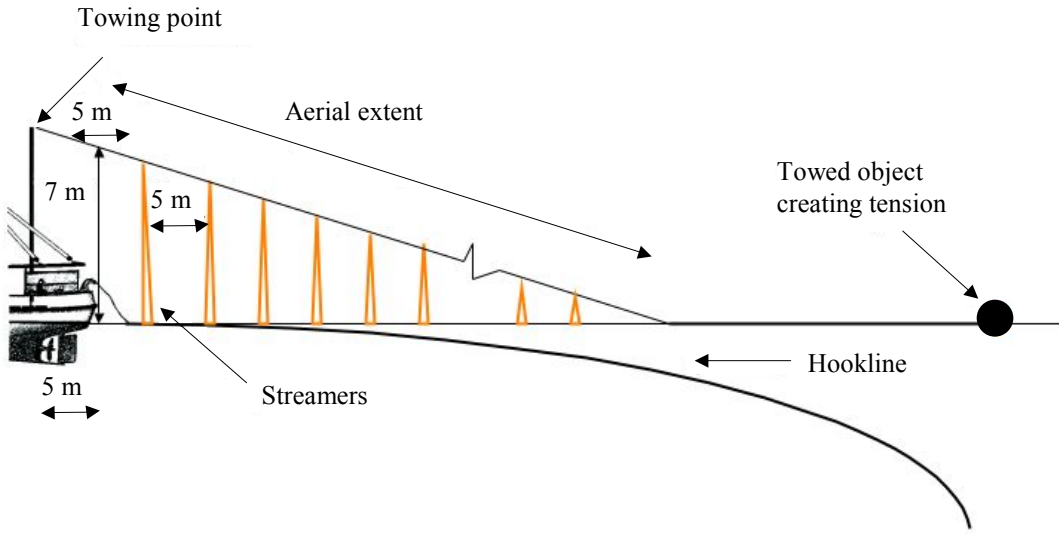
3. The streamer line shall be a minimum of 150 m in length and include an object towed at the seaward end to create tension to maximise aerial coverage. The object towed should be maintained directly behind the attachment point to the vessel such that in crosswinds the aerial extent of the streamer line is over the hookline.

4. Branched streamers, each comprising two strands of a minimum of 3 mm diameter brightly coloured plastic tubing[9] or cord, shall be attached no more than 5 m apart commencing 5 m from the point of attachment of the streamer line to the vessel and thereafter along the aerial extent of the line. Streamer length shall range between minimums of 6.5 m from the stern to 1 m for the seaward end. When a streamer line is fully deployed, the branched streamers should reach the sea surface in the absence of wind and swell. Swivels or a similar device should be placed in the streamer line in such a way as to prevent streamers being twisted around the streamer line. Each branched streamer may also have a swivel or other device at its attachment point to the streamer line to prevent fouling of individual streamers.

5. Vessels are encouraged to deploy a second streamer line such that streamer lines are towed from the point of attachment each side of the hookline. The leeward streamer line should be of similar specifications (in order to avoid entanglement the leeward streamer line may need to be shorter) and deployed from the leeward side of the hookline.

[9] Plastic tubing should be of a type that is manufactured to be protected from ultraviolet radiation.

Streamer Line



CONSERVATION MEASURE 25-03 (2003)[1]
Minimisation of the incidental mortality of seabirds and marine mammals in the course of trawl fishing in the Convention Area

Species	seabirds, marine mammals
Area	all
Season	all
Gear	trawl

The Commission,

Noting the need to reduce the incidental mortality of or injury to seabirds and marine mammals from fishing operations,

Adopts the following measures to reduce the incidental mortality of or injury to seabirds and marine mammals during trawl fishing.

1. The use of net monitor cables on vessels in the CCAMLR Convention Area is prohibited.

2. Vessels operating within the Convention Area should at all times arrange the location and level of lighting so as to minimise illumination directed out from the vessel, consistent with the safe operation of the vessel.

3. The discharge of offal shall be prohibited during the shooting and hauling of trawl gear.

4. Nets should be cleaned prior to shooting to remove items that might attract birds.

5. Vessels should adopt shooting and hauling procedures that minimise the time that the net is lying on the surface of the water with the meshes slack. Net maintenance should, to the extent possible, not be carried out with the net in the water.

6. Vessels should be encouraged to develop gear configurations that will minimise the chance of birds encountering the parts of the net to which they are most vulnerable.

RESOLUTION 21/XXIII
Electronic Catch Documentation Scheme for *Dissostichus* spp.

Species	toothfish
Area	all
Season	all
Gear	all

The Commission,

Noting the successful implementation of the trial electronic Catch Documentation Scheme for *Dissostichus* spp. (E-CDS) during the intersessional period,

Desiring to ensure that *Dissostichus* Catch Documents are handled in the most efficient and timely way,

Aware of the importance of applying the best technologies to make the functioning of the Catch Documentation Scheme for *Dissostichus* spp. (CDS) more secure against, *inter alia*, possible fraudulent activities;

Noting that, whilst paper-based *Dissostichus* Catch Documents will, for the time being, also be retained, some Contracting Parties are already converting to electronic systems,

1. Urges Contracting Parties, and non-Contracting Parties cooperating in the CDS, to adopt the E-CDS as a matter of priority.

2. Requests the Secretariat to compile information relating to, and submit a report on, the implementation of the E-CDS so that the effectiveness of the electronic scheme can be reviewed at the next meeting of the Commission.

RESOLUTION 22/XXV
International actions to reduce the incidental mortality of seabirds arising from fishing

Species	seabirds
Area	all
Season	all
Gear	all

The Commission,

Recollecting that the greatest current threats to species and populations of Southern Ocean seabirds breeding in the Convention Area are fishery-related incidental mortality and the potential impact of illegal, unreported and unregulated (IUU) fishing,

Noting the substantial reduction of incidental mortality of seabirds in the Convention Area as a result of conservation measures implemented by the Commission,

Concerned that, despite such measures, many populations of albatross and petrel species breeding in the Convention Area continue to decline and that such reductions in their populations are unsustainable,

Concerned at increasing evidence of fishery-related incidental mortality of seabirds that breed and forage in the Convention Area,

Noting that the seabirds caught are almost entirely albatross and petrel species which are threatened with global extinction,

Recognising that some populations of albatrosses and petrels will not stabilise until total incidental mortality levels are significantly reduced,

Recalling CCAMLR's collaborations with the Agreement on the Conservation of Albatrosses and Petrels (ACAP), a multilateral agreement that provides a focus for international cooperation and exchange of information and expertise towards the conservation of the declining populations of these seabirds,

Recalling repeated attempts to communicate these concerns to RFMOs,

1. Invites listed RFMOs (Appendix 1), consistent with the FAO's Code of Conduct for Responsible Fisheries and the IPOA-Seabirds, to implement or develop, as appropriate, mechanisms to require the collection, reporting and dissemination of annual data on seabird incidental mortality, particularly:

   (i) rates of incidental mortality of seabirds associated with each fishery, details of the seabird species involved, and estimates of total seabird mortality (at least at the scale of FAO area);

   (ii) measures to reduce or eliminate incidental mortality of seabirds that are in use in each fishery and the extent to which any of these are voluntary or mandatory, together with an assessment of their effectiveness;

   (iii) scientific observer programs that can provide comprehensive spatial and temporal coverage of fisheries to allow statistically robust estimation of incidental mortality associated with each fishery.

2. For high-seas areas within the range of seabirds that breed and forage in the Convention Area, where unregulated fishing takes place or where systematic data reporting has not yet been introduced by listed RFMOs, the Executive Secretary should contact Flag States which have vessels in these areas to:

   (i) express CCAMLR's interest in such seabird species,

   (ii) indicate the need to require such fishing vessels to collect and report the data specified in paragraph 1 above, and

   (iii) forward these data to the CCAMLR Secretariat to be made available to ad hoc WG-IMAF.

3. Encourages Contracting Parties to:

   (i) request that the topic of seabird incidental mortality be included on the agenda of meetings of pertinent RFMOs and, where possible and appropriate, to send relevant experts to these meetings;

   (ii) identify those areas and circumstances where incidental mortality of seabirds that breed and forage in the Convention Area occurs;

(iii) identify and continue to develop those mitigation measures which would be most effective at reducing or eliminating such mortality and to require such measures to be implemented in the relevant fisheries.

4. Encourages Contracting Parties involved with new and developing RFMOs to request that incidental mortality of seabirds is adequately addressed and mitigated. Appropriate initiatives might include:

(i) establishment or expansion of existing observer programs and adoption of appropriate data collection protocols on seabird incidental mortality;

(ii) establishment of by-catch working groups that will address incidental mortality issues and make recommendations for practicable and effective mitigation measures, including evaluation of established and innovative technologies and techniques;

(iii) evaluations of fishery impacts on the affected seabird populations;

(iv) collaborations (e.g. on data exchange) with listed RFMOs.

5. Encourages Contracting Parties to:

(i) implement, as appropriate, measures to reduce or eliminate seabird incidental mortality;

(ii) require their flagged vessels to collect and report the data specified in paragraph 1 above;

(iii) report to the CCAMLR Secretariat annually on the implementation of such measures, including their effectiveness in reducing seabird incidental mortality.

6. Requests ad hoc WG-IMAF, at its annual meeting, to collate and analyse reports relating to paragraphs 1, 2 and 5 above and advise the Commission, through the Scientific Committee, on the implementation and effectiveness of this resolution.

7. Further requests the Secretariat to bring this resolution to the attention of the RFMOs listed in Appendix 1 and seek their cooperation on its implementation.

APPENDIX 1

REGIONAL FISHERIES MANAGEMENT ORGANISATIONS IDENTIFIED FOR CONTACT WITH RESPECT TO COLLABORATIONS ON THE MITIGATION OF BY-CATCH OF SOUTHERN OCEAN SEABIRDS

Inter-American Tropical Tuna Commission (IATTC)

International Commission for the Conservation of Atlantic Tunas (ICCAT)

South East Atlantic Fisheries Organisation (SEAFO)

Indian Ocean Tuna Commission (IOTC)

Commission for the Conservation of Southern Bluefin Tuna (CCSBT)

Agreement on the Organization of the Permanent Commission on the Exploitation and Conservation of the Marine Resources of the South Pacific, 1952 (CPPS)

Southwest Indian Ocean Fisheries Commission (SWIOFC)

Commission for Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific (WCPFC)

Western Indian Ocean Tuna Organization Convention (WIOTO)
The organization does not have regulatory power.

Southern Indian Ocean Fisheries Agreement (SIOFA)

RESOLUTION 23/XXIII
Safety on board vessels fishing in the Convention Area

Species	all
Area	all
Season	all
Gear	all

The Commission,

Recognising the difficult and dangerous conditions experienced in high-latitude fisheries in the Convention Area,

Further considering the remoteness of those waters and in consequence the difficulties of search and rescue response,

Desiring to ensure that the safety of fishing crews and CCAMLR scientific observers remains a priority concern of all Members,

Urges Members to take particular measures through, *inter alia*, appropriate survival training and the provision and maintenance of appropriate equipment and clothing to promote the safety of all those on board vessels fishing in the Convention Area.

Approved 04/10/2006

Conservation Measure 05/06 on Reducing Incidental By-catch Of Seabirds In The SEAFO Convention Area

The Parties to the SEAFO Convention :

RECOGNISING the need to strengthen mechanisms to protect seabirds in the South-East Atlantic Ocean;

TAKING INTO ACCOUNT the United Nations Food and Agriculture Organisation (FAO) International Plan of Action for Reducing the Incidental Catch of Seabirds in Longline Fisheries (IPOA-Seabirds);

ACKNOWLEDGING that to date some Contracting Parties have identified the need for, and have either completed or are near finalising, their National Plan of Action on Seabirds;

RECOGNISING the concern that some species of seabirds, notably albatross and petrels, are threatened with global extinction;

NOTING that the Agreement on the Conservation of Albatrosses and Petrels, done at Canberra on 19 June 2001, has entered into force;

Have agreed as follows :

1. The Commission shall, within a year, develop effective mechanisms to enable Contracting Parties to record and exchange data on seabird interactions, including regular reporting to the Commission, and seek agreement to implement all mechanisms as soon as possible thereafter.

2. Contracting Parties shall collect and provide all available information to the Secretariat on interactions with seabirds, including incidental catches by fishing vessels, fishing for species covered by the SEAFO Convention, flagged to these Contracting Parties.

3. Each Contracting Party shall seek to achieve reductions in levels of seabird by-catch across all fishing areas, seasons, and fisheries through the use of effective mitigation measures.

4. All longline vessels fishing south of the parallel of latitude 30 degrees South shall carry and use bird-scaring lines (tori poles):

• Tori poles shall be in accordance with agreed tori pole design and deployment guidelines (provided for in Appendix A);

• Tori poles shall be deployed prior to longlines entering the water at all times south of the parallel of latitude 30 degrees South;

• Where practical, vessels shall be encouraged to use a second tori pole and bird-scaring line at times of high bird abundance or activity;

• Back-up tori lines shall be carried by all vessels and be ready for immediate use.

5. The Commission shall, upon receipt of information from the Scientific Committee, consider, and if necessary, refine, the area of application of the mitigation measures specified in paragraph 4.

6. Longlines shall be set at night only (i.e. during the hours of darkness between the times of nautical twilight[1]). During longline fishing at night, only the minimum ship's lights necessary for safety shall be used.

7. The dumping of offal is prohibited while gear is being shot or set. The dumping of offal during the hauling of gear shall be avoided. Any such discharge shall take place, where possible, on the opposite side of the vessel to that where the gear is being hauled. For vessels or fisheries where there is not a requirement to retain offal on board the vessel, a system shall be implemented to remove fish hooks from offal and fish heads prior to discharge. Nets shall be cleaned prior to shooting to remove items that might attract seabirds.

8. Vessels shall adopt shooting and hauling procedures that minimise the time that the net is lying on the surface with the meshes slack. Net maintenance shall, to the extent possible, not be carried out with the net in the water.

9. Each Contracting Party shall encourage their vessels to develop gear configurations that will minimise the chance of birds encountering the part of the net to which they are most vulnerable. This could include increasing the weighting or decreasing the buoyancy of the net so that it sinks faster, or placing coloured streamer or other devices over particular areas of the net where the mesh sizes create a particular danger to birds.

10. Contracting Party shall not authorise vessels to fish in the Convention Area which are so configured that they lack on-board processing facilities or adequate capacity to retain offal on-board, or the ability to discharge offal on the opposite side of the vessel to that where gear is being hauled.

[1] The exact times of nautical twilight are set forth in the Nautical Almanac tables for the relevant latitude, local time and date. All times, whether for ship operations or observer reporting, shall be referenced to GMT.

11. Every effort shall be made to ensure that birds captured alive during fishing operations are released alive and that whenever possible hooks are removed without jeopardising the life of the bird concerned.

12. The Commission shall review this measure at its 2009 Annual Meeting and shall consider adopting additional measures for the mitigation of any incidental catch of seabirds (including those applied and tested by the Commission for the Conservation of Antarctic Marine Living Resources).

Appendix A

Suggested guidelines for Design and Deployment of Tori Lines

Preamble

These guidelines are designed to assist in the preparation and implementation of tori line regulations for longline fishing vessels. While these guidelines are relatively explicit, improvement in tori line effectiveness through experimentation is encouraged. The guidelines take into account environmental and operational variables such as weather conditions, setting speed and ship size, all of which influence tori line performance and design in protecting baits from birds. Tori line design and use may change to take account of these variables provided that line performance is not compromised. Ongoing improvement in tori line design is envisaged and consequently review of these guidelines should be undertaken in the future.

Tori Line Design

1. It is recommended that a tori line 150 m in length be used. The diameter of the section of the line in the water may be greater than that of the line above water. This increases drag and hence reduces the need for greater line length and takes account of setting speeds and length of time taken for baits to sink. The section above water should be a string fine line (e;g. about 3 mm diameter) of a conspicuous colour such as red or orange.

2. The above water section of the line should be sufficiently light that its movement is unpredictable to avoid habituation by birds and sufficiently heavy to avoid deflection of the line by wind.

3. The line is best attached to the vessel with a robust barrel swivel to reduce tangling of the line.

4. The streamers should be made of material that is conspicuous and produces an unpredictable lively action (e.g. strong fine line sheathed in red polyurethane tubing) suspended from a robust three-way swivel (that again reduces tangles) attached to the tori line, and should hang just clear of the water.

5. There should be a maximum of 5-7 m between each streamer. Ideally each streamer should be paired.

6. Each streamer pair should be detachable by means of a clip so that line stowage is more efficient.

7. The number of streamers should be adjusted for the setting speed of the vessel, with more streamers necessary at slower setting speeds. Three pairs are appropriate for a setting speed of 10 knots.

Deployment of Tori Lines

1. The line should be suspended from a pole affixed to the vessel. The tori pole should be set as high as possible so that the line protects bait a good distance astern of the vessel and will not tangle with the fishing gear. Grater pole height provides greater bait protection. For example, a height of around 6 m above the water line can give about 100 m of bait protection.

2. The tori line should be set so that streamers pass over baited hooks in the water.

3. Deployment of multiple tori lines is encouraged to provide even greater protections of baits from birds.

4. Because there is the potential for line breakage and tangling, spare tori lines should be carried on board to replace damaged lines and to ensure fishing operations can continue uninterrupted.

5. When fishers use a bait casting machine (BCM) they must ensure co-ordination of the tori line and machine by:

    a) ensuring the BCM throws directly under the tori line protection and

    b) when using a BCM that allows throwing to port and starboard, ensure that two tori lines are used.

6. Fishers are encouraged to install manual, electric of hydraulic winches to improve ease of deployment and retrieval of tori lines.

07-07 **BYC**

RECOMMENDATION BY ICCAT ON REDUCING INCIDENTAL BY-CATCH OF SEABIRDS IN LONGLINE FISHERIES

RECOGNISING the need to strengthen mechanisms to protect seabirds in the Atlantic Ocean;

TAKING INTO ACCOUNT the United Nations Food and Agriculture Organisation (FAO) International Plan of Action for Reducing the Incidental Catch of Seabirds in Longline Fisheries (IPOA-Seabirds), and the IOTC Working Party on By-catch objectives;

ACKNOWLEDGING that to date some Contracting Parties and Cooperating non-Contracting Parties, Entities, or Fishing Entities (hereinafter referred to as "CPCs") have identified the need for, and have either completed or are near finalised, their National Plan of Action on Seabirds;

RECOGNISING the concern that some species of seabirds, notably albatross and petrels, are threatened with extinction;

NOTING that the Agreement on the Conservation of Albatrosses and Petrels, has entered into force;

RECALLING the *Resolution by ICCAT on Incidental Mortality of Seabirds [Res. 02-14]*;

CONSCIOUS that there are on-going scientific studies which may result in the identification of more effective mitigation measures and therefore that these current measures should be considered provisional;

THE INTERNATIONAL COMMISSION FOR THE CONSERVATION OF ATLANTIC TUNAS (ICCAT) RECOMMENDS THAT:

1. The Commission shall develop mechanisms to enable CPCs to record data on seabird interactions, including regular reporting to the Commission, and seek agreement to implement such mechanisms as soon as possible thereafter.

2. CPCs shall collect and provide all available information to the Secretariat on interactions with seabirds, including incidental catches by their fishing vessels.

3. CPCs shall seek to achieve reductions in levels of seabird by-catch across all fishing areas, seasons and fisheries, through the use of effective mitigation measures.

4. All vessels fishing south of 20°S shall carry and use bird-scaring lines (tori poles):
   - Tori poles shall be used in consideration of the suggested tori pole design and deployment guidelines (provided for in **Annex 1**);
   - Tori lines are to be deployed prior to longlines entering the water at all times south of 20°S;
   - Where practical, vessels are encouraged to use a second tori pole and bird-scaring line at times of high bird abundance or activity;
   - Back-up tori lines shall be carried by all vessels and be ready for immediate use.

5. Longline vessels targeting swordfish using monofilament longline gear may be exempted from the requirements of paragraph 4 of this Recommendation, on condition that these vessels set their longlines during the night, with night being defined as the period between nautical dusk/dawn as referenced in the nautical dusk/dawn almanac for the geographical position fished. In addition, these vessels are required to use a minimum swivel weight of 60g placed not more than 3m from the hook to achieve optimum sink rates.

CPCs applying this derogation shall inform the SCRS of their scientific findings resulting from their observer coverage of these vessels.

6. The Commission shall, upon receipt of information from the SCRS, consider, and if necessary, refine, the area of application of the mitigation measures specified in paragraph 4.

7. This measure is a provisional measure which will be subject to review and adjustment in the light of future available scientific advice.

8. The Commission shall consider adopting additional measures for the mitigation of any incidental catch of seabirds at its annual meeting in 2008 based on the results of the ICCAT seabird assessment which is currently underway.

Annex 1

Suggested Guidelines for Design and Deployment of Tori Lines

Preamble

These guidelines are designed to assist in preparation and implementation of tori line regulations for longline vessels. While these guidelines are relatively explicit, improvement in tori line effectiveness through experimentation is encouraged. The guidelines take into account environmental and operational variables such as weather conditions, setting speed and ship size, all of which influence tori line performance and design in protecting baits from birds. Tori line design and use may change to take account of these variables provided that line performance is not compromised. On-going improvement in tori line design is envisaged and consequently review of these guidelines should be undertaken in the future.

Tori line design

1. It is recommended that a tori line 150 m in length be used. The diameter of the section of the line in the water may be greater than that of the line above water. This increases drag and hence reduces the need for greater line length and takes account of setting speeds and length of time taken for baits to sink. The section above water should be a strong fine line (e.g. about 3 mm diameter) of a conspicuous colour such as red or orange.

2. The above water section of the line should be sufficiently light that its movement is unpredictable to avoid habituation by birds and sufficiently heavy to avoid deflection of the line by wind.

3. The line is best attached to the vessel with a robust barrel swivel to reduce tangling of the line.

4. The streamers should be made of material that is conspicuous and produces an unpredictable lively action (e.g. strong fine line sheathed in red polyurethane tubing) suspended from a robust three-way swivel (that again reduces tangles) attached to the tori line, and should hang just clear of the water.

5. There should be a maximum of 5-7 m between each streamer. Ideally each streamer should be paired.

6. Each streamer pair should be detachable by means of a clip so that line stowage is more efficient.

7. The number of streamers should be adjusted for the setting speed of the vessel, with more streamers necessary at slower setting speeds. Three pairs are appropriate for a setting speed of 10 knots.

Deployment of tori lines

1. The line should be suspended from a pole affixed to the vessel. The tori pole should be set as high as possible so that the line protects bait a good distance astern of the vessel and will not tangle with fishing gear. Greater pole height provides greater bait protection. For example, a height of around 6 m above the water line can give about 100 m of bait protection.

2. The tori line should be set so that streamers pass over baited hooks in the water.

3. Deployment of multiple tori lines is encouraged to provide even greater protection of baits from birds.

4. Because there is the potential for line breakage and tangling, spare tori lines should be carried onboard to replace damaged lines and to ensure fishing operations can continue uninterrupted.

5. When fishers use a bait casting machine (BCM), they must ensure coordination of tori line and machine by:
   (i) ensuring the BCM throws directly under the tori line protection, and
   (ii) when using a BCM that allows throwing to port and starboard, ensure that two tori lines are used.

6. Fishers are encouraged to install manual, electric or hydraulic winches to improve ease of deployment and retrieval of tori lines.

RESOLUTION 08/03
ON REDUCING THE INCIDENTAL BYCATCH OF SEABIRDS IN LONGLINE FISHERIES

The Indian Ocean Tuna Commission (IOTC),

RECALLING *Resolution 06/04 On reducing Incidental Bycatch of Seabirds in longline fisheries*, and in particular, its paragraph 7*:*

RECOGNISING the need to strengthen mechanisms to protect seabirds in the Indian Ocean;

TAKING INTO ACCOUNT the United Nations Food and Agriculture Organization (FAO) International Plan of Action for Reducing the Incidental Catch of Seabirds in Longline Fisheries (IPOA-Seabirds);

NOTING the recommendations of the IOTC Working Party on Ecosystems and Bycatch (WPEB) on measures to mitigate seabird interactions as outlined in their 2007 Report;

ACKNOWLEDGING that to date some Contracting Parties and Cooperating non-Contracting Parties (hereinafter referred to as "CPCs") have identified the need for, and have either completed or are near finalizing, their National Plan of Action on Seabirds;

RECOGNISING the concern that some species of seabirds, notably albatross and petrels, are threatened with global extinction;

NOTING that the Agreement on the Conservation of Albatrosses and Petrels, which opened for signatures at Canberra on 19 June 2001, has entered into force;

NOTING that the ultimate aim of the IOTC and the CPCs is to achieve a zero bycatch of seabirds for fisheries under the purview of the IOTC, especially threatened albatrosses and petrel species in longline fisheries;

ADOPTS in accordance with paragraph 1 of Article IX of the IOTC Agreement, that:

1. CPCs shall seek to achieve reductions in levels of seabird bycatch across all fishing areas, seasons, and fisheries through the use of effective mitigation measures.
2. Fishing operations shall be conducted in such a way that hooklines[8] sink beyond the reach of seabirds as soon as possible after they are put in the water.
3. CPCs shall ensure that all longline vessels fishing south of 30°S use at least two of the mitigation measures in Table 1 below, including at least one from Column A. Vessels shall not use the same measure from Column A and Column B.
4. In all other areas, CPCs may require that longline vessels use at least one of the measures in Table 1.
5. Mitigation measures used shall conform to the minimum technical standards for the measures as shown in Annex 1.
6. The design and deployment for bird scaring lines shall meet the specifications provided in Annex 2.
7. CPCs shall provide to the Commission, as part of their annual reports, information on how they are implementing this measure and all available information on interactions with seabirds, including bycatch by fishing vessels carrying their flag or authorised to fish by them. This is to including details of species where available to enable the Scientific Committee to annually estimate seabird mortality in all fisheries within the IOTC area of competence.

[8] Hookline is defined as the groundline or mainline to which the baited hooks are attached by snoods.

Table 1: Seabird mitigation measures

Column A	**Column B**
Night setting with minimum deck lighting	Night setting with minimum deck lighting
Bird-scaring lines (Tori Lines)	Bird-scaring lines (Tori Lines)
Weighted branch lines	Weighted branch lines
	Blue-dyed squid bait
	Offal discharge control
	Line shooting device

8. The Scientific Committee, based notably on the work of the WPEB and information from CPCs, will analyse the impact of this Resolution on seabird bycatch no later than for the 2011 meeting of the Commission. It shall advise the Commission on any modifications that are required, based on experience to date of the operation of the Resolution and/or further international studies or research on the issue, in order to make the Resolution more effective.
9. *Resolution 06/04. On Reducing Incidental Bycatch of Seabirds in Longline Fisheries* is superseded by this Resolution.

ANNEX I

Mitigation Measure	**Description**	**Specification**
Night setting with minimum deck lighting	No setting between nautical dawn and before nautical dusk. Deck lighting to be kept to a minimum	Nautical dusk and nautical dawn are defined as set out in the Nautical Almanac tables for relevant latitude, local time and date. Minimum deck lighting should not breach minimum standards for safety and navigation.
Bird-scaring lines (tori lines)	A bird-scaring line shall be deployed during longline setting to deter birds from approaching the branch line.	Design and deployment for bird-scaring lines are provided in Annex 2 of this Resolution.
Weighted branch lines	Weights must be attached to all branch lines in accordance with specifications provided	– minimum of 45 grams weight attached to all branch lines; – less than 60 grams weight must be within 1 metre of the hook; – 60 grams or greater and less than 98 grams must be within 3. 5 metres of the hook; and – 98 grams or greater must be within 4 metres of the hook
Blue-dyed squid bait	All bait must be dyed to the colour and shade shown in the placard provided by the IOTC Secretariat.	The standardized colour shall be equivalent to bait dyed using "Brilliant Blue" food dye (Colour Index 42090, also known as Food Additive Number E133) mixed at 0.5% for a minimum of 20 minutes.
Management of offal discharge	No offal discharge during setting. Strategic offal discharge may occur during hauling.	No offal discharge during setting. Offal discharge during hauling should be avoided if possible. If offal discharge is essential during hauling, it must be from the opposite side of the boat to hauling activity.
Line-setter or line-shooter	Permits a mainline to be set slack (no tension astern)	Position line-setter as close to the water line as feasible. Ensure mainline is pulled at a constant speed and slightly faster than the speed of vessel during line-setting, to ensure lines are set slack to aid sinking rate. Avoid setting into propwash.

ANNEX II

DESIGN AND DEPLOYMENT OF BIRD SCARING LINES (TORI LINES)

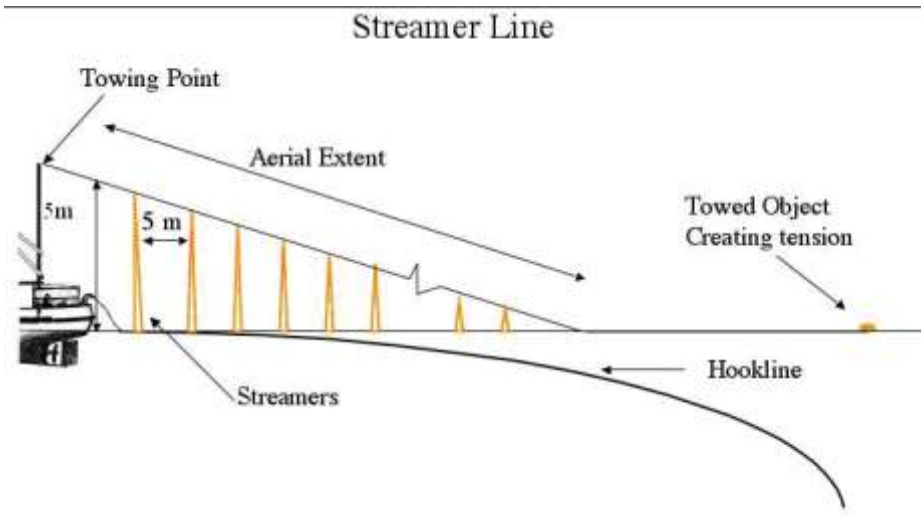
Bird-Scaring Line Design

1. The bird-scaring line shall be a minimum of 100 m in length and if less than 150 m in length will include an object towed at the seaward end to create tension to maximise aerial coverage. The section above water shall be a strong fine line of a conspicuous colour such as red or orange.
2. The above water section of the line shall be sufficiently light that its movement is unpredictable to avoid habituation by birds and sufficiently heavy to avoid deflection of the line by wind.
3. Streamers for the bird-scaring line shall be made of material that is conspicuous and produces an unpredictable lively action (e.g. strong fine line sheathed in red polyurethane tubing) and shall be suspended in pairs from a robust three-way swivel attached to the bird scaring line and shall hang just clear of the water.
4. There shall be a maximum of 5 m between each streamer pair.
5. The number of streamers shall be adjusted for the setting speed of the vessel, with more streamers necessary at slower setting speeds.

Deployment of Bird scaring Lines

1. The line shall be deployed before longlines enter into the water.
2. The line should have an aerial coverage of at least 100 metres. To achieve this coverage the line shall be suspended from a point a minimum of 5 metres above the water at the stern on the windward side of the point where the branch line enters the water.
3. The bird scaring line shall be set so that streamers pass over baited hooks in the water. The position of the object towed shall be maintained so as to ensure, even during crosswinds, that the aerial extent of the bird-scaring line is over the branch line as far astern of the vessel as possible.
4. Because there is the potential for line breakage and tangling, spare bird scaring lines shall be carried onboard to replace damaged lines and to ensure fishing operations can continue uninterrupted.

Figure 1. Diagram of Bird-scaring Streamer Line.



Commission for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean

Fourth Regular Session

Tumon, Guam, USA
2–7 December 2007

CHAIR'S CONSOLIDATED TEXT TO INCORPORATE TECHNICAL SPECIFICATIONS INTO CMM-2006-02

CMM-2007-04

WCPFC-2007/24 (Rev.2)
6 December 2007

Conservation and Management Measure 2006-02 (revised)

The Commission for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean

Concerned that some seabird species, notably albatrosses and petrels, are threatened with global extinction.

Noting advice from the Commission for the Conservation of Antarctic Marine Living Resources that together with illegal, unreported and unregulated fishing, the greatest threat to Southern Ocean seabirds is mortality in longline fisheries in waters adjacent to its Convention Area.

Noting scientific research into mitigation of seabird bycatch in surface longline fisheries has showed that the effectiveness of various measures varies greatly depending on the vessel type, season, and seabird species assemblage present.

Noting the advice of the Scientific Committee that combinations of mitigation measures are essential for effective reduction of seabird bycatch.

Resolves as follows:

1. Commission Members, Cooperating Non-members and participating Territories (CCMs) shall, to the extent possible, implement the International Plan of Action for Reducing Incidental Catches of Seabirds in Longline Fisheries (IPOA-Seabirds) if they have not already done so.

2. CCMs shall report to the Commission on their implementation of the IPOA-Seabirds, including, as appropriate, the status of their National Plans of Action for Reducing Incidental Catches of Seabirds in Longline Fisheries.

Adopts, in accordance with Article 5 (e) and 10(i)(c) of the Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean the Commission the following measure to address seabird bycatch:

1. CCMs shall require their longline vessels to use at least two of the mitigation measures in Table 1, including at least one from Column A in areas south of 30 degrees South and north of 23 degrees North.

Table 1: Mitigation measures

Column A	*Column B*
Side setting with a bird curtain and weighted branch lines[1]	*Tori line*[2]
Night setting with minimum deck lighting	*Weighted branch lines*
Tori line	*Blue-dyed bait*
Weighted branch lines	*Deep setting line shooter*
	Underwater setting chute
	Management of offal discharge

2. In other areas, where necessary, CCMs are encouraged to employ one or more of the seabird mitigation measures listed in Table 1.

3. Minimum technical specifications for measures in Table 1 are provided in Annex 1.

4. For research and reporting purposes, each CCM with longline vessels that fish in the Convention Area south of 30°S or north of 23°N shall submit to the Commission in part 2 of its annual report for 2007 (due in 2008) information describing which of the mitigation measures in Table 1 they require or will require their vessels to use, as well as the technical specifications for each of those mitigation measures. Each such CCM shall also include in its annual reports for subsequent years any changes it has made to its required mitigation measures or technical specifications for those measures.

5. CCMs are encouraged to undertake research to further develop and refine measures to mitigate seabird bycatch including mitigation measures for use during the hauling process and should submit to the Secretariat for the use by the SC and the TCC any information derived from such efforts. Research should be undertaken in the fisheries and areas to which the measure will be used.

6. The SC and TCC will annually review any new information on new or existing mitigation measures or on seabird interactions from observer or other monitoring programmes. Where necessary, an updated suite of mitigation measures, specifications for mitigation measures, or recommendations for areas of application will then be provided to the Commission for its consideration and review as appropriate.

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[1] This measure can only be applied in the area north of 23 degrees north until research establishes the utility of this measure in waters south of 30 degrees south. If using side setting with a bird curtain and weighted branch lines from column A this will be counted as two mitigation measures.

[2] If tori line is selected from both Column A and Column B this equates to simultaneously using two (i.e. paired) tori lines.

7. CCMs are encouraged to adopt measures aimed at ensuring that seabirds captured alive during longlining are released alive and in as good condition as possible and that wherever possible hooks are removed without jeopardizing the life of the seabird concerned.

8. The intersessional working group for the regional observer programme (IWG-ROP) will take into account the need to obtain detailed information on seabird interactions to allow analysis of the effects of fisheries on seabirds and evaluation of the effectiveness of by-catch mitigation measures.

9. CCMs shall annually provide to the Commission, in part 1 of their annual reports, all available information on interactions with seabirds, including bycatches and details of species, to enable the Scientific Committee to estimate seabird mortality in all fisheries to which the WCPF Convention applies.

10. Paragraph 1 of this Conservation and Management Measure shall be implemented by CCMs in the following manner:

- In areas south of 30 degrees South, no later than 1 January 2008 in relation to large-scale longline vessels of 24 meters or more in overall length, and no later than 31 January 2009 in relation to smaller longline vessels of less than 24 meters in overall length.

- In areas north of 23 degrees North, and in relation to large-scale longline vessels of 24 meters or more in overall length, no later than 30 June 2008.

11. CCMs shall as of 1 January 2007 initiate a process to ensure that vessels flying their flag will be able to comply with the provisions of para 1 within the deadlines referred to in para 10.

12. This Conservation and Management measure replaces Resolution 2005-01, which is hereby repealed.

Attachment O, Annex 1

As the methods below have not all been given due consideration by the SC and TCC all are subject to review and are considered to be provisional. Recognizing that the SC and the TCC will annually review any new information on new or existing mitigation measures or on seabird interactions that indicate their effectiveness in reducing seabird bycatch for that measure, CCMs with longline vessels that fish in the Convention Area shall submit to the Commission detailed information describing the minimum technical specifications being used in fulfillment of this measure as well as any data resulting from research undertaken and/or monitoring measures to further develop and refine measures to mitigate seabird bycatch.

Specifications for Column A mitigation measures

1a) Tori Lines

i. Minimum length: 100 m
ii. Must be attached to the vessel such that it is suspended from a point a minimum of 5 m above the water at the stern on the windward side of the point where the hookline enters the water.
iii. Must be attached so that the aerial extent is maintained over the sinking baited hooks.
iv. Streamers must be less than 5m apart, be using swivels and long enough so that they are as close to the water as possible.
v. If the tori line is less than 150 m in length, must have a towed object attached to the end so that the aerial extent is maintained over the sinking baited hooks.
vi. If two (i.e. paired) tori lines are used, the two lines must be deployed on opposing sides of the main line.

1b) Tori Line (light streamer)

i. Minimum length of tori line: 100 m or three times the total length of the vessel.
ii. Must be attached to the vessel such that it is suspended from a point a minimum of 5 m above the water at the stern on the windward side of a point where the hookline enters the water.
iii. Must be attached so that the aerial extent is maintained over the sinking baited hooks.
iv. Streamers must be less than 1m apart and be 30 cm in minimum length.
v. If two (i.e. paired) tori lines are used, the two lines must be deployed on opposing sides of the main line.

2. Side setting with bird curtain and weighted branch lines

i. Mainline deployed from port or starboard side as far from stern as practicable (at least 1 m), and if mainline shooter is used, must be mounted at least 1m forward of the stern.
ii. When seabirds are present the gear must ensure mainline is deployed slack so that baited hooks remain submerged.
iii. Bird curtain must be employed:
    - Pole aft of line shooter at least 3 m long;
    - Minimum of 3 main streamers attached to upper 2 m of pole;
    - Main streamer diameter minimum 20 mm;
    - Branch streamers attached to end of each main streamer long enough to drag on water (no wind) – minimum diameter 10 mm.

3. Night setting

i. No setting between local sunrise and one hour after local sunset.
ii. Deck lighting to be kept to a minimum, noting requirements for safety and navigation.

4. Weighted branch lines

i. Following minimum weight specifications are required:
ii. Minimum weights attached to all branch lines is 45 g, with the following options:
- less than 60 g weight attached to within 1 m of the hook or;
- greater than 60 g and less than 98 g weight attached to within 3.5 ms of the hook or;
- greater than 98 g weight attached to within 4 m of the hook.

Specifications for Column B mitigation measures

1. Weighted branch lines

i. Following minimum weight specifications are required:
ii. Minimum weights attached to all branch lines is 45 g, with the following options:
- less than 60 g weight attached to within 1 m of the hook; or
- greater than 60 g and less than 98 g weight attached to within 3.5 m of the hook; or
- greater than 98 g weight attached to within 4 m of the hook.

2. Blue dyed bait

i. The Commission Secretariat shall distribute a standardized color placard.
ii. All bait must be dyed to the shade shown in the placard.

3. Management of offal discharge

i. Either:
- No offal discharge during setting or hauling; or
- Strategic offal discharge from the opposite side of the boat to setting/hauling to actively encourage birds away from baited hooks.

Attachment 6

Guidelines for Design and Deployment of Tori Lines

Preamble

These guidelines are designed to assist in preparation and implemention of tori line regulations for long-line vessels.

While these guidelines are relatively explicit, they are not intended to inhibit improvement in tori line effectiveness through experimentation. The guidelines have taken into account environmental and operational variables such as weather conditions, setting speed and ship size, all of which influence tori line performance and design in protecting baits from birds. Tori line design and use may change to take account of these variables provided that line performance is not compromised. The working group envisages ongoing improvement in tori line design and consequently review of these guidelines should be undertaken in the future.

Tori Line Design

1. It is recommended that a tori line 150 m in length be used. The diameter of the section of the line in the water may be greater than that of the line above water. This increases drag and hence reduces the need for greater line length and takes account of setting speeds and length of time taken for baits to sink. The section above water should be a strong fine line (e.g. about 3 mm diameter) of a conspicuous colour such as red or orange.
2. The above water section of the line should be sufficiently light that its movement is unpredictable to avoid habituation by birds and sufficiently heavy to avoid deflection of the line by wind.
3. The line is best attached to the vessel with a robust barrel swivel to reduce tangling of the line.
4. The streamers should be made of material that is conspicuous and produces an unpredictable lively action (e.g. strong fine line sheathed in red polyurethane tubing) suspended from a robust three-way swivel (that again reduces tangles) attached to the tori line, and should hang just clear of the water.
5. There should be a maximum of 5-7 m between each streamer. Ideally each streamer should be paired.
6. Each streamer pair should be detachable by means of a clip so that line stowage is more efficient.
7. The number of streamers should be adjusted for the setting speed of the vessel, with more streamers necessary at slower setting speeds. Three pairs are appropriate for a setting speed of 10 knots.

Deployment of Tori Lines

1. The line should be suspended from a pole affixed to the vessel. The tori pole should be set as high as possible so that the line protects bait a good distance astern of the

vessel and won't tangle with fishing gear. Greater pole height provides greater bait protection. For example, a height of around 6 m above the water line can give about 100 m of bait protection.

2. The tori line should be set so that streamers pass over baited hooks in the water.
3. Deployment of multiple tori lines is encouraged to provide even greater protection of baits from birds.
4. Because there is the potential for line breakage and tangling, spare tori lines should be carried onboard to replace damaged lines and to ensure fishing operations can continue uninterrupted.
5. When fishers use a bait casting machine (BCM) they must ensure coordination of tori line and machine by:
    a) ensuring the BCM throws directly under the tori line protection and
    b) when using a BCM that allows throwing to port and starboard, ensure that two tori lines are used.
6. Fishers are encouraged to install manual, electric or hydraulic winches to improve ease of deployment and retrieval of tori lines.

A standard design is detailed in various educational material available to fishers eg. Longline fishing dollars and sense, Catch fish not birds, and Fish the seas not the sky.