

 <p>Agreement on the Conservation of Albatrosses and Petrels</p>	<p>Seventh Meeting of the Seabird Bycatch Working Group</p> <p><i>La Serena, Chile, 2 - 4 May 2016</i></p> <p>Recommended revisions to the presentation of information in the ACAP review and best practice documents relating to bycatch mitigation</p> <p><i>Anton Wolfaardt, Marco Favero, Jonathon Barrington, Wiesława Misiak, Warren Papworth, Ken Morgan</i></p>
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SUMMARY

Prior to SBWG6, an intersessional review of ACAP's technical review and best practice (summary) advice documents on bycatch mitigation for longline and trawl fisheries highlighted a number of areas in which the presentation of the information could be improved. These included consistency of format, terminology between documents, and ensuring references are correct and up-to-date. Following discussion at SBWG6, it was agreed that a revised version of the review and best practice advice documents should be prepared using pelagic longline fisheries as a pilot, and, following feedback from the SBWG, these changes should be extended to the other gear types. We present an updated version of the review and best practice advice documents for pelagic longline fisheries, for consideration by the SBWG.

RECOMMENDATIONS

1. That SBWG reviews the revised bycatch mitigation documents for pelagic longline fisheries.
2. Subject to the feedback received, that SBWG endorses adoption of a revised format of the review and best practice advice documents on bycatch mitigation for all gear types.

Revisiones recomendadas de la presentación de información en los documentos de revisión y mejores prácticas del ACAP relativos a la mitigación de captura secundaria

RESUMEN

Durante el período entre sesiones, antes de la reunión de GdTCS6, se analizaron documentos de revisión técnica y recomendaciones (resumidas) de mejores prácticas de mitigación de la captura secundaria en pesquerías de palangre y arrastre, y se identificaron algunos aspectos para mejorar a la hora de presentar información. Estos aspectos incluían asegurar la uniformidad de formato y terminología entre documentos y garantizar la precisión y actualización de las referencias. Después de las deliberaciones mantenidas en la reunión del GdTCS6, se convino en que se debía preparar una versión revisada de los documentos de revisión y recomendaciones de mejores prácticas partiendo de las pesquerías de palangre pelágico a modo de estudio piloto, y que, tras recibir los comentarios del GdTCS, se deberían aplicar dichas modificaciones a los otros artes de pesca. Presentamos una versión actualizada de los documentos de revisión y recomendaciones de mejores prácticas en las pesquerías de palangre pelágico para la consideración del GdTCS.

RECOMENDACIONES

1. Que el GdTCS examine los documentos revisados de mitigación de captura secundaria para las pesquerías de palangre pelágico.
2. Que, en función de los comentarios recibidos, el GdTCS avale la aprobación de un formato revisado de los documentos de revisión técnica y recomendaciones de mejores prácticas de mitigación de la captura secundaria aplicable a distintos tipos de artes de pesca.

Révisions recommandées pour la présentation des informations dans les documents relatifs à l'examen et aux bonnes pratiques de l'ACAP concernant l'atténuation de la capture accessoire des oiseaux marins

RÉSUMÉ

Préalablement au GTCA6, un examen intersession des documents présentant les avis en matière d'examen technique et de bonnes pratiques de l'ACAP (résumé) relatives à l'atténuation de la capture accessoire pour les pêches à la palangre et au chalut mettait en évidence un certain nombre de points pour lesquels les informations pouvaient être mieux présentées. Parmi ces points figurent notamment l'uniformité du format, la terminologie entre les documents, et la garantie de l'exactitude et de l'actualisation des références. À la suite de la discussion du GTCA6, il a été décidé qu'une version révisée des documents présentant les avis en matière d'examen et de bonnes pratiques devrait être préparée en utilisant la pêche pélagique à la palangre comme modèle. En fonction des retours et observations du GTCA, ces changements pourraient être appliqués à d'autres types d'engins. Nous présentons une version actualisée des documents présentant les avis en matière d'examen et de bonnes pratiques pour la pêche pélagique à la palangre pour examen par le GTCA.

RECOMMANDATIONS

1. Que le GTCA examine les documents révisés relatifs à l'atténuation de la capture accessoire pour la pêche pélagique à la palangre.
2. En fonction des commentaires reçus, que le GTCA encourage l'adoption d'un format révisé pour les documents présentant les avis en matière d'examen et de bonnes pratiques concernant l'atténuation de la capture accessoire pour tous les types d'engins.

1. BACKGROUND

At each of its meetings, the ACAP Seabird Bycatch Working Group (SBWG) reviews research relating to seabird bycatch mitigation, and the formal outputs of this review process – the review and ACAP summary advice on seabird bycatch mitigation – are updated accordingly. The updated review and summary advice documents are made available on the ACAP website as a resource for scientists, managers and decision makers from Parties and other relevant organisations, such as Regional Fisheries Management Organisations. The main objective of these documents is to present a comprehensive scientific assessment of the efficacy of seabird bycatch mitigation measures that have been proposed, used or tested, and on the basis of this assessment, to articulate clearly ACAP's advice on best practice bycatch mitigation. Due to time constraints within the meetings, the review and updating process has generally involved adding or editing relevant sections of the documents, rather than reviewing in detail the entire documents.

Prior to SBWG6, an intersessional review of ACAP's review and best practice advice documents highlighted a number of areas in which the presentation of information could be improved. These included consistency of format and terminology between documents, and ensuring references are correct and up-to-date. Following discussion at SBWG6, it was agreed that a revised version of the review and best practice advice documents should be prepared using pelagic longline fisheries as a pilot, and, following feedback from the SBWG, to extend the revised format to other gear types.

2. REVISED FORMAT OF REVIEW AND BEST PRACTICE SUMMARY ADVICE DOCUMENTS FOR SEABIRD BYCATCH MITIGATION IN PELAGIC LONGLINE FISHERIES

A revised version of the review and best practice advice documents for pelagic longline fisheries is included in Annex 1. The main guiding principles for the revision of these documents were: clear, efficient and consistent presentation of information, ensuring that references are correct and up to date, better definition of some terminology, the use of illustrations where possible and the inclusion of a category catering for measures that show potential, but which are still under development. The review process was restricted to the format and presentation of the review and best practice advice documents, and did not include issues of substance relating to our reviews and advice.

2.1. Summary of the main changes

2.1.1. Combining the review and best practice advice documents

In some previous versions, the review and best practice summary advice documents were treated as separate entities. In order to facilitate a more explicit and seamless link between ACAP's review of mitigation measures and its best practice advice (which is underpinned by the former), the revised version has combined these two components into a single document.

2.1.2. Links to mitigation fact sheets

Rather than inserting illustrations into the ACAP review document, we have inserted hyperlinks to the relevant BirdLife/ACAP Bycatch Mitigation Fact Sheets.

2.1.3. Outline of the ACAP review process and criteria used to assess the effectiveness of seabird bycatch mitigation measures

In order to facilitate a greater understanding of the ACAP review process and the development of best practice advice, an outline of the review process and the criteria that are used in the assessment framework has been inserted at beginning of the review section of the document.

2.1.4. Improving practices

The revised document reflects more clearly the category of 'Improving Practices', which may in time, and with further research and evidence, be recommended as 'Best Practice'.

2.1.5. Clearer definitions of terminology

In the revised document, we have sought to clarify any terminology that was considered to be unclear or ambiguous. The intersessional drafting group considered the possibility of developing a glossary of terminology, or linking to other glossaries that may exist or are under development. Any links to external web-sites would need to be considered carefully to ensure that the information does not conflict with, or confuse, the ACAP best practice advice.

2.2. Issues for discussion

In addition to the revised format of the review and best practice advice document, it would be useful for the SBWG to consider the following issues:

- The inclusion of information regarding the magnitude of bycatch reductions achieved with particular bycatch mitigation measures, or combinations thereof. This information could be included in the sections dealing with scientific evidence for efficacy. It is not envisaged that some metric of bycatch reduction would be used as a threshold for determining best practice, but rather that data quantifying bycatch reductions, where available, would be explicitly reported in the review. If this approach is adopted, it may be prudent to include some caveats highlighting that the extent of bycatch reduction will likely be influenced by a range of variables, including fishery, geographic area and the composition of seabird assemblages.
- Whether it would be useful to include a glossary of terms, or link to an appropriate external glossary.
- Whether further graphic design inputs would help improve the layout of the document, making it easier to follow, and if so, if this should be done professionally, or through a potential secondment project.

3. FUTURE REVIEWS

Once the format of the review and best practice advice documents has been agreed, it will be important to routinely maintain and update these documents at and after each meeting of the SBWG and Advisory Committee. It will also be important to ensure that the relevant mitigation fact sheets are similarly updated, and that the information in these documents is consistent, and that all hyperlinks to external documents/resources are checked and updated if necessary. Posting the review and best practice advice documents as Information Papers prior to each meeting may be a useful mechanism to facilitate an efficient review process.

ANNEX 1

 <p>Agreement on the Conservation of Albatrosses and Petrels</p>	<p>BEST AND IMPROVING PRACTICES FOR REDUCING THE IMPACT OF PELAGIC LONGLINE FISHERIES ON SEABIRDS</p> <p><i>Reviewed at the 9th Meeting of the Advisory Committee (AC9) La Serena, Chile, 09 – 13 May 2016</i></p> <p><i>Version: xx xx 2016</i></p>
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INTRODUCTION

The incidental mortality of seabirds in pelagic longline fisheries continues to be a serious global concern, especially for threatened albatrosses and petrels. The need for international cooperation in addressing this concern was a major reason for establishing the Agreement on the Conservation of Albatrosses and Petrels (ACAP). In pelagic longline fisheries seabirds are killed when they become hooked or entangled and drowned while foraging for baits on longline hooks as the gear is deployed. Seabirds can also be hooked or entangled as the gear is hauled; however, many of these seabirds can be released alive with careful handling.

There have been significant efforts internationally to develop mitigation measures to avoid or minimise the risk of incidental catch of seabirds in longline fisheries. Although most mitigation measures are broadly applicable, the application and specifications of some will vary with local methods and gear configurations. ACAP has comprehensively reviewed the scientific literature dealing with seabird bycatch mitigation in pelagic longline fisheries (see review section below) and this document is a summary of the advice informed by the review. Most of this scientific literature relates to large vessels, with lesser research attention given to small vessels and gear configurations and methods used in artisanal or semi-industrial fleets. Seabird bycatch mitigation advice for these fisheries is currently under development.

This document provides advice about best practices for reducing the impact of pelagic longlines on seabirds. Currently, no single mitigation measure can reliably prevent the incidental mortality of seabirds in pelagic longline fisheries. ACAP's best practice advice is that the simultaneous use of weighted branch lines, bird scaring lines and night setting is the most effective approach to mitigate seabird bycatch in pelagic longline fisheries. These measures should be applied in areas where fishing effort overlaps with seabirds vulnerable to bycatch to reduce the incidental mortality to the lowest possible levels. Other factors such as safety, practicality and the characteristics of the fishery should also be recognised.

This document also provides information about improving practices for reducing the impact of pelagic longlines on seabirds. Such advice concerns a range of mitigation measures that are under active development, and which show promise as future best practices in pelagic longline fisheries. ACAP will continue to monitor the development of these improving practices and the results of scientific research about their effectiveness.

Additionally, this document provides information about mitigation measures that are not recommended. A wide range of potential seabird bycatch mitigation measures have been proposed over time; however, not all of these have proven effective. ACAP considers that certain mitigation measures are ineffective, based either on scientific studies, or a lack of evidence in substantiation of claims made about the mitigation measure.

SUMMARY OF ADVICE

BEST PRACTICE MEASURES

ACAP recommends that the following three best practices are used in combination.

1. Branch line weighting

Branch lines should be weighted to sink the baited hooks rapidly out of the diving range of feeding seabirds. Studies have demonstrated that branch line weighting where there is more mass closer to the hooks, sink most rapidly and consistently; thereby, dramatically reducing seabird attacks on baits and most likely reducing mortalities. Studies of a range of weighting regimes, including placing weights at the hook, have shown no negative effect on target catch rates. Continued refinement of line weighting configurations (mass, number and position of weights and materials) with regard to effectively reducing seabird bycatch and safety concerns through controlled research and application in fisheries, is encouraged.

Increased weighting will shorten but not eliminate the distance behind the vessel in which birds can be caught. Line weighting has been shown to improve the effectiveness of other mitigation methods such as night setting and bird scaring lines, in reducing seabird bycatch. Line weighting is integral to the fishing gear and, compared to bird scaring lines and night setting, has the advantage of being more consistently implemented, hence facilitating compliance and port monitoring. On this basis it is important to enhance the priority accorded to line weighting, providing certain pre-conditions can be met, among other things: (a) weighting regime adequately specified; (b) safety issues adequately addressed; and (c) issues concerning application to artisanal fisheries being taken into account.

Current recommended minimum standards for branch line weighting configurations include the following:

- (a) greater than 45 g weight attached within 1 m of the hook; or
- (b) greater than 60 g attached within 3.5 m of the hook; or
- (c) greater than 98 g weight attached within 4 m of the hook.

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

2. Night setting

Setting longlines at night (defined as the time between the end of nautical twilight and before nautical dawn as set out in the Nautical Almanac tables for relevant latitude, local time and date.) is highly effective at reducing incidental mortality of seabirds because the majority of vulnerable seabirds are inactive at night. However, night setting is not as effective for crepuscular/ nocturnal foragers (e.g. white-chinned petrels, *Procellaria aequinoctialis*). The effectiveness of this measure may be reduced during bright moonlight and when using intense deck lights, and is less practical in high latitudes during summer, when the time between nautical dusk and dawn is limited.

3. Bird scaring lines

Properly designed and deployed bird scaring lines (BSLs) deter birds from sinking baits, dramatically reducing seabird attacks and related mortalities. A bird scaring line runs from a high point at the stern to a device or mechanism that creates drag at its terminus. Brightly coloured streamers hanging from the aerial extent of the line scare birds from flying to and under the line, preventing them from reaching the baited hooks.

Bird scaring lines should be the lightest practical strong fine line. Lines should be attached to the vessel with a barrel swivel to minimise rotation of the line from torque created as it is dragged behind the vessel. Long streamers should be attached with a swivel to prevent them from rolling up onto the BSL. Towed objects should be attached at the terminus of the BSL to increase drag. BSLs are at risk of tangling with float lines leading to lost bird scaring lines, interruptions in vessel operations and in some cases lost fishing gear. Alternatives, such as adding short streamers to the in-water portion of the line, can enhance drag while minimising tangles with float lines. Weak links (breakaways) should be incorporated into the in-water portion of the line for safety reasons and to minimize operational problems associated with lines becoming tangled.

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

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

Simultaneous use of two BSLs, one on each side of the sinking longline, provides maximum protection from bird attacks under different wind conditions. The setup for BSLs should be as follows:

- BSLs should be deployed to maximise the aerial extent, which is a function of vessel speed, height of the attachment point to the vessel, drag, and weight of bird scaring line materials.
- To achieve a minimum recommended aerial extent of 100 m, BSLs should be attached to the vessel such that they are suspended from a point a minimum of 8 m above the water at the stern.

- BSLs should contain a mix of brightly coloured long and short streamers placed at intervals of no more than 5 m. Long streamers should be attached to the line with swivels to prevent streamers from wrapping around the line. All long streamers should reach the sea-surface in calm conditions.
- Baited hooks should be deployed within the area bounded by the two BSLs. If using bait-casting machines, they should be adjusted so as to land baited hooks within the area bounded by the BSLs.

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

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

Two designs have been shown to be effective:

1. a design with a mix of long and short streamers, that includes long streamers placed at 5 m intervals over the first 55 m of the BSL, and
2. a design that does not include long streamers. Short streamers (no less than 1 m in length) should be placed at 1 m intervals along the length of the aerial extent.

In all cases, streamers should be brightly coloured. To achieve a minimum recommended aerial extent of 75 m, BSLs should be attached to the vessel such that they are suspended from a point a minimum of 7 m above the water at the stern.

ACAP also regards the following as a best practice measure

4. Time-Area fishery closures

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

OTHER RECOMMENDATIONS

Mainline tension: Setting longlines into propeller turbulence (wake) should be avoided because it slows the sink rates of baited hooks.

Live vs. dead bait: Use of live bait should be avoided. Individual live baits can remain near the water surface for extended periods, thus increasing the likelihood of seabird captures.

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

Offal and discard discharge management: Offal and discards should not be discharged during line setting. During line hauling, offal and used baits should preferably be retained or discharged on the opposite side of the vessel from that on which the line is hauled. All hooks should be removed and retained on board before discards are discharged from the vessel.

IMPROVING PRACTICES

ACAP supports further development of the following improving practices

5. Side-setting with line weighting and bird curtain (North Pacific)

Research results indicate that side-setting was more effective than other simultaneously trialled mitigation measures, including setting chutes and blue-dyed bait (Gilman *et al.*, 2003b). It should be noted that these tests were conducted in a single pilot scale trial of 14 days in the Hawaiian pelagic longline fishery for tuna and swordfish with an assemblage of surface-feeding seabirds (Gilman *et al.*, 2003b). This method requires testing in the Southern Ocean with deeper-diving species and at a larger spatial scale, before it can be considered as a recommended approach beyond the pilot fishery.

Side-setting **must** be used in combination with ACAP best practice recommendations for line weighting in order to increase sink rates forward of the vessel's stern, and hooks should be cast well forward of the setting position, but close to the hull of the vessel, to allow hooks time to sink as far as possible before they reach the stern. Bird curtains, a horizontal pole with vertical streamers, positioned aft of the setting station, may deter birds from flying close to the side of the vessel. The combined use of side-setting, line weighting and a bird curtain should be considered as a single measure.

6. Technologies that control depth of release of baited hooks

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

MITIGATION MEASURES THAT ARE NOT RECOMMENDED

ACAP considers that the following measures lack scientific substantiation as technologies or procedures for reducing the impact of pelagic longlines on seabirds

6. Measures that are not recommended

Line shooters: No experimental evidence of effectiveness in pelagic longline fisheries.

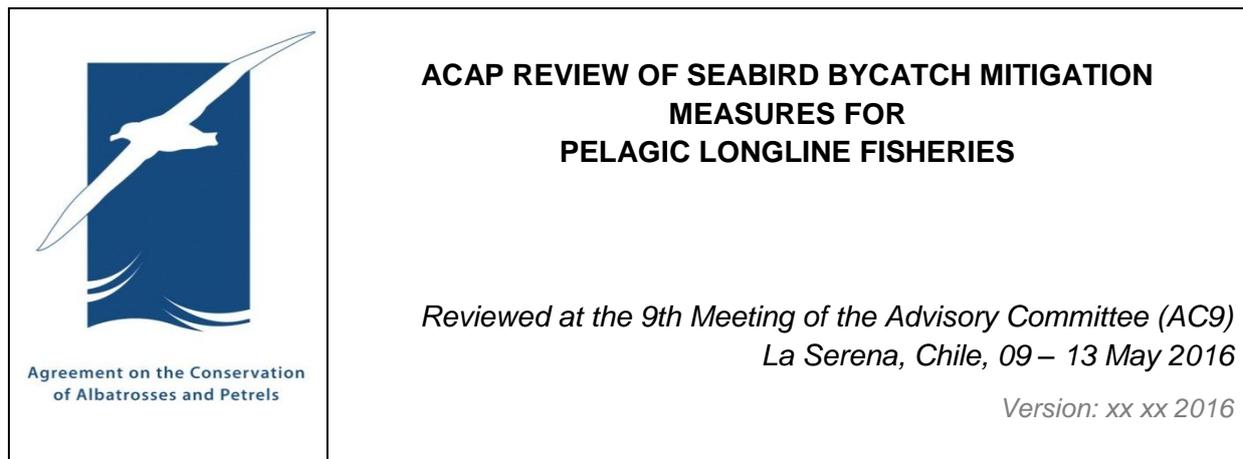
Olfactory deterrents: No evidence of effectiveness in pelagic longline fisheries.

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

Blue dyed bait: No experimental evidence of effectiveness in pelagic longline fisheries. Insufficiently researched.

Bait thaw status: No evidence that the thaw status of baits has any effect on the sink rate of baited hooks set on weighted lines.

The ACAP review of seabird bycatch mitigation measures for pelagic longline fisheries is presented in the following section.



INTRODUCTION

A range of technical and operational mitigation methods have been designed or adapted for use in pelagic longline fisheries. These methods aim to reduce incidental mortality of seabirds by avoiding peak areas and periods of seabird foraging activity, reducing the time baited hooks are available to birds, actively deterring birds from baited hooks, making the vessel less attractive to birds, and minimising the visibility of baited hooks. Apart from being technically effective at reducing seabird bycatch, mitigation methods need to be easy and safe to implement, cost effective, enforceable and should not reduce catch rates of target species.

Given that no single measure will eliminate seabird bycatch, a combination of measures is the most effective approach. The suite of mitigation measures available may vary in their feasibility and effectiveness depending on the area, seabird assemblages, fishery and vessel type, and gear configuration. Some of the mitigation methods are well established and explicitly prescribed in pelagic longline fisheries; however, additional measures are undergoing further testing and refinements.

The Seabird Bycatch Working Group (SBWG) of ACAP has comprehensively reviewed the scientific literature dealing with seabird bycatch mitigation in pelagic fisheries and this document is a distillation of that review. At each of its meetings, the SBWG review any recent research or information regarding seabird bycatch mitigation, and update the review and best practice advice accordingly. Currently, the simultaneous use of weighted branch lines, bird scaring lines and night setting is considered best practice mitigation for reducing seabird bycatch in pelagic longline fisheries.

THE ACAP REVIEW PROCESS

At each of its meetings, the ACAP SBWG considers any new research or information pertaining to seabird bycatch mitigation in pelagic longline fisheries. The following criteria are used by ACAP to guide the assessment process, and to determine whether a particular fishing technology or measure can be considered best practice to reduce the incidental mortality of albatrosses and petrels in fishing operations.

Best Practice Seabird Bycatch Mitigation Criteria and Definition

- i. Individual fishing technologies and techniques should be selected from those shown by experimental research to significantly¹ reduce the rate of seabird incidental mortality² to the lowest achievable levels. Experience has shown that experimental research comparing the performance of candidate mitigation technologies to a control of no deterrent, where possible, or to status quo in the fishery, yields definitive results. Analysis of fishery observer data after it has been collected on the relative performance of mitigation approaches are plagued with a myriad of confounding factors. Where a significant relationship is demonstrated between seabird behaviour and seabird mortality in a particular system or seabird assemblage, significant reductions in seabird behaviours, such as the rate of seabirds attacking baited hooks, can serve as a proxy for reduced seabird mortality. Ideally, when simultaneous use of fishing technologies and practices is recommended as best practice, research should demonstrate significantly improved performance of the combined measures.
- ii. Fishing technologies and techniques, or a combination thereof, shall have clear and proven specifications and minimum performance standards for their deployment and use. Examples would include: specific bird scaring line designs (lengths, streamer length and materials; etc.), number (one vs. two) and deployment specifications (such as aerial extent and timing of deployment); night fishing defined by the time between the end of nautical dusk and start of nautical dawn; and, line weighting configurations specifying mass and placement of weights or weighted sections.
- iii. Fishing technologies and techniques shall be demonstrated to be practical, cost effective and widely available. Commercial fishing operators are likely to select for seabird bycatch reduction measures and devices that meet these criteria including practical aspects concerning safe fishing practices at sea.
- iv. Fishing technologies and techniques should, to the extent practicable, maintain catch rates of target species. This approach should increase the likelihood of acceptance and compliance by fishers.
- v. Fishing technologies and techniques should, to the extent practicable not increase the bycatch of other taxa. For example, measures that increase the likelihood of catching other protected species such as sea turtles, sharks and marine mammals, should not be considered best practice (or only so in exceptional circumstances).
- vi. Minimum performance standards and methods of ensuring compliance should be provided for fishing technologies and techniques, and should be clearly specified in fishery regulations. Relatively simple methods to check compliance should include, but not be limited to, port inspections of branch lines to determine compliance with branch line weighting, determination of the presence of davits (tori poles) to support bird scaring lines, and inspections of bird scaring lines for conformance with design requirements. Compliance monitoring and reporting should be a high priority for enforcement authorities.

¹ Any use of the word 'significant' in this document is meant in the statistical context

² This may be determined by either a direct reduction in seabird mortality or by reduction in seabird attack rates, as a proxy

On the basis of these criteria, the scientific evidence for the effectiveness of mitigation measures or fishing technologies/techniques in reducing seabird bycatch is assessed, and explicit information is provided on whether the measure is recommended as being effective, and thus considered best practice, or not. The ACAP review also indicates whether the measure needs to be combined with additional measures, and provides notes and caveats for each measure, together with information on performance standards and further research needs. Following each meeting of ACAP's SBWG and Advisory Committee, this review document and ACAP's best practice advice, is updated (if required). A summary of ACAP's current best practice advice is provided in the preceding section of this document.

SEABIRD BYCATCH MITIGATION FACT SHEETS

A series of seabird bycatch mitigation fact sheets have been developed by ACAP and BirdLife International to provide practical information, including illustrations, on seabird bycatch mitigation measures (<http://www.acap.ac/en/resources/bycatch-mitigation/mitigation-fact-sheets>). The sheets, which include information on the effectiveness of the specific measure, their limitations and strengths and best practice recommendations for their effective adoption, are linked to the ACAP review process, and are updated following ACAP reviews. Links to the available fact sheets are provided in the relevant sections below. The mitigation fact sheets are currently available in [English](#), [French](#), [Spanish](#), [Portuguese](#), [Japanese](#), [Korean](#) and [Mandarin](#).

BEST PRACTICE MEASURES

1. Branchline weighting

Scientific evidence for effectiveness in pelagic fisheries

Proven and recommended mitigation method. Should be used in combination with night setting and bird scaring lines (Brothers 1991; Boggs 2001; Sakai *et al.* 2001; Brothers *et al.* 2001; Anderson & McArdle 2002; Hu *et al.* 2005; Melvin *et al.* 2013; 2014).

Notes and Caveats

Weights will shorten but not eliminate the distance behind the vessel in which birds can be caught. Branch lines should be weighted in order to rapidly sink the baited hooks out of the diving range of seabirds. Studies have demonstrated that branch line weighting configurations with more mass close to the hook sinks the hooks most rapidly (Gianuca *et al.* 2013; Robertson *et al.* 2010a; 2013), reduces seabird attacks on baits (Gianuca *et al.* 2013; Jiménez *et al.* 2013; Ochi *et al.* 2013) and is most likely to reduce mortalities (Jiménez *et al.* 2013). Studies of a range of weighting regimes, including regimes with weight at the hook, have shown no negative effect on target catch rates (Gianuca *et al.* 2013; Jiménez *et al.* 2013; Melvin *et al.* 2013; Ochi *et al.* 2013; Robertson *et al.* 2013).

Line weighting has been shown to improve the effectiveness of night setting and bird scaring lines in reducing seabird bycatch. Line weighting is integral to the fishing gear and has the advantage of being more consistently implemented and thus facilitates compliance and port monitoring. On this basis it is important to enhance the priority accorded to line weighting, providing certain pre-conditions can be met, inter alia: (a) weighting regime characteristics

adequately specified; (b) safety issues adequately addressed; (c) issues relating to application to artisanal fisheries are taken into account.

Minimum standards

Current minimum standards for branchline weighting configurations are:

- (1) greater than 45 g of weight attached within 1 m of the hook or;
- (2) greater than 60 g weight attached within 3.5 m of the hook or;
- (3) greater than 98 g weight attached within 4 m of the hook.

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

These regimes have been adopted in the Hawaiian (45 g at 1 m) and Australian (60 g at 3.5 m and 98 g at 4 m) pelagic longline fisheries, and the Western and Central Pacific Fisheries Commission (WCPFC) have adopted the latter two regimes. The WCPFC provisions also include the option of branch lines being configured with weights of 45 g to 60 g within 1 m of the hook). The 98 g weights specified in the Australian fishery pertain to the line weighting experiment of Robertson *et al.* (2010a).

Need for combination

Should be combined with bird scaring lines and night setting.

Implementation monitoring

Vessels <35 m total length: Line weights crimped into branch lines are very difficult to remove at sea. Inspection before departure from port of all gear bins on vessels is therefore considered an acceptable form of implementation monitoring.

Vessels >35 m total length: It is possible to remove and/or re-configure gear at sea. Consequently, implementation is required, using appropriate methods (e.g., observer inspection of line setting operations; video surveillance; at-sea compliance checks). Video surveillance may be possible, subject to the mainline setter being fitted with motion sensors to trigger cameras.

Research needs

Continued refinement of line weighting configurations (mass, number and position of weights and materials) with regard to effectively reducing seabird bycatch and safety concerns, through controlled research and application in fisheries, is encouraged. Studies should also include evaluations of the effects of branch line weighting on the catch rate of pelagic fish and provide data that allow evaluation of the relative safety and practicality attributes of various weighting configurations.

Mitigation Fact Sheet

Download [here](#).

2. Night setting

Scientific evidence for effectiveness in pelagic fisheries

Proven and recommended mitigation method. Should be used in combination with weighted branch lines and bird scaring lines (Duckworth 1995; Gales *et al.* 1998; Klaer & Polacheck 1998; Brothers *et al.* 1999; McNamara *et al.* 1999; Gilman *et al.* 2005; Baker & Wise 2005; Jiménez *et al.* 2009; Melvin *et al.* 2013; 2014).

Notes and Caveats

Less effective during full moon, under intensive deck lighting and/or in high latitude fisheries in summer. Also less effective for nocturnal foragers (e.g. white-chinned petrels, Brothers *et al.* 1999; Cherel *et al.* 1996).

Minimum standards

No setting should take place between nautical dawn and nautical dusk. Nautical dawn and nautical dusk are defined as set out in the Nautical Almanac tables for relevant latitude, local time and date.

Need for combination

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

Implementation monitoring

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

Research needs

Assessing the effectiveness of bird scaring lines and branchline weighting at night needs to be determined, possibly by way of using thermal or night vision technologies.

Mitigation Fact Sheet

Download [here](#).

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

Scientific evidence for effectiveness in pelagic fisheries

Proven and recommended mitigation method. Should be used in combination with weighted branch lines and night-setting. For vessels >35 m in length two bird scaring lines (BSLs) is considered best practice. BSLs with the appropriate aerial extent can be more easily rigged on large vessels. Two BSLs are considered to provide better protection of baited hooks in crosswinds than single BSLs (Melvin *et al.* 2004; 2013; 2014; Sato *et al.*

2013). Hybrid BSLs (with long and short streamers) are more effective than BSLs with short streamers only in deterring diving seabirds (e.g. white-chinned petrels, Melvin *et al.* 2010; 2013; 2014).

Notes and Caveats

BSLs potentially increase the likelihood of entanglements, particularly if the attachment points on davits (tori poles) are insufficiently outboard of vessels. To achieve a minimum aerial extent BSLs should be attached to the vessel such that it is suspended from a point a minimum of 8 m above the water at the stern. Deployment of a towed device to prevent tangling with fishing gear is essential to improve adoption and compliance.

The presence of diving species increases the vulnerability of surface foragers (e.g., albatrosses) due to secondary interactions (i.e. albatrosses attacking baited hooks that are brought back to the surface by diving birds).

Minimum standards

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

If large vessels use only one BSL it should be set to windward of sinking baits. If baited hooks are set outboard of the wake, the BSL attachment point to the vessel should be positioned several meters outboard of the side of the vessel that baits are deployed. Baited hooks shall be deployed within the area bounded by the two BSLs. Bait-casting machines shall be adjusted so as to land baited hooks within such area.

Need for combination

Should be used in combination with appropriate line weighting and night setting.

Implementation monitoring

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

Research needs

Developing methods that minimise entanglements of the in-water portion of BSLs with longline floats remains the highest priority for research on bird-scaring lines. Other research priorities include: (1) evaluating the effectiveness of one vs. two BSLs; and, (2) BSLs design features including streamer lengths, configurations and materials.

Mitigation Fact Sheet

Download [here](#).

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

Scientific evidence for effectiveness in pelagic fisheries

Proven and recommended mitigation method. Should be used in combination with weighted branch lines and night-setting. (Imber 1994; Uozumi & Takeuchi 1998; Brothers *et al.* 1999; Klaer & Polacheck 1998; McNamara *et al.* 1999; Boggs 2001; CCAMLR 2002; Minami & Kiyota 2004; Melvin 2003). For vessels <35 m in length, a single BSL in combination with night setting and appropriate line weighting, has been found to be effective for mixed and short BSLs (ATF 2011; Domingo *et al.* 2011, Gianuca *et al.* 2013).

Notes and Caveats

To achieve a minimum aerial extent BSLs should be attached to the vessel such that it is suspended from a point a minimum of 7 m above the water at the stern. The use and further development of a suitable towed device to prevent tangling with fishing gear is essential to improve adoption and compliance. Diving species increase vulnerability of surface foragers (albatrosses) due to secondary interactions.

Minimum standards

Vessels should deploy BSLs with a minimum aerial extent of 75 m. Streamers should be brightly coloured. Short streamers (>1 m) should be placed at 1 m intervals along the length of the aerial extent. Two designs have been shown to be effective: (1) a mixed design that includes long streamers (placed at 5 m intervals over the first 55 m of the BSL) and short streamers; and, (2) a design that only includes short streamers. BSLs should be the lightest practical strong fine line. Lines should be attached to the vessel with a barrel swivel to minimise rotation of the line from torque (created as it is dragged behind the vessel).

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

Need for combination

Should be used with appropriate line weighting and night setting.

Implementation monitoring

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

Research needs

Developing methods that minimise entanglements of the in-water portion of BSLs with longline floats remains the highest priority for research on bird-scaring lines. Other research priorities include: (1) evaluating the effectiveness of one vs. two BSL, (2) BSL design features including steamer lengths, configurations and materials, especially for very small vessels.

Mitigation Fact Sheet

Download [here](#).

4. Time - Area closures

Scientific evidence for effectiveness in pelagic fisheries

Proven and recommended mitigation method. Avoiding fishing in peak areas and/or during periods of intense foraging activity, has been used effectively to reduce rapidly and substantially bycatch in longline fisheries.

Notes and Caveats

This is an important and effective management response, especially for high-risk areas, and when other measures prove ineffective. Although this can be highly effective in targeted locations and/or during a specific season, time-area closures may displace fishing effort into areas that are not as well regulated, leading to greater incidental mortality levels.

Minimum standards

None defined, but highly recommended.

Need for combination

Must be combined with other measures, both in the targeted areas when the subsequently opened again for fishing, and also in adjacent areas to ensure displacement of fishing effort does not merely lead to a spatial shift in the incidental mortality.

Implementation monitoring

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

Research needs

Further research is required on the seasonal variability in patterns of seabird distribution and behaviour in relation to fisheries, including whether closing areas to fishing causes a shift in the distribution of seabirds to adjacent areas.

OTHER CONSIDERATIONS

5. Side setting with line weighting and bird curtain

Scientific evidence for effectiveness in pelagic fisheries

Shown to be more effective than other simultaneously tested mitigation measures, including setting chutes and blue dyed bait, on relatively small vessels in the Hawaiian pelagic longline tuna and swordfish fisheries (Gilman et al. 2003b). Effectiveness in southern hemisphere fisheries has not been researched and

consequently it is not recommended as a proven mitigation measures in these fisheries at this time (Brothers & Gilman 2006; Yokota & Kiyota 2006).

Notes and Caveats

Hooks must be sufficiently below the surface and protected by a bird curtain by the time they reach the stern of the vessel. In Hawaii, side-setting trials were conducted with a bird curtain and 45-60 g weighted swivels placed within 0.5 m of hooks. Japanese research concludes it must be used in combination with other measures (Yokota & Kiyota 2006). The Hawaiian trial was conducted in an area with an assemblage of largely surface-feeding seabirds, and this measure requires testing in other fisheries and areas where seabird abundance is higher and secondary ingestion (hooks retrieved by diving birds and secondarily – subsequently - attacked by surface foragers) is more important. Hence, it cannot be recommended for use in other fisheries at this time.

Minimum standards

Clear definition of side setting is required. Hawaiian definition is a minimum of only 1 m forward of the stern, which is likely to reduce effectiveness. The distance forward of the stern refers to the position from which baits are manually deployed. Baited hooks must be thrown by hand forward of the bait deployment location if they are to be afforded “protection” by being close to the side of the vessel.

Need for combination

Lines set from the side of vessels must be appropriately weighted in accordance with ACAP best practice advice and protected by an effective bird curtain.

Implementation monitoring

Requires fisheries observers or video surveillance.

Research needs

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

Mitigation Fact Sheet

Download [here](#).

6. Blue dyed bait

Scientific evidence for effectiveness in pelagic fisheries

Unproven and not recommended as a mitigation method (Boggs 2001; Gilman *et al.* 2003b; Minami & Kiyota 2001; Minami & Kiyota 2004; Lydon & Starr 2005, Cocking *et al.* 2008; Ochi *et al.* 2011).

Notes and Caveats

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

Minimum standards

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

Need for combination

Must be combined with bird scaring lines or night setting.

Implementation monitoring

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

Research needs

Further testing is needed in the Southern Ocean.

Mitigation Fact Sheet

Download [here](#).

7. Line shooter

Scientific evidence for effectiveness in pelagic fisheries

Unproven and not recommended as a mitigation measure (Robertson *et al.* 2010b).

Notes and Caveats

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

Minimum standards

Not Applicable.

Need for combination

Not Applicable.

Implementation monitoring

Not Applicable.

Research needs

Not Applicable.

Mitigation Fact Sheet

Download [here](#).

8. Bait caster

Scientific evidence for effectiveness in pelagic fisheries

Unproven and not recommended as a mitigation measure (Duckworth 1995; Klaer & Polacheck 1998).

Notes and Caveats

Not a mitigation measure unless bait casting machines are available with the capability to control the distance at which baits are cast. This is necessary to allow accurate delivery of baits under a bird scaring line. Current machines (without variable power control) likely to deploy baited hooks well beyond the streaming position of bird scaring lines, increasing risks to seabirds. Few commercially-available machines have variable power control. Needs more development.

Minimum standards

Not Applicable.

Need for combination

Not Applicable.

Implementation monitoring

Not Applicable

Research needs

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

Mitigation Fact Sheet

Download [here](#).

9. Underwater setting chute

Scientific evidence for effectiveness in pelagic fisheries

Unproven and not recommended as a mitigation measure (Brothers 1991; Boggs 2001; Gilman *et al.* 2003a; Gilman *et al.* 2003b; Sakai *et al.* 2004; Lawrence *et al.* 2006).

Notes and Caveats

In pelagic fisheries, existing equipment is not yet sturdy enough for large vessels in rough seas. Problems with malfunctions and performance inconsistencies have been reported (e.g. Gilman *et al.* 2003a, and Australian trials cited in Baker & Wise 2005).

Minimum standards

Not yet established

Need for combination

Not recommended for general application at this time.

Implementation monitoring

Not Applicable.

Research needs

Design problems to overcome.

10. Management of offal discharge

Scientific evidence for effectiveness in pelagic fisheries

Unproven and not recommended as a primary mitigation measure in pelagic longline fisheries, but should be considered good practice (McNamara *et al.* 1999; Cherel *et al.* 1996).

Notes and Caveats

This should be considered a supplementary measure (i.e. used in addition to primary best practice mitigation measures). Offal attracts birds to vessels, and also conditions birds to attend vessels. Where practical, the discharge of offal should be eliminated or restricted to periods when not setting or hauling. Strategic discharge during line setting (dumping of homogenised offal to the side of the vessel during setting to attract birds to this area and away from the baited hooks, Cherel *et al.* 1996)) can increase interactions and should be discouraged. Offal retention and/or incineration may be impractical on small vessels.

Minimum standards

Not yet established for pelagic fisheries. In the Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR), discharge of offal is prohibited during line setting for demersal longline fisheries. During line hauling, storage of waste is encouraged, and if discharged must be discharged on the opposite side of the vessel to the hauling bay.

Need for combination

Must be combined with other measures.

Implementation monitoring

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

Research needs

Further information needed on opportunities and constraints for the application of offal management in pelagic fisheries (short and long term).

11. Live bait

Scientific evidence for effectiveness in pelagic fisheries

Not recommended, as use of live bait may lead to increased rates of seabird bycatch (Robertson *et al.* 2010a; Trebilco *et al.* 2010).

Notes and Caveats

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

Minimum standards

Not Applicable.

Need for combination

Not Applicable.

Implementation monitoring

Not Applicable.

Research needs

Not Applicable.

12. Bait thaw status – use of thawed baits rather than frozen baits

Scientific evidence for effectiveness in pelagic fisheries

Unproven and not recommended as a primary mitigation measure (Brothers 1991; Duckworth 1995; Klaer & Polacheck 1998; Brothers *et al.* 1999; Robertson & van den Hoff 2010).

Notes and Caveats

Thawed baits are believed to sink faster than frozen baits. However, Robertson & van den Hoff (2010) concluded that the bait thaw status has no practical bearing on seabird mortality in pelagic fisheries. Baits cannot be separated from others in frozen blocks of bait, and hooks cannot be inserted into baits unless they are partially thawed (it is not practical for fishers to use fully frozen baits). Partially thawed baits sink at similar rates to fully thawed baits.

Minimum standards

Not Applicable.

Need for combination

Not Applicable.

Implementation monitoring

Not Applicable.

Research needs

Not Applicable.

13. Haul Mitigation

Scientific evidence for effectiveness in pelagic fisheries

Strategies to reduce seabird hooking during the haul have yet to be developed and properly tested for pelagic longline fisheries.

Notes and Caveats

The development and testing of seabird bycatch mitigation measures in pelagic longline fisheries has focussed almost exclusively on how minimise or prevent bycatch during setting operations. Although some measures, such as Bird Curtains, have been designed and tested in demersal longline fisheries to reduce the incidence of haul captures, these methods are not directly transferable to pelagic longline fisheries.

Need for combination

No information

Research needs

Developing methods that minimize seabird hooking during line hauling in pelagic longline fisheries remain an urgent research priority.

Minimum standards

No information

Implementation monitoring

No information

Mitigation Fact Sheet

Note that this fact sheet is directed mostly at haul mitigation in demersal longline fisheries, and is not directly applicable to pelagic longline fisheries.

Download [here](#).

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