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PROGRESS TOWARDS THE IATTC SEABIRD ACTION PLAN: BYCATCH MITIGATION OPTIONS, MEASURES AND IMPLEMENTATION

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In 2024, the IATTC Ecosystem and Bycatch Working Group (EBWG) recommended a Seabird Action Plan to undertake scientific analyses of existing data to support further research, conservation and management of seabirds in the EPO. This document presents the results of two components of this plan, which focus on i) a review of the mitigation options adopted across tuna RFMOs and ii) a review of the mitigation options being utilized across CPCs to the IATTC. This document is the second of two documents (EB-03-02 & EB-03-03) addressing activities in the Seabird Action Plan.

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SUMMARY

Seabird bycatch is a global conservation issue faced by fisheries that target tuna and tuna-like species. International efforts have been, and continue to be, made to reduce interaction rates and consequent mortality of seabirds, particularly by longline vessels. Although the IATTC's primary responsibility is to ensure the sustainability of tuna and tuna-like species in the eastern Pacific Ocean, the Antigua Convention by which the IATTC is governed, also mandates the sustainability of "dependent" and "associated" species belonging to the same ecosystem that may be impacted during fishing activities. As such, the IATTC has actively implemented conservation and management measures to reduce seabird bycatch mortality since at least 2005 through dedicated seabird resolutions C-05-01, C-10-02 and C-11-02. Since 2010, the IATTC has been prescriptive in the required use of seabird mitigation measures by its CPCs in Resolution C-11-02. However, in the intervening period there has been a significant number of scientific studies undertaken to test the efficacy of new and existing seabird mitigation measures and there is now scope to strengthen measures to improve the conservation of seabirds in the EPO. Consequently, the Ecosystem and Bycatch Working Group (EBWG) has recommended updates to IATTC

seabird conservation measures, endorsing a Seabird Action Plan (SAP) to refine bycatch mitigation strategies and address data, research and conservation gaps. This document provides a review of measures mandated or recommended for use in other tuna RFMOs, mitigation options and measures currently being used by IATTC CPCs, and a review of the measures themselves. In reflection of the review, the IATTC scientific staff recommends a refined set of mitigation options—scientifically proven to be effective at reducing seabird bycatch mortality when implemented as prescribed, approved by the Agreement on the Conservation of Albatrosses and Petrels, and already in use in other RFMOs. The recommended measures also account for vessel size and the vast differences in fleet characteristics across the EPO. The updated seabird bycatch mitigation recommendations include several options: A) Simultaneous use of i) weighted branch lines; ii) night setting; and iii) tori lines; or B) hook-shielding devices; or C) Underwater bait setting devices; or D) side setting with weighted branchlines and bird curtains (for the area north of 23°N). Options B–D can be used as standalone measures while option A would require large vessels (>20 m) to use at least two measures in the list simultaneously and medium (12–20 m) to small (<12 m) vessels would be required to utilize at least one method.

The review conducted also revealed inaccuracies and inconsistencies in the IATTC specifications for several of the mitigation options that should be addressed to ensure the mitigation measures are implemented as successfully as intended. Additionally, it is well documented that no combination of seabird bycatch mitigation options are currently perfectly effective. Thus, for those occasions when seabirds are captured, ensuring that the approved best handling and release practices (BHRP) are used to remove seabirds from fishing gear will help to improve the post release survival outcomes across seabird species and in all fisheries. The staff recommends the adoption of the BHRP guidelines developed in conjunction with CPCs, industry personnel and subject matter experts available in EB-03-06. The identification of funding to generate infographics for outreach, education and training materials and to support training and capacity building across the region are also necessary components for seabird conservation in the EPO.

1. INTRODUCTION

Seabirds are among the most threatened taxa in marine habitats globally, with incidental catch (i.e., bycatch) in fisheries representing a leading cause of anthropogenic-induced mortality for many species. Longline and gillnet fisheries, in particular, contribute most to this mortality, as seabirds may become hooked or entangled while foraging on bait or discards during fishing operations. In 1999, this global concern led to the development of the International Plan of Action (IPOA) for reducing incidental catch of seabirds in longline fisheries (FAO, 1999). Within the Inter-American Tropical Tuna Commission (IATTC) Convention Area in the eastern Pacific Ocean (EPO), several species of albatrosses and petrels (e.g., Buller's Albatross, Black-browed Albatross, Black-footed Albatross, White-chinned Petrels, and others; EB-03-02)—many of which are already classified as endangered or declining—have been documented to interact with fishing gear, especially across the high seas and neritic habitats at high-latitudes. Addressing seabird bycatch is therefore a critical conservation priority that also supports the pursuit of ecosystem approaches to fisheries management by many fisheries management bodies internationally. The IATTC in particular has formally recognized the potential negative ecological consequences of tuna and tuna-like fisheries and is exploring ecosystem approaches to the management of its tuna fisheries in the EPO. The Antigua Convention (IATTC, 2003), which entered into force in 2010, includes Article VII 1(f) that requires the IATTC to "*adopt, as necessary, conservation and management measures and recommendations for species belonging to the same ecosystem and that are affected by fishing for, or dependent on or associated with, the fish stocks covered by this Convention…*". Therefore, the adoption and implementation of scientifically driven bycatch mitigation measures is essential for the IATTC to fulfil its responsibilities pertaining to ecological sustainability by reducing bycatch mortality and to ensure the

long-term viability of seabird populations that play a vital role in the structuring and functioning of the EPO ecosystem.

At its second meeting in 2024, the Ecosystem and Bycatch Working Group (EBWG) made a series of recommendations to the Scientific Advisory Committee (SAC) and the 102nd Meeting of the IATTC Commission aimed at strengthening seabird conservation. Chief among these was the endorsement of a Seabird Action Plan (SAP) which calls on the IATTC scientific staff to review existing bycatch mitigation measures and address key data gaps related to seabird interactions in the eastern Pacific Ocean (EPO). The overarching goal of the SAP is to provide the impetus and knowledge base to guide an eventual update of Resolution C-11-02 by incorporating spatially relevant and scientifically defensible mitigation options.

Specifically, a key objective of the SAP was for the IATTC staff to conduct a seabird assessment for presentation at the 2025 EBWG meeting, including:

a. A comparison between C-11-02 and mitigation measures adopted by other tuna Regional Fisheries Management Organizations (tRFMOs);

b. Update of SAR-07-05b: spatial distributions of seabird species in the IATTC Convention Area, including any geographic hotspots for these species, overlap with LL fishing effort, and conservation statuses;

c. Overview of mitigation measures in use by CPCs in the IATTC Convention Area as required in paragraph 5 of C-11-02. This should account for all CPCs, including any that may have vessels fishing in areas where bycatch mitigation measures are not required; and

d. Summary of observed and estimated seabird bycatch rates in the IATTC Convention Area, including geographic information where possible, noting that data are limited.

This paper addresses points **a** and **c** above, while a separate document (EB-03-02) addresses points **b** and **d**.

To evaluate the effectiveness of current conservation efforts, this paper first assesses how the IATTC's existing measures, namely Resolution C-11-02, compare with those adopted by other tRFMOs. While C-11-02 outlines mitigation requirements in specific geographic areas, evolving scientific knowledge and best practices have led other tRFMOs to strengthen their seabird conservation measures. Section 2 of this document describes this comparative analysis, identifying opportunities for improvement within the IATTC framework. Section 3 summarizes mitigation measures currently implemented by IATTC Members and Cooperating Non-Members (CPCs), including those operating outside the areas where mitigation is mandatory. Section 4 reviews the available data on seabird bycatch mitigation strategies and options, and Section 5 considers best-practice guidance from the Agreement on the Conservation of Albatrosses and Petrels (ACAP). Together, these analyses inform the staff recommendations provided in the final section, aimed at enhancing seabird conservation and management in the EPO.

2. COMPARISON OF SEABIRD BYCATCH MITIGATION MEASURES ACROSS T-RFMOS

All tuna RFMOs have adopted seabird bycatch mitigation measures in areas of each convention where seabird interactions are observed, or purported, to be elevated. At its second meeting in 2024, the EBWG requested the IATTC scientific staff provide a review of mitigation measures in place across RFMOs, including those that have been adopted or under review, in the case of the WCPFC, and these are detailed below.

2.1. Inter-American Tropical Tuna Commission (IATTC)

The first seabird conservation measure that was adopted for the IATTC was Resolution C-05-01 adopted in 2005, encouraging CPCs to implement the International Plan of Action for seabirds. Resolution C-10-02 adopted in 2010 introduced the table of bycatch mitigation options listed in Table 1 below and required

vessels of all sizes to use at least two of the mitigation measures, one from each column in Table 1 when operating in the following regions of the IATTC Convention Area (see map in Annex 1):

- North of 23°N (excluding specified Mexican waters),
- South of 30°S, and
- A defined area between 2°N and 30°S, bounded longitudinally between 95°W and 85°W.

In 2011, the currently active seabird Resolution C-11-02 entered into force superceding C-10-02. Resolution C-11-02 only pertains to longline vessels over 20 m in length overall and fitted with hydraulic, mechanical, or electrical systems. The Resolution requires these vessels to implement seabird bycatch mitigation measures while fishing in the designated seabird mitigation areas. Qualifying vessels must use at least two of the mitigation measures from Table 1, with at least one selected from Column A. Where weighted branchlines cannot be selected from both columns and if bird scaring lines (i.e., tori lines) are selected from both columns this equates to simultaneously using two (i.e. paired) tori lines. Additionally, CPCs with vessels fishing outside the high-risk areas are encouraged to voluntarily implement at least one mitigation measure from Table 1. The technical specifications for these measures are provided in the Annex (Tables A.1.a-f).

TABLE 1. IATTC Seabird Bycatch Mitigation Options. Options in grey are those shown to be ineffective (see section 4) and are no longer recommended by ACAP or the other tRFMOs.

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

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

In the specifications section for the mitigation options in the Resolution there are specifications for a Tori line and a Tori line (light streamer). In the rest of the Resolution there is no mention of when or where a 'Tori line light streamer' might be used. The 'tori line light streamer', weighted branchlines and night setting measures also contain specifications that require updating to be in alignment with ACAP best practices.

2.2. Western Central Pacific Fisheries Commission (WCPFC)

Conservation and Management Measures (CMM) to mitigate the impacts of fishing on Seabirds have been implemented by WCPFC since 2007 (CMM 2007-04). Since then, several CMMs (CMM 2012-07, CMM 2015-03, CMM 2017-06) have been updated and strengthened, with the currently active CMM (CMM 2018-03)—adopted in December of 2018—mandating all WCPFC Members, Cooperating Non-Members, and Participating Territories (CCMs) to require their longline vessels in the Southern Hemisphere, fishing South of 30°S, to use either a) at least two of these three measures: i). weighted branch lines; ii). night setting; iii). tori lines; or b) hook-shielding devices as a standalone option. In the area between 25°S–30°S: CCMs shall require their longline vessels fishing to use one of the following mitigation measures: i) weighted branch lines; ii) tori lines; or iii) hook-shielding devices. Exemptions for these requirements were

adopted for the EEZs of French Polynesia, New Caledonia, Tonga, Cook Islands and Fiji due to the perceived low risk of fishing to seabirds. In the Northern hemisphere, north of 23°N, large-scale longline vessels (≥24 m) must use at least two mitigation measures from Table 2, including one from Column A, while small-scale longline vessels (<24 m) must use at least one measure from Column A.

TABLE 2. WCPFC Mitigation measures for longline vessels operating North of 23°N. Options in grey are no longer recommended by ACAP.

Column A	Column B
Side setting with a bird curtain and weighted branch lines[1]	Tori line[2]
Night setting with minimum deck lighting	Blue-dyed bait
Tori line	Deep setting line shooter
Weighted branch lines	Management of offal discharge
Hook-shielding devices[3]	

[1] 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 a tori line is selected from both Column A and Column B, this equates to simultaneously using two (i.e. paired) tori lines. [3]Hook-shielding devices can be used as a stand-alone measure. The technical specifications for these measures are provided in the Annex (Table A.1).

Currently the WCPFC is undergoing an inter-sessional review process to update the mitigation options and spatial stratification guidelines above (WCPFC-TCC20-2024-DP05_rev1; TCC20-2024-DP01), after new information on effective combinations of mitigation measures reducing bycatch rates close to zero in high risk areas (i.e., branch line weighting, night setting and tori lines; or alternatively, using the stand-alone methods of hook shielding devices, and/or the underwater bait setter) and data on seabird distributions and diving behavior revealed that high risk areas extended to all Southern Hemisphere waters south of 25°S, has become available.

The proposed updated mitigation options for WCPFC would require all vessels fishing South of 25°S to use either:

a) These three measures in combination:
   i. Weighted branchlines;
   ii. Night setting
   iii. Tori lines; or
b) Hook-shielding devices; or
c) An underwater bait setting device.

For the area North of 23°N the updated mitigation options would remove deep-setting lineshooters, blue-dyed bait, and offal discharge management, after the Scientific Committee to the WCPFC (SC20) noted limited evidence of their effectiveness. The new options for this region are listed below in Table 3. Where vessels >24 m LOA must use two options from Column A or one option from Column B. Vessels <24 m would be required to use at least one option from Column A or one option from Column B.

TABLE 3. Mitigation options under review for longline vessels fishing North of 23°N

Column A	Column B
Night setting with minimum deck lighting	Side setting with a bird curtain and weighted branch lines
Tori line	Hook-shielding devices
Weighted branch lines	Underwater bait setting device

In the areas between 25°S and 23°N, particularly in the area between 25°S and 20°S, CCMs are strongly encouraged to have their longline vessels employ one or more of these seabird mitigation measures listed above (weighted branchlines, night setting, tori lines, hook-shielding devices; or an underwater bait setting device).

2.3. Indian Ocean Tuna Commission (IOTC)

In the IOTC seabird conservation measures have been in place since 2006 (Resolution 06/04). The IOTC has revised their seabird conservation Resolutions four times since the adoption of 06/04 (Resolutions 08/03, 10/06, 12/06, 23/07) as improved mitigation options were developed and as other tRFMOs updated their measures. The most recently adopted measure, Resolution 23/07 'On Reducing the Incidental Bycatch of Seabirds in Longline Fisheries' entered into force on 1 July 2024. Resolution 23/07 requires CPCs with longline vessels operating in the area south of 25°S, to use at least two of three mitigation measures (night setting with minimum deck lighting, tori lines or branchline weighting) or, alternatively, use hook-shielding devices as a stand-alone measure. The technical specifications for these measures are provided in Table A.1. The measure does not make any distinctions or exceptions for vessel size – all longline vessels are required to use the options outline above. This Resolution also encourages CPCs operating in other areas to consider using these devices as appropriate, consistent with scientific advice.

2.4. International Commission for the Conservation of Atlantic Tunas (ICCAT)

In 2007 ICCAT adopted 'Recommendation on Reducing Incidental By-catch of Seabirds in Longline Fisheries' [Rec. 07-07]. In 2011, 'Supplemental Recommendation on Reducing Incidental By-catch of Seabirds in ICCAT Longline Fisheries' [Rec. 11-09] was adopted and °entered into force in 2013. This recommendation replaced the mitigation measures stipulated in Rec. 07-07, except in the area between 20°S to 25°S where ICCAT Rec. 07-07 continued to apply. In Rec. 07-07 (between 20°S and 25°S) all vessels are required to carry and use bird scaring lines (BSLs or Tori poles). Noting there are no technical standards based on vessel size nor does it specify the aerial extent required. Rec 07-07 also makes exemptions for longline vessels targteting swordfish and using monofilament longlines on the condition that the vessels use night-setting, 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 3 m from the hook to achieve optimum sink rates.

Under Rec 11-09 all ICCAT contracting Parties (CPCs) are encouraged to reduce seabird bycatch across all fishing areas, seasons, and fisheries through effective mitigation measures, considering crew safety and practicality. All longline vessels operating south of 20°S are required to implement at least two of the following mitigation measures: night setting; Tori lines (bird-scaring lines), or weighted branch lines. Vessels operating in the Mediterranean are not required, but encouraged, to implement the aforementioned three mitigation measures. The specifications for these three mitigation options are available in the Annex.

In 2024, the ICCAT Sub-Committee for Ecosystems and Bycatch (SC-ECO) was tasked to review Rec. 07-07 and Rec. 11-09. The recommendations of SCRS/2024/079 were to update the specifications of the three existing mitigation measures to meet the ACAP best-practice guidance, the requirement for simultaneous use of all three existing measures, and the inclusion of hook shielding devices as an alternate. Any of these measures could apply to latitudes south of 20°South. The Subcommittee further discussed that some of the mitigation measures in Rec. 07-07 and Rec. 11-09 are not in line with ACAP's best practices or decisions recently taken within the IOTC or the WCPFC and could be updated. However, it's important to note that ICCAT did not adopt new seabird bycatch mitigation measures during the 2024 meeting.

2.5. Commission for the Conservation of Southern Bluefin Tuna (CCSBT)

CCSBT adopted a Resolution to align conservation measures of Ecologically Related Species (ERS) with those of other tuna RFMOs in the areas of competence that overlap with the WCPFC, IOTC and ICCAT during October 2024. CCSBT members when fishing within the relevant area of competence must adhere to the seabird measures adopted in that convention area.

CCSBT commenced a project on enhancing education on and implementation of ERS seabird measures within CCSBT Fisheries (Seabird Project) in March 2022. As a part of the Seabird Project, educational seabird bycatch mitigation infographics have been developed to convey useful information in a visual format. They show key features of seabird bycatch mitigation measures that were in force in 2024 and applicable to SBT fisheries that may be useful for CPCs with vessels operating in the IATTC.

3. MITIGATION MEASURES IN USE BY IATTC CPCS

In response to the request made by the EBWG for the IATTC scientific staff to provide an overview of mitigation measures implemented by CPCs, including those fishing in areas where such measures are not mandatory, the staff reviewed annual reports sent to the Commission by each CPC as required in paragraph 5 of C-11-02 where, '*CPCs shall inform the IATTC, by 1 September 2011, and annually thereafter, of the mitigation measures that their flag vessels plan to employ in the implementation of this resolution.'*

All seabird reports submitted by each CPC between September of 2011 through 2023 were reviewed for the list of mitigation measures used, the required specifications of each measure, the incidences of reported seabird interactions, and the year the National Plan of Action (NPOA) was published for each CPC (as agreed in Paragraph 1 of Res. C-11-02 that, '*CPCs report to the IATTC 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'*). The CPCs that submitted a report for at least one year between 2011 and 2023 include: Belize, Canada, Chile, China, Ecuador, El Salvador, Japan, Korea, Panama, Peru, Portugal (EU), Spain (EU), Chinese Taipei, United States of America, Venezuela, and Vanuatu. For the majority of CPCs and reported years, the measures in IATTC Resolution C-11-02 were cited. The most commonly used mitigation measures across CPCs, submitting at least one report during the specified time period were: Tori lines, weighted branch lines, and management of offal discharge (Figure 1).

Mitigation measure use through time was assessed from the CPC annual seabird reports. A separate table was generated for each CPC that communicated that they had at least one active longline vessel greater than 20 m operating the EPO (Tables A2.a-q). In the CPC seabird report tables (Tables A2.a-q), for each year the mitigation measures used are recorded. The specifications of certain measures (e.g., tori line) were also recorded, including when reports mentioned that vessels followed measures described in C-11-02. In each table, the year the National Plan of Action (NPOA) was published is indicated as well. Whether each CPC had registered longline vessels was recorded annually using the Vessel Register List. In years where no seabird report was given, other communications with the Secretariat were used to determine whether CPCs had active longline vessels of more than 20 m length overall. If a report was not provided to the Secretariat and it was clear a CPC had at least one active longline vessel of more than 20 m, then it was recorded that CPC did not provide a report. Additionally, other comments were recorded in the table when provided by individual CPCs in their seabird reports, such as whether no fishing occurred in the Resolution mitigation area or no longline vessel greater than 20 m was active, among others. It was also clearly marked when CPCs indicated to the Secretariat that they had no observer program to monitor mitigation measures. CPC reporting tables (Tables A2.a-q) can be found in the Annex.

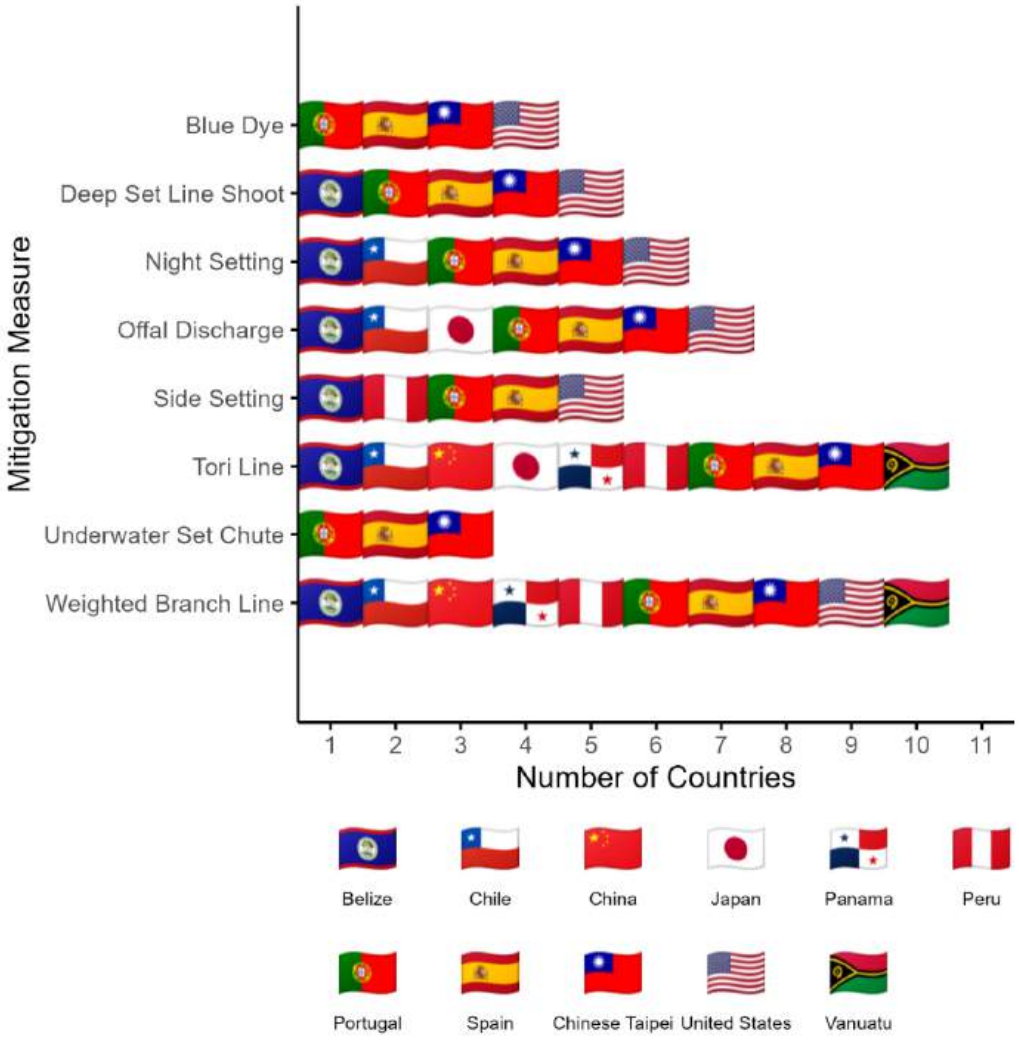

FIGURE 1. The number of CPCs that reported using each seabird mitigation measure. The location of a country's flag in the same row as a mitigation measure, indicates that mitigation measure was used and reported for at least one year between the years 2011-2023. It should be noted that the mitigation measures for the two fisheries reported by U.S. were combined for this figure for the sake of simplicity.

To summarize the use of mitigation measures through time, each year the proportion of CPCs that had at least one active longline vessel greater than 20 m that used each mitigation measure was calculated. In addition, the proportion of CPCs that did not report that met the 20 m requirement was calculated. The proportion of CPCs that reported or provided other information was also calculated such as, among others, whether fishing did not occur in the Resolution area or the CPC did not have an observer program. The type of mitigation measures used varied considerably through time (Figure 2). For most years, most CPCs utilized tori lines and weighted branch lines (20-40%; other than during the Covid 2020 year). The next most frequently used measures were management of offal discharge and night setting. From 2011 to 2021, there was no major trend in the use of any of these measures, however in 2022 and 2023 around 50% of CPCs with active longline vessels greater than 20 m used tori lines and weighted branch lines. Interestingly, the percentage of CPCs that met the active vessel requirement varied from 30-60% from 2011-2020 and then dropped significantly to under 20% from 2021-2023 (Figure 2).

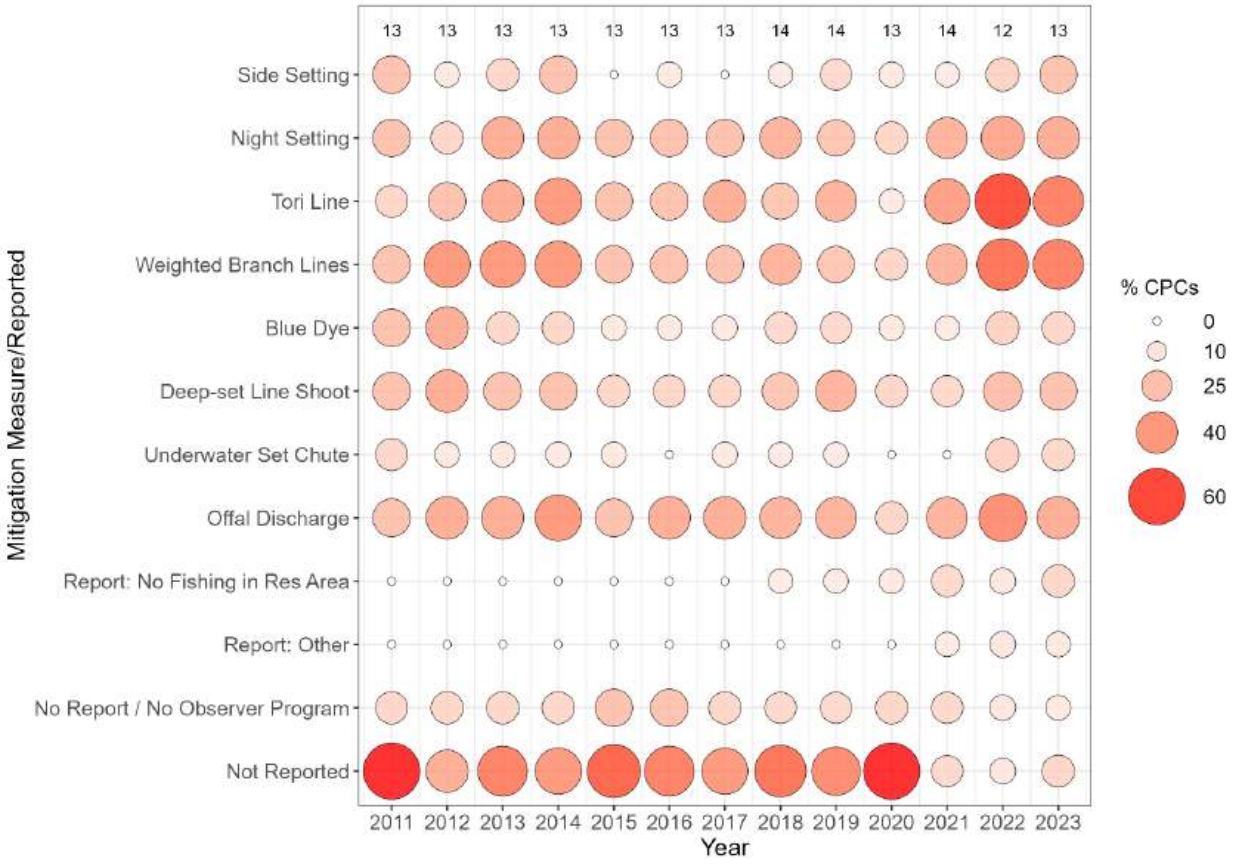

FIGURE 2. The percentage of CPCs each year (size and color of bubble) that had at least one active longliner greater than 20 m in length in the IATTC Convention Area that used various seabird mitigation measures from 2011 to 2023. Similarly, the percentage of CPCs that did not submit a report, did not submit a report and had no observer program, submitted a report with other information other than seabird mitigation measures, and submitted a report indicating that no fishing occurred in the Resolution Area were also recorded. The total number of CPCs each year that had at least one active longliner greater than 20 m in length is labeled along the top of the plot.

While compiling the mitigation measures reported by CPCs each year multiple difficulties arose. The type of report submitted varied considerably across CPCs with some CPCs providing the mitigation measures each vessel used, while others simply referred to the options in Resolution C-11-02. The specifications of each measure were often not identified and were thus assumed to be following those described in C-11-02. To monitor mitigation measure usage, their specifications and their efficacy more accurately, it would be beneficial for the CPCs to adopt a standardized form that would be submitted to IATTC annually.

4. REVIEW OF SEABIRD MITIGATION MEASURES

A diverse range of demersal and pelagic fisheries worldwide face the common issue of mitigating seabird bycatch, which has resulted in a variety of mitigation measures being developed for specific types of vessels, gears, and habitats. Since the development of the Food and Agriculture Organization's International Plan of Action (FAO-IPOA) on seabirds in 1999, there has been increasing effort to improve the efficiency of existing methods or develop new methods to minimize seabird mortality to the furthest extent possible. Over the last two decades of mitigation technique development, testing, adoption, and implementation, robust data sets have been generated on how different measures perform in actual fishery settings. Herein, we review the current state of knowledge for the mitigation methods adopted

across tuna RFMOs for pelagic longline fisheries, to identify the most effective options and those that may not perform as intended.

4.1. Hook shielding devices

Hook shielding devices are a relatively new and highly effective mitigation method being increasingly used in longline fisheries that experience high seabird bycatch. These devices encase a hook's point and barb to prevent seabird hooking during the line deployment process in longline fisheries. The device activates after a specific depth (usually a minimum of 10 m) or time after immersion (usually at least 10 minutes) is reached, exposing the hook once it is beyond the foraging depth of most seabirds. A number of studies (Baker et al. 2016, Barrington 2016a, 2016b; Sullivan et al. 2018; Goad et al. 2019; Gianuca et al. 2021; Sullivan & Barrington 2021) have been undertaken on various hook shielding device designs and three are now recommended by ACAP and considered best practice as a stand alone measure for reducing seabird mortality. These devices integrate two performance components: i) protecting hook points and ii) weights to increase the sink rate of the baited hooks reducing opportunities for seabirds to access them. Although, mortality may be further reduced when used in combination with other effective measures such as Bird Scaring Lines (BSLs or Tori lines) and night setting. The specific configurations of effective hook shielding designs are listed in Annex Table A.1.d. This option has been adopted as a standalone measure in the IOTC, WCPFC and proposed for addition in ICCAT. It is not currently listed as an available option for IATTC.

4.2. Night setting with minimum deck lighting

Night setting of longlines can significantly reduce bycatch mortality of seabird species that primarily forage during the day by reducing the overlap of diurnal seabirds with the deployment of baited hooks. Several studies in the northern hemisphere demonstrated reductions in catch rates of up to 98% of albatrosses (e.g. McNamara et al. 1999; Boggs 2003). However, bright moons and long deployment times spanning twighlight periods can lead to higher bycatch rates of nocturnal (e.g. northern fulmars *Fulmarus glacialis*, Melvin et al., 2001a,b) and crepuscular foragers (e.g., white-chinned petrels, *Procellaria aequinoctialis*; ACAP, 2023). Thus this option is not perfectly effective on its own but when combined with weighted branchlines and bird scaring lines (i.e., tori lines) significantly reduces seabird bycatch rates (Jimenez et al. 2020; Pierre 2023; Fischer et al. 2024).

Night setting has been adopted and implemented effectively across all tRFMOs. However, the specifications in Resolution C-11-02, which prohibit setting longline gear between local sunrise and one hour after local sunset, are insufficient to fully minimize seabird bycatch risk. This is because they do not account for the light levels present during crepuscular periods—dawn and dusk—when many seabird species are most actively foraging. These crepuscular windows include civil and nautical twilight, which occur before sunrise and after sunset, when there is still enough light for birds to visually detect and pursue baited hooks. In contrast, the night setting specifications recommended by the Agreement on the Conservation of Albatrosses and Petrels (ACAP) define night as the period between nautical dusk and nautical dawn, when the sun is at least 12 degrees below the horizon. This definition captures the full extent of twilight and better aligns with seabird behavior and visibility thresholds.

Local sunrise and sunset, by definition, occur when the upper edge of the sun crosses the horizon. However, civil twilight occurs when the sun is between 0° and 6° below the horizon, and nautical twilight when it is between 6° and 12° below. During these twilight phases, light levels are often sufficient for seabirds to forage, and gear deployed during these times remains visible and accessible to them.

By allowing gear deployment during civil and nautical twilight, current regulations under C-11-02 leave a substantial overlap between fishing operations and periods of high seabird activity. Adopting the more precautionary ACAP specifications would better minimize this risk by ensuring that gear is set only when ambient light levels are low enough to reduce seabird interactions significantly.

4.3. Bird Scaring Lines (Tori lines)

Bird scaring lines (BSLs), or Tori lines as they are called in the IATTC and elsewhere, is a device designed to deter birds from descending upon sinking baits as they are being deployed. The line is attached to a high point at the stern of the vessel and deployed over the water to a device or mechanism that creates drag and keeps the line taught. Brightly coloured streamers are attached to the line over the aerial portion, above the water's surface that deter seabirds from flying within the vicinity of the baited hooks as they are being set. BSLs are considered highly effective for reducing seabird bycatch mortality particularly when combined with weighted branchlines—that expedite the sink rate of baited hooks—and night setting.

Because pelagic longline vessels differ in their operational characteristics, including size and gear specifications, ACAP has made recommendations for BSLs for vessels >35 m and those that are <35 m LOA. For vessels >35 m, it is recommended that vessels employ the simultaneous use of a BSL on each side of the longline to maintain effective deterrence of seabirds under various wind conditions. However, if it is only possible to use one BSL, it should be deployed windward of the sinking baits. The BSLs should be attached at least 8m above the water at the stern to provide at least 100 m of aerial extent above the surface, and use a mix of brightly coloured long and short streamers—to be attached at intervals of ≤5 m—where the long streamers should be able to reach the sea-surface in calm conditions and attached to the line in a way that prevents entanglement (e.g. using unweighted swivels). For vessels <35m there are two design options that are recommended. They are similar to the >35 m design but the effective aerial extent recommendation is at least 75m to account for lower attachment height of 6m for smaller vessels. The recommendations also allow for short streamers (≥1 m in length) attached at 1 m intervals along the BSL – one option is to use a combination of long and short streamers over at least the first 55m of the BSL the second design option is to use only short streamers. (See Table A.1.c. for specifications)

Other studies testing BSLs have demonstrated efficacy when tailored more specifically to various vessels across regions, sizes and operational characteristics. For example, Melvin et al. (2014) suggests that in order for bird-scaring lines to be successful, the aerial extent of the lines should be aligned with the distance astern that baited hooks sink beyond the foraging depth of the dominant seabird. While Ochi et al. (2011) noted that for smaller vessels, lighter materials and streamer-less designs that covered a wide aerial extent were effective for most Japanese small-scale longline vessels. Currently, ongoing experiments with the Peruvian artisanal fleet using varied tori-line designs have shown promise utilizing materials that are locally and abundantly available (Quiñones Dávila pers. comm.)

At present, Resolution C-11-02 only applies to vessels >20 m LOA. The specifications for Tori lines in the seabird measure contain requirements for a Tori line that is nearly in alignment with the ACAP specifications but omits the requirement for brightly colored streamers and only requires a minimum height of 5 meters above the water as opposed to the recommended 8 or 6 meters for larger (>35 m) or smaller (< 35m) vessels respectively. There are also specifications for a Tori line (light streamer), but the Resoloution lacks clarification on when or where these should be utilized. The light streamer also only requires a minimum length of 100 m or three times the total length of the vessel. Some improvements in the specifications for Tori lines is desirable for improved options across vessel classes.

4.4. Branchline Weighting

Weighting branchlines with metal—typically lead—sinkers or swivels is a proven method for reducing seabird bycatch mortality. Weights accelerate the sink rate of baited hooks, thereby reducing their visibility and accessibility to diving seabirds. Since most seabird interactions occur during gear deployment, particularly while the hooks are still within the top 10 m of the water column (ACAP, 2021), accelerating sink rates is critical to effective bycatch mitigation.

In the Southern Hemisphere, species such as the black-browed albatross (*Thalassarche melanophris*) and

three *Procellaria* petrel species—also present in the IATTC Convention Area (see EB-03-02 for distributions and fishery interaction rates)—have been observed diving to depths of 17.3–38.5 m, with descent rates up to 0.6 m/s and as high as 1.52 m/s depending on species and dive profile (Dussler et al., 2024; Guilford et al., 2022). In contrast, Northern Hemisphere species such as Laysan and Black-footed albatrosses exhibit shallower diving behavior, with maximum recorded depths ranging from 0.46 to 6.02 m (Guilford et al., 2022), though descent rates were not reported.

To effectively move baited hooks out of reach of most seabirds, an ideal sink rate of 0.5 m/s has been recommended (Robertson et al., 2012). Achieving this requires careful consideration of both the mass of the weight and its proximity to the hook. Both factors significantly influence bycatch risk during setting (Gilman et al., 2024). Heavier weights positioned closer to the hook exert greater influence on initial sink rates, reducing the window of exposure to seabirds.

A comprehensive meta-analysis (Gilman et al., 2024) examined the effectiveness of various weighting configurations. It found a >97% probability that all tested designs—characterized by different weight masses and distances from the hook—significantly reduced seabird bycatch compared to unweighted branchlines. However, not all designs were equally effective. Configurations using weights >60 g positioned more than 1 meter from the hook (e.g., ≥60 g placed 1–3.5 m, or ≥80 g placed 1–2 m or 2–3.5 m from the hook) were the most effective, with >93% probability of outperforming commonly used alternatives such as ≥40 g placed ≤0.5 m or ≥45 g placed 0.5–1 m from the hook. These top-performing designs reduced seabird bycatch by approximately 89% relative to unweighted gear in Pacific longline fisheries. A separate meta-analysis conducted by Fischer et al. (2024) of WCPFC fisheries noted that the current specifications for branch line weighting under WCPFC CMM 2018-03 limit the effectiveness of this mitigation method. Their analysis showed that updating the weighting specifications to those recommended by ACAP (see section 5 for specs and Table A.1.a.) would improve the performance of this method by 52%.

When implementing weighting requirements, CPCs should consider these comparative performance outcomes to ensure optimal efficacy.

Achieving target sink rates may be influenced by other gear characteristics, such as mainline and or leader materials. A paired trial conducted by Scott et al. (2022) in the EPO assessed sink rates of tuna-targeting longline branchlines, with leaders made from either wire or monofilament, each rigged with a 45-gram swivel within one meter of the hook. Using temperature-depth recorders, the study found no statistically significant differences in sink rates between the two materials ($t = 1.317$, $p = 0.188$). Mean sink rates were 0.21 ± 0.026 m/s for monofilament and 0.21 ± 0.037 m/s for wire leaders.

Despite its effectiveness, a major drawback of weighted branchlines is the risk of injury to crew members from "flybacks"—when a weighted line under tension breaks and the weight recoils toward the vessel. This risk is particularly high when monofilament leaders are used, as they may be bitten through by large fish, sharks, or marine mammals during hauling. To address this safety concern, varioustechnologies have been developed, including sliding weights (Sullivan et al., 2012; Gilman et al., 2024b), protective screens, and devices such as the Lumo Lead© by Fishtek Marine. Some innovative designs have also been developed by fishers themselves, such as weighted devices that can be sent down the line while removing large animals from the gear.

In recognition of their efficacy and practicality, the ACAP has identified weighted branchlines as one of the most effective seabird bycatch mitigation measures for longline fisheries. These measures can be easily and consistently implemented across all vessel sizes to very effectively reduce seabird mortality.

4.5. Line shooter

A line shooter is a hydraulically operated device often used to reduce seabird bycatch in pelagic longline fisheries. These devices dispense the mainline at a faster rate than the vessel's forward velocity, decreasing the tension in the mainline ensuring appropriate sink rates of weighted branchlines, to ensure tension from the mainline does not reduce sink rates and increase accessibility of baited hooks to seabirds. However, the sink rate of baited hooks will be unaffected by the sink rate of the mainline until the hook has settled to the full length of the branchline, which in most fisheries is below the depth where seabirds susceptible to pelagic longline capture can dive (for details, see WPRFMC, 2019; Gilman et al. 2024b ISSF report). The line shooter was not recommended by ACAP as a bycatch mitigation method for pelagic longline fisheries owing to a lack of conclusive scientific evidence establishing efficacy. However, this device is still listed as a bycatch mitigation option for IATTC and WCPFC while other tRFMOs have either removed this method or never adopted it to mitigate seabird bycatch rates.

4.6. Blue-dyed bait

Blue dye applied to bait used in longline fisheries is thought to reduce the visibility of the baits to seabirds from less contrast between the blue-dyed bait and seawater and is thus purported to reduce seabird interactions and bycatch mortality. There are some limitations to this method as it is more effective for squid baits (Cocking et al. 2008) and dying can be applied inconsistently, and is difficult and laborious to undertake at sea (Gilman 2003, Ochi et al 2011). Several studies conducted in the US tuna longline fishery in the central North Pacific demonstrated that blue-dyed baits reduced overall seabird interactions but were most effective when when used in combination with other mitigation measures such as tori lines, weighted branchlines, and night setting (reviewed by Gilman et al. 2005). While a large meta-analysis of seabird catch and mitigation methods across the WCPFC demonstrated that blue-dyed bait is an ineffective bycatch method noting it added little to no improvements in bycatch rates across the region and across studies (Fischer et al. 2024). Blue-dying bait is no longer a recommended mitigation option by ACAP and only the IATTC and WCPFC[1] allow for its use as an option for reducing seabird bycatch.

4.7. Underwater bait setting device

An underwater bait setting device is a seabird bycatch mitigation device that deploys baited hooks at a pre-determined depth immediately at the stern of the vessel. They work by deploying baited hooks enclosed in a capsule or similar device, vertically down a track fitted to the fishing vessel's transom to eliminate any visual stimulus for seabirds following the vessel. The capsule is pulled underwater to a predetermined target depth that can be adjusted in response to the dive capabilities of seabirds attending the vessel during line setting to prevent interactions.

A short-term trial of an underwater setting device in the Hawaii pelagic longline tuna fishery found that it eliminated seabird captures (0.00 captures/1000 hooks/bird), was 95% effective at reducing seabird contacts with fishing gear compared to a control, and increased fishing efficiency 14.7% to 29.6% when albatrosses were abundant (Gilman et al. 2003). Later trials experienced design flaws making implementation impractical in some instances (Gilman et al. 2005). More recently, new research on underwater bait setting devices prevailed and the ACAP added this device (by one manufacturer) to its list of recommended mitigation options (ACAP, 2024) after several studies demonstrated efficacy and improvements to fishing efficiency (see review in Pierre, 2023). Additionally the WCPFC has recently added this option to their list of standalone mitigation options currently under review (WCPFC-TCC20-

[1] Blue-dyed bait and management of offal discharge is removed from the list of options under review by the WCPFC.

2024-DP05_rev1). This device is not currently an approved mitigation option in the IATTC and could be reviewed for inclusion.

4.8. Management of offal discharge

The discharge of offal—waste products from fish processing—from longline vessels can attract seabirds and potentially result in capture either during deployment or retrieval, or injury by interacting with the gear. For example, in the central North Pacific Gilman et al. (2021) found that discharging offal during setting by the US tuna longline fishery exacerbated seabird interactions. Therefore, delaying or ceasing offal discharge during setting and hauling may reduce seabird interactions. Although this is not recommended as an effective mitigation measure by ACAP, it is good practice to avoid attracting seabirds. The IOTC and ICCAT do not allow this as a seabird mitigation option while the WCPFC and the IATTC do.

4.9. Side setting

Side-setting refers to the practice of deploying baited hooks from the side of a longline vessel, typically from a position well forward of the stern and close to the hull, rather than from the stern itself. This method alters the spatial dynamics of gear deployment in a way that can reduce seabird interactions. Seabirds are generally less inclined to pursue baited hooks alongside the vessel, particularly when physical deterrents such as bird curtains (similar in action to BSLs) are in place. When side-setting is combined with weighted branchlines and bird curtains—as required under IATTC Resolution C-11-02—it can prevent baited hooks from remaining within the foraging depth of most albatross in the northern hemisphere by the time they pass astern (Gilman et al., 2005; ACAP, 2021). Additionally, setting outside of aerated propeller wash at the stern speeds up sink rates.

However, empirical studies suggest that the sink rates achieved through side-setting alone are often not fast enough to move hooks beyond the diving range of all seabird species before the gear moves astern. As such, side-setting is generally considered effective only when used in combination with other mitigation methods, particularly branchline weighting and bird curtains (ACAP, 2021; Gilman et al. 2005). For example, the effectiveness of side-setting in the Hawaii-based pelagic longline tuna fishery was significantly improved (contact reduction of 99%) when used with a bird curtain and 45 g weighted swivels placed within 1 m of the hook (Gilman et al., 2005).

When implemented correctly, with supporting measures, side-setting is cautiously recommended by the ACAP as a standalone option under ideal operational conditions in the Northern hemisphere (ACAP, 2024). ACAP further notes that this method has only been tested in the Northern hemisphere and is not recommended as a proven mitigation measure in the Southern hemisphere where deeper diving seabirds are more abundant. This mitigation option is currently approved for use in the IATTC as a standalone option with the caveat that this measure can only be applied in the area north of 23°N until research establishes the utility of this measure in waters South of 30°S. Further the specifications for setting position (distance forward of the stern) and the specifications for bird curtains still need to be developed.

4.10. Combining mitigation options

Multiple mitigation options exist to reduce seabird bycatch in longline fisheries, each targeting different stages of gear deployment and bird behavior. While individually effective to varying degrees—by reducing visibility (e.g., hook shielding devices) or accessibility (e.g., branchline weighting, bird-scaring lines, night setting)—these techniques are most effective when used in combination. This integrative approach is widely endorsed by experts, ACAP, and adopted by several tRFMOs, particularly in high-risk areas.

Individually, each mitigation measure has limitations. For example, weighted branchlines accelerate hook sink rates and reduce seabird access, but there remains a critical window immediately after deployment when hooks are still exposed. Night setting can substantially reduce interactions with diurnal seabirds but

is less effective during full moons or in the presence of nocturnal or crepuscular foragers such as white-chinned petrels. Bird-scaring lines (BSLs or tori lines) deter seabirds in the immediate vicinity of the vessel, but hooks become vulnerable once beyond the aerial extent of the lines. Hook shielding devices protect baited hooks during initial deployment and release them only after reaching depths typically beyond seabird foraging zones; however, their use is currently limited to some fleets and regions.

Field studies consistently demonstrate that combining mitigation methods substantially improves bycatch reduction. For instance, when tori lines and night setting were used together, seabird catch rates declined significantly—by factors ranging from 4 to over 200—compared to sets with no mitigation (Pierre, 2023; Fischer et al., 2024). A South African study showed that the use of weighted branchlines in combination with dual bird-scaring lines extending 100 m aft reduced seabird attacks fourfold and mortality sevenfold, with no adverse effects on target catch or crew safety (Melvin et al., 2014).

Hook shielding devices are particularly promising as standalone measures, integrating both hook protection and additional weighting to hasten sink rates. Yet even these benefit from being used alongside tori lines and night setting, as recommended by ACAP. Likewise, updated weighting configurations—such as ≥60g weights placed closer to the hook—have proven to be most effective at reducing bycatch without compromising fishing performance (Gilman et al., 2024).

For smaller vessels, which may face operational challenges implementing multiple measures simultaneously, optimal weighting can help shorten, but not eliminate, the high-risk exposure zone behind the vessel (ACAP, 2024). However, no single technique can completely eliminate seabird bycatch. Therefore, combining strategies that can leverage the specific mitigation strengths of one another is essential for minimizing seabird bycatch, especially in regions with diverse seabird assemblages and high bycatch risk.

4.11. BHRP

The use of Best Handling and Release Practices (BHRP) cannot be considered a bycatch mitigation option because they do not decrease interaction rates, but they are widely viewed as simple, straightforward options for reducing mortality when other mitigation options fail and seabirds are captured. By making small changes to fisher behavior when handling bycatch species and by educating fleets on which practices are harmful and ought to be avoided, post release survival outcomes can be improved.

The seabird conservation Resolution C-11-02 contains content relating to the use of BHRP for ensuring survival of incidental seabirds captured in longline fisheries (paragraph 9), which states:

CPCs are encouraged to adopt measures aimed at ensuring that seabirds captured alive during longline fishing operations are released alive and in the best condition possible, and that, whenever possible, hooks are removed without jeopardizing the life of the seabird.

The Resolution does not however, identify or expand upon what practices help to release seabirds in the 'best condition possible' to reduce mortality nor does it provide guidance on hook removal.

Recently, the IATTC scientific staff established a five-year workplan for the development of BHRP guidelines for vulnerable species captured in IATTC fisheries (EB-02-03). The workplan, endorsed by EBWG-2 in 2024, established a timeline for BHRP development for all vulnerable taxa with seabirds prioritized for 2025, lining up with the timing of the SAP. The staff developed proposed BHRP guidelines for seabirds (EB-03-06) that were informed by expert consultations, workshops, regulations and guidelines from CPC fishery agencies, ACAP and other tuna RFMOs and underwent two rounds of review by participating CPCs and external experts. These BHRP guidelines offer science-based recommendations for handling seabirds in IATTC purse seine, longline, and gillnet fisheries. They follow the ACAP guidance on avoiding bird flu infection from potentially ill seabirds, include step by step instructions for removing

hooks, identifies injurious practices that should be avoided and contains recovery and release recommendations to help fishers avoid further harm while removing fishing gear from seabirds.

4.12. ACAP Best Practice Advice to reduce seabird bycatch in pelagic longline fisheries

In 2024 the seabird bycatch working group (SBWG) of ACAP reviewed all available data and endorsed the best practice advice for reducing the impact of pelagic longline fisheries on seabirds. The ACAP review process recognizes that factors such as safety, practicality and the characteristics of the fishery should also be considered when assessing the efficacy of seabird bycatch mitigation measures and these are integral in the resulting best practice advice.

ACAP has identified measures that should be used in combination and measures that are adequate as standalone methods. The best practice measures that should be used in combination includes branchline weighting, night setting and BSLs (Tori lines). The recommended minimum standards for branchline weighting configurations are: greater than 40 g attached within 0.5 m of the hook or; greater than 60 g attached within 1 m of the hook or; greater than 80 g weight attached within 2 m of the hook. The SBWG12 further noted that branchlines should achieve a minimum sink rate, under experimentally controlled conditions, of 0.5m/s to 5 m depth. They suggest that these measures should be applied in high risk areas such as the high latitudes of southern hemisphere oceans and lower to mid-latitude fisheries of both the northern and south east Pacific to reduce incidental mortality, noting that currently the above options on their own cannot effectively prevent mortality in pelagic longline fisheries (CCSBT-ERS/1203/Info06). Alternatively, any of the three assessed hook shielding devices—'Hookpod-LED', 'Hookpod-mini' or 'Smart Tuna Hook'—or an underwater bait setting device can be used as a stand-alone measure.

ACAP also ranked individual seabird bycatch mitigation methods under their best practice specifications, from best to worst performing (based on relative standardised interaction rates): 1) hook-shielding devices, 2) weighted branch lines, 3) night setting, and 4) tori lines. They also ranked the best combinations of two out of three mitigation methods: 1) weighted branch lines with tori lines, 2) weighted branch lines with night setting, and 3) tori lines with night setting, as the optimal combinations for RFMOs only requiring the use of two mitigation options (ACAP 2024; Fischer et al. 2024).

Measures that are not currently recommended due to the lack of scientific evidence on effectiveness includes: line shooters, bait casting devices, live bait, olfactory deterrents; blue-dyed bait; bait thaw status; laser technology; offal management. However, some of these measures may be considered in the future as best practice in instances where they are scientifically proven to be effective for reducing seabird bycatch mortality.

Recently, a meta-analysis of standardized interactions rates conducted by New Zealand's Department of Conservation for WCPFC fisheries showed that the ACAP best practices reduce seabird bycatch more effectively than the current minimum requirements in the WCPFC CMM 2018-03 (Fischer et al. 2024). They found that adopting ACAP best practices in the WCPFC Convention Area could result in bycatch mitigation performance improvements of 61% for the area south of 30°S, 81% for the area 25°–30°S, and 73% for the area north of 23°N (Fischer et al. 2024). Because the current mitigation options for the IATTC are very similar to those in the WCPFC CMM 2018-03 it is reasonable to assume that updating the IATTC options to reflect the best practices endorsed by ACAP would also elicit a comparable reduction in seabird bycatch rates.

5. CONCLUSIONS AND STAFF RECOMMENDATIONS

The IATTC has been actively working towards bycatch mitigation in pelagic fisheries that target tuna and tuna-like in the EPO to meet its obligations under the Antigua Convention with relation to ecological sustainability. The conservation concerns surrounding seabird mortality in these fisheries in the EPO,

namely longline, resulted in themandated use of a range of mitigation measures in specific areas of the EPO to reduce seabird bycatch (C-10-02) that were later amended to only apply to vessels > 20 m LOA in the current active Resolution C-11-02, which entered into force in 2011. However, in the intervening 14 years since the implementation of C-11-02, a significant amount of reliable scientific research has been undertaken to test the efficacy of new and existing mitigation measures in the EPO, throughout the Pacific Ocean, and within the Convention Areas of tRFMOs in other oceans. As a result, all tRFMOs have updated, or are in the process of reexamining and updating, the spatial boundaries within which seabird mitigation measures are required to be used, and also the specific mitigation measures and specifications that may be used after removing outdated measures and adding newly approved options.This has provided a strong impetus for the IATTC (see Seabird Action Plan) to follow a similar process, since several mitigation measures that have been scientifically demonstrated to be ineffective and are no longer recommended by ACAP (i.e. blue-dyed bait, management of offal discharge, and line shooters), are currently valid options in Resolution C-11-02.

Reporting of mitigation techniques in use across IATTC CPCs

As requested by the EBWG-3 the specific seabird mitigation measures in use by IATTC CPCs were assessed by reviewing the seabird bycatch mitigation reports submitted by CPCs in response to paragraphs 5 and 9 of Resolution C-11-02. Although our review determined that almost all CPCs exercised best practices by the use of approved mitigation measures, with a preference for tori lines (BSLs) and weighted branchlines, operational level information was unavailable to verify the specifications or *in situ* operation of these measures to determine whether they are being optimally implemented during routine fishing operations. In a simple example, Resolution C-11-02 specifies that night setting is to take place at least one hour after local sunset, but because even fundamental operational level data, such as set time, is collected only for observed sets—covering a minimum of 5% of the effort of the fleet—it is unknown whether this measure is being implemented by CPCs as prescribed. Further, using AIS data the Global Fishing Watch estimated that only 2% of longline sets occur completely at night (EB-03-02).

Additionally, the review revealed inconsistencies in reporting frequency and content. For example, for those CPCs that had not submitted a report, determining whether or not they had longline vessels fishing in the EPO, whereby the requirement would not apply, needed to be extracted using a convoluted means of interrogating the IATTC vessel register, compliance questionnaires or other communications. In other situations, reports merely noted that the permitted mitigation options in Resolution C-11-02 were utilized. For those CPCs that did identify which mitigation measures were being employed, at times the specifications needed to be extracted from the CPC's NPOA or other governmental documents, and in some cases, were not found. Therefore, the IATTC staff recommends that:

A standardized reporting format for the requirements outlined in Resolution C-11-05 should be developed and adopted to better assist CPCs with meeting their obligations of implementing seabird mitigation requirements and to provide clarity for the scientific and compliance aspects of the technical specifications and efficacy of utilized mitigation measures.

Furthermore, assessing the efficacy of different seabird bycatch mitigation techniques is hindered by insufficient seabird bycatch data reporting and content. This highlights the need for improved reporting of seabird interactions and increased observer coverage of the longline fleet, as well as the submission of operational-level data from logbooks, as recommended by the IATTC staff (SAC-16-11) to improve research, conservation and management of not only seabirds, but a range of other vulnerable bycatch species such as sea turtles, elasmobranchs, marine mammals and teleosts.

Seabird bycatch mitigation options

To assist CPCs, the EBWG, SAC, and proponents of the IATTC seabird action plan in the potential development of an updated Resolution proposal, this document reviewed the seabird mitigation measures adopted in the IATTC, across other tRFMOs, and those endorsed by ACAP—for evidence of their relative efficacy in pelagic tuna and tuna-like longline fisheries. The review identified several permissible measures in Resolution C-11-02 that lack scientific support for their efficacy, including line shooters, management of offal discharge and the use of blue-dyed bait. The review also revealed that several of the measures, very effective at reducing interaction rates under optimal conditions, had specifications in Res. C-11-02 that require updating (i.e. weighted branchlines, tori lines, night setting), not only to meet ACAP standards but to ensure the full effects and intent of the measures are actualized.

The review of measures across CPCs showed that weighted branchlines are one of the more commonly used techniques. However, as suggested by Fischer et al. (2024) for WCPFC fleets, to optimize the efficacy of this mitigation technique in the EPO, the current IATTC branchline weighting specifications need to be updated to achieve a desired hook sink rate of at least 0.5 m/s. Additionally, updated specifications should also take into account safe weighting options (e.g., sliding weights-reviewed in section 4.4) because of the risks to crew safety from 'fly-backs' of weights from dislodged hooks. The scientific staff also believes there would be great benefit in collaborating with CPCs to continue research to develop affordable fly-back prevention methods.

The scientific staff also noted the IATTC specifications for bird-scaring lines (BSLs or tori lines) currently lack several key elements integral to optimizing the efficacy of this device. The existing specifications should be revised to require the use of brightly colored streamers to maximize seabird deterrence, and an updated minimum height above the water line where BSLs are attached to achieve the minimum required aerial extent of the lines. Since this mitigation method is recommended for vessels of all sizes, the specifications should also be revised to account for vessel size, ensuring that smaller vessels are able to implement appropriately scaled BSLs. Furthermore, Resolution C-11-02 specifies two different configurations: a standard Tori line and "Tori line (light streamers)". However, it is unclear what constitutes a light streamer configuration and under what circumstances it may be used in place of the standard Tori line. Therefore, the specifications of BSLs in Resolution C-11-02 need to be explicitly defined, by vessel size, to ensure consistent and effective implementation.

Night setting is an effective measure for reducing seabird bycatch since the potential for interactions is greatly reduced given that the majority of seabirds forage during the day, although efficacy can be compromised when setting overlaps with crepuscular periods. Resolution C-11-02 requires vessels using night setting as a mitigation option not to set their gear between local sunrise and one hour after local sunset. The specifications for night setting recommended by ACAP require fishers not to set their gear between nautical dawn and nautical dusk—as defined in the Nautical Almanac tables for relevant latitude, local time and date. During nautical dawn and dusk the sun is 12° below the horizon, whereas during local sunrise and sunset the sun is just below or above the horizon. The difference means that fishers are able to set their gear during times of both civil and nautical twilight, thereby increasing the potential for seabird interactions during crepuscular periods.

This review further revealed that hook shielding devices are among the most effective seabird mitigation devices and currently recommended as a stand-alone measure by ACAP, ICCAT, IOTC and the WCPFC. This relatively new mitigation device has not previously been considered by the IATTC for inclusion in the list of approved mitigation measures in Resolution C-11-02 but is strongly recommended by the staff, provided an approved device meets the minimum specifications listed by ACAP (Table A.1.d.).

An additional measure that is approved by ACAP as a stand alone mitigation measure and has also been

suggested for approval by the scientific committee to the WCPFC is underwater bait setting devices. Underwater bait setting devices have been shown to significantly reduce seabird bycatch rates while also improving fishing efficiency. The staff suggests that these devices – if the appropriate speficications can be met- also be included in the list of approved bycatch mitigation options for the IATTC.

Although the staff strongly recommend the use of hook shielding devices and underwater bait setting devices as standalone measures owing to their proven efficacy, it is acknowledged that their use may be cost prohibitive for some longline fisheries in specific regions and fleets. As an alternative for these resource limited situations, seabird mortality may still be greatly reduced by using a combination of existing measures (i.e., weighted branchlines, bird scaring lines, and night setting). The best practice advice from ACAP includes the simultaneous use of these three mitigation options, although they rank performance of combinations of only two mitigation options. Therefore, the staff consider the best performing combinations of mitigations measures to be (best to worst): 1) weighted branch lines with tori lines, 2) weighted branch lines with night setting, and 3) tori lines with night setting. Individual seabird bycatch mitigation options were also ranked from best to worst performing: 1) hook-shielding devices, 2) weighted branch lines, 3) night setting, and 4) tori lines (ACAP 2024; Fischer et al. 2024).

When considering seabird mitigation options for the IATTC it is prudent to also take into account the cooperation and coordination of measures with the WCPFC, where the Commission has agreed to ensure harmonization and compatibility of conservation and management measures, particularly in the overlap areas. Article XXIV of the Antigua Convention on the Cooperation with other Organizations and Arrangements notes that the IATTC shall adopt the rules of operation of subregional, regional, and global fishery organizations. As such, it would be practical to consider the WCPFCs updated advice[2] outlined in Section 2.2 above, noting that the updated advice has not yet been adopted.

Yet in the EPO, it is well recognized that longline fisheries vary significantly in fleet characteristics and fishing strategies, both across the IATTC Convention Area and in comparison to those operating under the WCPFC. Thus, the scientific staff recommend options based on longline vessel sizes delineated in SAC-16-09—where the fleet characteristics across the EPO were described—and suggest categorizing longline fleets as: small-scale (<12 m), medium-scale (12–20 m), and large-scale (>20 m).

Considering ACAP best practices, the mitigation measures adopted across tRFMOs, the mitigation options currently utlilized by IATTC CPCs, and the best available data, the staff recommends an update to the mitigation options in Resolution C-11-02 as described below.

While fishing in high-risk seabird bycatch areas (Annex I, C-11-02), all vessels must use at least one of the options below (A, B, C, or D [can only be applied if fishing North of 23°N]) following the approved specifications for each measure[3]:

[2]WCPFC updates provided here for easy reference: Removes ineffective mitigation techniques (blue-dyed bait, line shooters, managing offal discarding) from the table of options and requires vessels operating South of 25°S to use either: a) These three measures in combination (Weighted branchlines, Night setting andTori lines); or b) Hook-shielding devices; or c) An underwater bait setting device; or d) Side setting with bird curtains and weighted branchlines. Vessels larger than 24 meters LOA, fishing North of 23° N must use two options from Column A or one option from Column B in Table 3. Vessels smaller than 24 meters would be required to use at least one option from Column A or one option from Column B.

[3] Specifications for these measures following the ACAP guidance are available in the Annex Table A.3.

A. For large vessels (>20 m) use at least 2 of the following measures in combination, for medium and small vessels (<20 m), use at least 1 of these measures:
    i. Weighted branchlines;
    ii. Night setting;
    iii. Bird Scaring Lines (Tori lines); or
B. Hook-shielding devices; or
C. An underwater bait setting device; or
D. Side setting with a bird curtain and weighted branch lines[4]

Outside the high-risk seabird bycatch areas CPCs are strongly encouraged to employ one or more of the listed seabird mitigation options (A–D).

Examination of the exclusions and scope of C-11-02

Resolution C-11-02 excludes certain areas and fisheries from mandatorily employing seabird bycatch mitigation measures (see, for example, the Annex I in C-11-02). Similarly, Resolution C-11-02, which refers to seabird conservation in general, seems to mostly focus on reducing fishery impacts on albatrosses and petrels, while other species like shearwaters (*Procellariidae*), frigatebirds (*Fregatidae*), terns (*Laridae*), tropicbirds (*Phaethontidae*), and boobies (*Sula*) and their habitats may be overlooked (EB-03-02). Therefore, taking into account the experience and information gathered in the intervening 14 years since the adoption of Resolution C-11-02, the IATTC staff recommends the Commission:

Review Resolution C-11-02, in particular its definition of the spatial and fisheries exclusions, as well as the scope of the covered species, and consider updating it with a view at improving its clarity and the intended seabird conservation outcomes in the IATTC Convention Area.

Improving post release survival rates

This review demonstrated that no single mitigation measure is 100% effective in eliminating seabird bycatch in longline fisheries. Therefore, on those occasions when seabirds are captured it is important that crews are aware of, and correctly implement, the BHRP guidelines prepared by the IATTC staff (EB-03-06) in consultation with CPCs, ACAP, industry personnel and external experts. The staff strongly believes that safe and effective guidance for removing seabirds from fishing gear are integral to complement any conservation measure and recommends that the BHRP guidelines in EB-03-06 be a required component alongside seabird mitigation measures in an update of Resolution C-11-02.

Consider updating Resolution C-11-02 with the inclusion of the BHRP guidelines outlined in EB-03-06 for all IATTC fisheries.

6. REFERENCES

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[4] This measure can only be applied in the area north of 23°N until research establishes the utility of this measure in waters south of 30°S.

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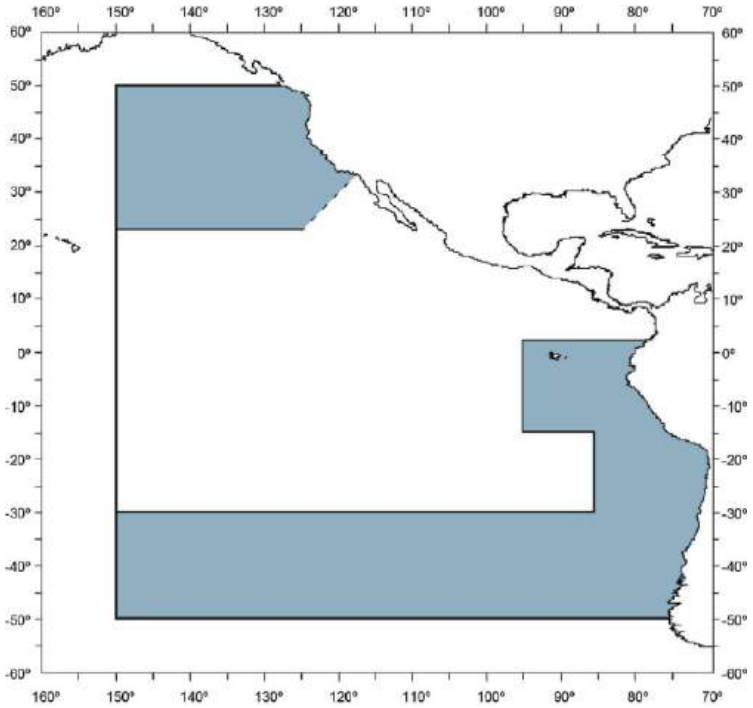
7. ANNEX

LIST OF DOCUMENTS:

- Figure A.1. Map of IATTC convention area showing where seabird mitigation measures are required
- Tables A.1a-g Seabird bycatch mitigation option specifications across tRFMOs compared to the ACAP advice.
- Tables A.2.a-q CPC reports of seabird bycatch mitigation measure use from 2011 - 2023.
- Table A.3a-f. Recommended updated specifications to the recommended seabird bycatch mitigation options.

7.1. Figure A.1. Map of IATTC Seabird Mitigation Device Requirements



Areas (shaded) within the EPO in which the use of at least two mitigation measures for reducing seabird bycatch is required: North of 23°N (except in mexican waters) and South of 30°S, plus the area bounded by the coastline at 2°N, West to 20°N-95°W, South to 15°S-95°W, East to 15°S-85°W, and South to 30°S.

7.2. Seabird bycatch mitigation option specifications across tRFMOs compared to the ACAP advice.

7.2.1. Table A1.a. RFMO Branch line weighting specifications compared to the ACAP best practices advice.

IATTC	WCPFC	IOTC	ICCAT	ACAP
Following minimum weight specifications are required:	Following minimum weight specifications are required:	Line weights to be deployed on the snood prior to setting.	Line weights to be deployed on the snood prior to setting.	Best practice advice for branchline weighting configurations:
Minimum weights attached to all branch lines is 45 g, with the following options:	One weight greater than or equal to 40g within 50 cm of the hook; or	Greater than a total of 45 g attached within 1 m of the hook or;	Greater than a total of 45 g attached within 1 m of the hook or;	Greater than 40 grams attached within 0.5 m of the hook; or
less than 60 g weight attached to within 1 m of the hook; or	greater than or equal to a total of 45g attached to within 1 m of the hook; or	Greater than a total of 60 g attached within 3.5 m of the hook or;	Greater than a total of 60 g attached within 3.5 m of the hook or;	Greater than 60 g attached 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 or equal to a total of 60 g attached to within 3.5 m of the hook; or	Greater than a total of 98 g weight attached within 4 m of the hook.	Greater than a total of 98 g weight attached within 4 m of the hook.	Greater than 80 g weight attached within 2 m of the hook
greater than 98 g weight attached to within 4 m of the hook	greater than or equal to a total of 98 g weight attached to within 4 m of the hook.			

7.2.2. Table A1.b. **RFMO Night setting specifications compared to the ACAP best practices advice.**

IATTC	WCPFC	IOTC	ICCAT	ACAP
No setting between local sunrise and one hour after local sunset.	No setting between nautical dawn and before nautical dusk.	Night setting with minimum deck lighting.	No setting between nautical dawn and before nauticaldusk. Deck lighting to be kept to a minimum.	No setting should take place between nautical dawn and nautical dusk.
Deck lighting to be kept to a minimum, noting requirements for safety and navigation.	Nautical dusk and nautical dawn are defined as set out in the Nautical Almanac tables for relevant latitude, local time and date.	No setting between nautical dawn and before nautical dusk,	Nautical dusk and nautical dawn are defined as set out in the Nautical Almanac tables for relevant latitude, local time and date.	Nautical dawn and nautical dusk are defined as set out in the Nautical Almanac tables for relevant latitude, local time and date
	Deck lighting to be kept to a minimum. Minimum deck lighting should not breach minimum standards for safety and navigation.	Deck lighting to be kept to a minimum.	Minimum deck lighting should not breach minimum standards for safety and navigation.	Setting longlines across night and day does not represent night setting: either when setting commences at night and finishes after the nautical dawn, or when setting commences prior to the nautical dusk and continues into the night.
		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.		

7.2.3. Table A.1.c. RFMO Bird Scaring Line (BSL or Tori Line) specifications compared to the ACAP best practices advice.

IATTC[5]	WCPFC	IOTC	ICCAT	ACAP
	For vessels fishing South of 25°S	Bird-scaring lines shall be deployed during the entire longline setting to deter birds from approaching the branch line.	Bird-scaring lines shall be deployed during longline setting to deter birds from approaching the branch line.	
Tori lines	*For vessels greater than or equal to 35 m:*	*For vessels greater than or equal to 35 m:*	*For vessels greater than or equal to 35 m:*	*For vessels greater than or equal to 35 m:*
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	Deploy at least 1 tori line. Where practical, vessels are encouraged to use a second tori line at times of high bird abundance or activity; both tori lines shall be deployed simultaneously, one on each side of the line being set. If two tori lines are used baited hooks shall be deployed within the area bounded by the two tori lines. ii. A tori line using long and short streamers shall be used. Streamers shall be: brightly coloured, a mix of long and short streamers. a. Long streamers shall be placed at intervals of no more than 5 m, and long	Deploy at least 1 bird-scaring line. Where practical, vessels are encouraged to use a second tori pole and bird scaring line at times of high bird abundance or activity; both tori lines should be deployed simultaneously, one on each side of the line being set. • Aerial extent of bird-scaring lines must be greater than or equal to 100 m. • Long streamers of sufficient length to reach the sea surface in calm conditions must be used. • Long streamers must	Deploy at least 1 bird-scaring line. Where practical, vessels are encouraged to use a second tori pole and bird scaring line at times of high bird abundance or activity; both tori lines should be deployed simultaneously, one on each side of the line being set. Aerial extent of bird-scaring lines must be greater than or equal to 100 m. Long streamers of sufficient length to reach the sea surface in calm conditions must be used. Long streamers must be at intervals of no more than 5m.	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

[5] Resolution C-11-02 does not specify when light Tori lines streamers may be used. The specifications are also missing critical components including a requirement for brightly colored streamers and the specified minimum height of the Tori line also does not meet the ACAP minimum standards of 8 m above the water line (highlighted in yellow).

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.	streamers must be attached to the line with swivels that prevent streamers from wrapping around the line. Long streamers of sufficient length to reach the sea surface in calm conditions must be used. b. Short streamers (greater than 1m in length) shall be placed no more than 1m apart. iii. Vessels shall deploy the tori line to achieve a desired aerial extent greater than or equal to 100 m. To achieve this aerial extent the tori line shall have a minimum length of 200m, and shall be attached to a tori pole >7m above the sea surface located as close to the stern as practical. iv. If vessels use only one tori line, the tori line shall be deployed windward of sinking baits.	be at intervals of no more than 5m.		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.
Tori line (light streamer)	*For vessels less than 35 m:*	*For vessels less than 35 m:*	*For vessels less than 35m:*	*For vessels less than 35 m total length:*
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	A single tori line using either long and short streamers, or short streamers only shall be used. ii. Streamers shall be: brightly coloured long and/or short (but greater	• Deploy at least 1 bird-scaring line. • Aerial extent must be greater than or equal to 75 m. • Long and/or short (but greater than 1 m in length) streamers must	Deploy at least 1 bird-scaring line. Aerial extent must be greater than or equal to 75m. Long and/or short (but greater than 1m in length) streamers must be used	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 at least the first 55 m of the BSL. Streamers

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.	than 1m in length) streamers must be used and placed at intervals as follows: a. Long streamers placed at intervals of no more than 5m for the first 75 m of tori line. b. Short streamers placed at intervals of no more than 1m. iii. Long streamers should be attached to the line in a way that prevent streamers from wrapping around the line. All long streamers shall reach the sea-surface in calm conditions. Streamers may be modified over the first 15 m to avoid tangling. . iv. Vessels shall deploy the tori line to achieve a minimum aerial extent of 75 m. To achieve this aerial extent the tori line shall be attached to a tori pole >6m above the sea surface located as close to the stern as practical. Sufficient drag must be created to maximise aerial extent and maintain the line directly behind the vessel during crosswinds. To avoid tangling, this is best achieved using a long in-water section of rope or monofilament. v. If two	be used and placed at intervals as follows: o Short: intervals of no more than 2 m. o Long: intervals of no more than 5 m for the first 55 m of bird scaring line.	and placed at intervals as follows: Short: intervals of no more than 2m. Long: intervals of no more than 5m for the first 55 m of bird scaring line.	may be modified over the first 15 m to avoid tangling, 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 6 m above the water at the stern.

	tori lines are used, the two lines must be deployed on opposing side			
		Supplemental guidelines for design and deployment are available in Annex 1 of Resolution 23/07.	Additional design and deployment guidelines for bird-scaring lines are provided in Annex 1 of Recommendation 11-09.	

(WCPFC For vessels fishing North of 23° N:**)**

2a) Long Streamer

i. Minimum length: 100 m

ii. Must be attached to the vessel such that it is suspended from a point a minimum of 5m 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 two (i.e. paired) tori lines are used, the two lines must be deployed on opposing sides of the main line.

2b) Short Streamer (For vessels >=24 m total length)

i. Must be attached to the vessel such that it is suspended from a point a minimum of 5m above the water at the stern on the windward side of a point where the hookline enters the water.

ii. Must be attached so that the aerial extent is maintained over the sinking baited hooks.

iii. Streamers must be less than 1m apart and be 30 cm minimum length.

iv. If two (i.e. paired) tori lines are used, the two lines must be deployed on opposing sides of the main line.

2c) Short Streamer (For vessels <24 m total length)

This design shall be reviewed no later than 3 years from the implementation date based on scientific data[6].

i. Must be attached to the vessel such that it is suspended from a point a minimum of 5m above the water at the stern on the windward side of a point where the hookline enters the water.

ii. Must be attached so that the aerial extent is maintained over the sinking baited hooks.

iii. If streamers are used, it is encouraged to use the streamers designed to be less than 1m apart and be 30cm minimum length.

iv. If two (i.e. paired) tori lines are used, the two lines must be deployed on opposing sides of the mainline.

[6] Changes to these Northern Hemisphere tori lines specificiations are under review based on the recommendations in SC20-EB-WP-06, which show that there is no compelling evidence to consider streamerless tori lines and tori lines with an insufficient aerial extent an effective seabird bycatch mitigation method.

7.2.4. Table A.1.d. **RFMO Hook Shielding Device specifications compared to the ACAP best practices advice.**

IATTC	WCPFC	IOTC	ICCAT	ACAP
Not applicable.	Hook shielding devices	Hook-shielding devices[7]	Not applicable.	Hook shielding devices
	Hook-shielding devices encase the point and barb of baited hooks to prevent seabird attacks during line setting. The following devices have been approved for use in WCPFC fisheries:	Hook-shielding devices, listed by the Parties to the Agreement on the Conservation of Albatross and Petrels as Best Practice Advice, that encase the point and barb of baited hooks to prevent seabird bycatch during setting shall be used.		Hook-shielding devices encase the point and barb of baited hooks to prevent seabird attacks during line setting until a prescribed depth is reached (a minimum of 10 metres), or until after a minimum period of immersion has occurred (a minimum of 10 minutes) that ensures that baited hooks are released beyond the foraging depth of most seabirds.
	1. Hookpods, which comply with the following performance characteristics: a) the device encases the point and barb of the hook until it reaches a depth of at least 10 meters or has been immersed for at least 10 minutes; b) the device meets current minimum standards for branch line weighting as specified in this Annex; and c) the device is designed to be retained on the fishing gear rather than being lost.	Hook-shielding devices that comply with the following performance characteristics. Devices must: • encase the point and barb of the hook until it reaches a depth of at least 10 m or has been immersed for at least 10 minutes; • meet current minimum standards for branch line weighting, as follows: greater than a total of 45 g attached within 1 m of the hook or; greater than a total of 60 g attached within 3.5 m of the hook or; greater than a total of 98 g weight attached within 4 m of the hook. • be designed to be retained on the fishing gear rather than lost.		Three approved devices meeting the ACAP specifications: 1. 'Hookpod-LED' – 68 g minimum weight that is positioned at the hook, encapsulating the barb and point of the hook during setting, and remains attached until it reaches 10 m in depth, when the hook is released, 2. 'Hookpod-mini' – 48 g minimum weight that is positioned at the hook, encapsulating the barb and point of the hook during setting, and remains attached until it reaches 10 m in depth, when the hook is released, 3. 'Smart Tuna Hook' – 40 g minimum weight that is positioned at the hook, encapsulating the barb and point of the hook during setting, and remains attached for a minimum period of 10 minutes after setting, when the hook is released.

[7] Hook-shielding devices can be used as a stand-alone measure, subject to meeting line weighting requirements.

7.2.5. Table A.1.e. RFMO Blue dyed bait specifications compared to the ACAP best practices advice.

IATTC	WCPFC	IOTC	ICCAT	ACAP
The IATTC Secretariat shall distribute a standardized color placard.	If using blue-dyed bait it must be fully thawed when dyed.	Not applicable.	Not applicable.	Not recommended
All bait must be dyed to the shade shown in the placard.	The Commission Secretariat shall distribute a standardized colour placard.			
	All bait must be dyed to the shade shown in the placard.			

7.2.6. Table A.1.f. RFMO Management of offal discharge specifications compared to the ACAP best practices advice.

IATTC	WCPFC	IOTC	ICCAT	ACAP
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.	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.	Not applicable.	Not applicable.	Not recommended

7.2.7. Table A.1.g. RFMO Underwater bait setter specifications8 compared to the ACAP best practices advice.

IATTC	WCPFC (not yet adopted)	IOTC	ICCAT	ACAP
Not applicable.	Underwater bait setting devices set baited hooks at a predefined depth using a capsule mechanism and are proven to be practical on vessels <35m in length. Suitability for vessels >35m is yet to be determined. i. Underwater bait setting devices must meet the following performance requirements for use in WCPFC fisheries: a. the device deploys encapsulated hooks in a vertical manner at the stern of the vessel until a minimum prescribed depth of 5 m is reached; and b. branch lines meet current recommended minimum standards for branch line weighting; and c. experimental research has been undertaken to allow assessment of the effectiveness, efficiency and practicality of the technology.	Not applicable.	Not applicable.	The following performance requirements are used by ACAP to assess the efficacy of underwater bait setting devices in reducing seabird bycatch: (a) the device deploys encapsulated hooks in a vertical manner at the stern of the vessel until a minimum prescribed depth of 5 m is reached; (b) branch lines meet current recommended minimum standards for branch line weighting; and (c) experimental research has been undertaken to allow assessment of the effectiveness, efficiency and practicality of the technology against the ACAP best practice seabird bycatch mitigation criteria developed for assessing and recommending best practice advice on seabird bycatch mitigation measures. The assessment of an Underwater Bait Setting device as best practice is conditional on the device continuing to meet the above performance requirements.
	ii. The following devices have been approved for use in WCPFC fisheries: a. Skadia Technologies Underwater Bait Setter.			Underwater Bait Setter (Skadia Technologies): a computer operated and hydraulically powered machine that deploys baited hooks individually underwater in a capsule, and where recommended minimum standards for branch line weighting are met. The capsule is pulled down a removable track fitted to the vessel's transom and then catapulted to a target depth. The capsule descends along the track at 6 m.sec-1 and thereafter at ≥3 m.sec-1

[8] Underwater bait setting devices can be used as a stand-alone measure, subject to meeting line weighting requirements.

7.3. CPC reports of seabird bycatch mitigation measure use from 2011 - 2023

TABLE A.2. CPC reports of seabird bycatch mitigation measures used from 2011 - 2023. Tables were only generated for CPCs that had active longline vessels for at least one year. Each table summarizes individual CPC seabird reporting to the IATTC. For a given year when an "x" is placed under a mitigation measure it means that vessels from that CPC used or were directed to use that mitigation measure. A blank cell under a mitigation measure indicates that it was not used for that year. The specifications or details regarding that mitigation measure are listed in parentheses after the "x." When the IATTC C-11-02 Resolution was stated then "IATTC regs" was put in the parentheses. For each CPC, the year their Seabird National Plan of Action (NPOA) was published is indicated with an "X." Whether longliners greater than 20 m in length were registered in the Regional Vessel Register (RVR) was indicated for a given year. Using a combination of correspondences between the CPC and the IATTC Secretariat, it was determined whether active longliner vessels greater than 20 m in length operated in the Convention Area for a given year. If a CPC did have at least one active longliner greater than 20 m, but did not provide a seabird report a "?" was put under each mitigation measure and "no report" was indicated in the Comments column. For years where there was an active longliner greater than 20 m, but the CPC did not have an observer program (for whatever reason) an "*" was added after "Yes." Years where "Yes" is in a green font implies that the Secretariat used an educated guess to determine whether active longliners greater than 20 m operated in the Convention Area. Other useful information reported or shared with the Secretariat was added in the Comments column.

7.3.1. Table A.2.a. Summary of Belize seabird reporting.

Belize	Side-setting with bird curtains and weighted branch lines	Night setting with minimum deck lighting	Tori line	Weighted branch lines	Blue-dyed bait	Deep-setting line shooter	Underwater setting chute	Management of offal discharge	NPOA	Longliners (20+m) in RVR	Active Longliners (20+m)	Comments
2011	x (IATTC regs)	x (IATTC regs)	x (light streamer; IATTC regs)	x (IATTC regs)		x		x (IATTC regs)		Yes	Yes*	Indicated which vessels used which mitigation measures, but did not identify specifications
2012	?	?	?	?	?	?	?	?		Yes	Yes*	no report
2013	x (IATTC regs)	x (IATTC regs)	x (light streamer; IATTC regs)	x (IATTC regs)				x (IATTC regs)		Yes	Yes*	IPOA-Seabirds is still in its drafting stages
2014	x (IATTC regs)	x (IATTC regs)	x (light streamer; IATTC regs)	x (IATTC regs)				x (IATTC regs)		Yes	Yes*	IPOA-Seabirds is still in its drafting stages
2015		x (IATTC regs)	x (light streamer; IATTC regs)	x (IATTC regs)				x (IATTC regs)		Yes	Yes	Developing NPOA based on IPOA-Seabirds by FAO
2016		x (IATTC regs)	x (light streamer; IATTC regs)	x (IATTC regs)				x (IATTC regs)	X	Yes	Yes	

2017		x (IATTC regs)	x (light streamer; IATTC regs)	x (IATTC regs)				x (IATTC regs)		Yes	Yes	
2018										No	No	No fishing in IATTC Convention Area
2019	?	?	?	?	?	?	?	?		Yes	Yes	no report
2020	?	?	?	?	?	?	?	?		Yes	Yes*	no report
2021		x (IATTC regs)								Yes	Yes*	
2022										Yes	No	No fishing in IATTC Convention Area
2023											No	No fishing in IATTC Convention Area

7.3.2. Table A.2.b. Summary of Chile seabird reporting.

Chile	Side-setting with bird curtains and weighted branch lines	Night setting with minimum deck lighting	Tori line	Weighted branch lines	Blue-dyed bait	Deep-setting line shooter	Underwater setting chute	Management of offal discharge	NPOA	Longliners (20+m) in RVR	Active Longliners (20+m)	Comments
2011	Not a CPC yet											
2012												
2013												
2014												
2015												
2016												
2017												
2018		x (IATTC regs)	x (The length will vary according to the fishery. Cover the aerial section behind the stern, until it reaches a depth of 10 m. Suspended at a minimum of 7 m above the water at the stern on the windward of the point where the hookline enters the water. The length of the streamers shall vary from a minimum of 6.5 m from the top to 1 m at the end.)	x (IATTC regs)				x (IATTC regs)		Yes	Yes	

Chile	Side-setting with bird curtains and weighted branch lines	Night setting with minimum deck lighting	Tori line	Weighted branch lines	Blue-dyed bait	Deep-setting line shooter	Underwater setting chute	Management of offal discharge	NPOA	Longliners (20+m) in RVR	Active Longliners (20+m)	Comments
2019		x (IATTC regs)	x (The length will vary according to the fishery. Cover the aerial section behind the stern, until it reaches a depth of 10 m. Suspended at a minimum of 7 m above the water at the stern on the windward of the point where the hookline enters the water. The length of the streamers shall vary from a minimum of 6.5 m from the top to 1 m at the end.)	x (IATTC regs)				x (IATTC regs)	X	Yes	No	Adopted in 2003. Member of the Agreement on the Conservation of Albatrosses and Petrels, or ACAP since 2005
2020		x (IATTC regs)	x (The length will vary according to the fishery. Cover the aerial section behind the stern, until it reaches a depth of 10 m. Suspended at a minimum of 7 m above the water at the stern on the windward of the point where the hookline enters the water. The length of the streamers shall vary from a minimum	x (IATTC regs)				x (IATTC regs)		Yes	No	No longline active fleet >20m

Chile	Side-setting with bird curtains and weighted branch lines	Night setting with minimum deck lighting	Tori line	Weighted branch lines	Blue-dyed bait	Deep-setting line shooter	Underwater setting chute	Management of offal discharge	NPOA	Longliners (20+m) in RVR	Active Longliners (20+m)	Comments
			of 6.5 m from the top to 1 m at the end.)									
2021		x (IATTC regs)	x (The length will vary according to the fishery. Cover the aerial section behind the stern, until it reaches a depth of 10 m. Suspended at a minimum of 7 m above the water at the stern on the windward of the point where the hookline enters the water. The length of the streamers shall vary from a minimum of 6.5 m from the top to 1 m at the end.)	x (IATTC regs)				x (IATTC regs)		Yes	Yes	No longline active fleet >20m
2022		x (IATTC regs)	x (The length will vary according to the fishery. Cover the aerial section behind the stern, until it reaches a depth of 10 m. Suspended at a minimum of 7 m above the water at the stern on the windward of the	x (IATTC regs)				x (IATTC regs)		Yes	No	No longline active fleet >20m

Chile	Side-setting with bird curtains and weighted branch lines	Night setting with minimum deck lighting	Tori line	Weighted branch lines	Blue-dyed bait	Deep-setting line shooter	Underwater setting chute	Management of offal discharge	NPOA	Longliners (20+m) in RVR	Active Longliners (20+m)	Comments
			point where the hookline enters the water. The length of the streamers shall vary from a minimum of 6.5 m from the top to 1 m at the end.)									
2023		x (IATTC regs)	x (The length will vary according to the fishery. Cover the aerial section behind the stern, until it reaches a depth of 10 m. Suspended at a minimum of 7 m above the water at the stern on the windward of the point where the hookline enters the water. The length of the streamers shall vary from a minimum of 6.5 m from the top to 1 m at the end.)	x (IATTC regs)				x (IATTC regs)			No	No longline active fleet >20m

7.3.3. Table A.2.c. Summary of China seabird reporting.

China	Side-setting with bird curtains and weighted branch lines	Night setting with minimum deck lighting	*Tori* line	Weighted branch lines	Blue-dyed bait	Deep-setting line shooter	Underwater setting chute	Management of offal discharge	NPOA	Longliners (20+m) in RVR	Active Longliners (20+m)	Comments
2011	?	?	?	?	?	?	?	?		Yes	Yes	no report
2012	?	?	?	?	?	?	?	?		Yes	Yes	no report
2013	?	?	?	?	?	?	?	?		Yes	Yes	no report
2014	?	?	?	?	?	?	?	?		Yes	Yes	no report
2015	?	?	?	?	?	?	?	?		Yes	Yes	no report
2016	?	?	?	?	?	?	?	?		Yes	Yes	no report
2017	?	?	?	?	?	?	?	?		Yes	Yes	no report
2018	?	?	?	?	?	?	?	?		Yes	Yes	no report
2019	?	?	?	?	?	?	?	?		Yes	Yes	no report
2020	?	?	?	?	?	?	?	?		Yes	Yes	no report
2021			x (IATTC regs)	x (IATTC regs)						Yes	Yes	
2022			x (IATTC regs)	x (IATTC regs)						Yes	Yes	
2023			x (IATTC regs)	x (IATTC regs)						Yes	Yes	

7.3.4. Table A.2.d. Summary of Chinese Taipei seabird reporting.

Chinese Taipei	Side-setting with bird curtains and weighted branch lines	Night setting with minimum deck lighting	*Tori* line	Weighted branch lines	Blue-dyed bait	Deep-setting line shooter	Underwater setting chute	Management of offal discharge	NPOA	Longliners (20+m) in RVR	Active Longliners (20+m)	Comments
2011	?	?	?	?	?	?	?	?		Yes	Yes	no report
2012		x (IATTC regs)	x (IATTC regs)	x (IATTC regs)	x (IATTC regs)	x (IATTC regs)	x (IATTC regs)	x (IATTC regs)		Yes	Yes	Earlier NPOA adopted in 2006
2013		x (IATTC regs)	x (IATTC regs)	x (IATTC regs)		x (IATTC regs)		x (IATTC regs)		Yes	Yes	
2014		x (IATTC regs)	x (IATTC regs)	x (IATTC regs)		x (IATTC regs)		x (IATTC regs)	X	Yes	Yes	
2015		x (IATTC regs)	x (IATTC regs)	x (IATTC regs)		x (IATTC regs)		x (IATTC regs)		Yes	Yes	
2016		x (IATTC regs)	x (IATTC regs)	x (IATTC regs)		x (IATTC regs)		x (IATTC regs)		Yes	Yes	
2017		x (IATTC regs)	x (IATTC regs)	x (IATTC regs)		x (IATTC regs)		x (IATTC regs)		Yes	Yes	
2018		x (IATTC regs)	x (IATTC regs)	x (IATTC regs)		x (IATTC regs)		x (IATTC regs)		Yes	Yes	
2019		x (IATTC regs)	x (IATTC regs)	x (IATTC regs)		x (IATTC regs)		x (IATTC regs)		Yes	Yes	
2020		x (IATTC regs)	x (IATTC regs)	x (IATTC regs)		x (IATTC regs)		x (IATTC regs)		Yes	Yes	
2021		x (IATTC regs)	x (IATTC regs)	x (IATTC regs)		x (IATTC regs)		x (IATTC regs)		Yes	Yes	
2022		x (IATTC regs)	x (IATTC regs)	x (IATTC regs)		x (IATTC regs)		x (IATTC regs)		Yes	Yes	
2023		x (IATTC regs)	x (IATTC regs)	x (IATTC regs)		x (IATTC regs)		x (IATTC regs)		Yes	Yes	

7.3.5. Table A.2.e. Summary of Costa Rica seabird reporting.

Costa Rica	Side-setting with bird curtains and weighted branch lines	Night setting with minimum deck lighting	*Tori* line	Weighted branch lines	Blue-dyed bait	Deep-setting line shooter	Underwater setting chute	Management of offal discharge	NPOA	Longliners (20+m) in RVR	Active Longliners (20+m)	Comments
2011	?	?	?	?	?	?	?	?		Yes	Yes*	no report
2012	?	?	?	?	?	?	?	?		Yes	Yes*	no report
2013	?	?	?	?	?	?	?	?		Yes	Yes*	no report
2014	?	?	?	?	?	?	?	?		Yes	Yes*	no report
2015	?	?	?	?	?	?	?	?		Yes	Yes	no report
2016	?	?	?	?	?	?	?	?		Yes	Yes*	no report
2017										Yes	Yes*	No active longline fleet >20 m
2018	?	?	?	?	?	?	?	?		Yes	Yes*	no report
2019	?	?	?	?	?	?	?	?		Yes	Yes*	no report
2020	?	?	?	?	?	?	?	?		Yes	Yes*	no report
2021	?	?	?	?	?	?	?	?		Yes	Yes*	no report
2022	?	?	?	?	?	?	?	?		Yes	Yes*	no report
2023	?	?	?	?	?	?	?	?		Yes	Yes*	no report

7.3.6. Table A.2.f. Summary of Ecuador seabird reporting.

Ecuador	Side-setting with bird curtains and weighted branch lines	Night setting with minimum deck lighting	*Tori* line	Weighted branch lines	Blue-dyed bait	Deep-setting line shooter	Underwater setting chute	Management of offal discharge	NPOA	Longliners (20+m) in RVR	Active Longliners (20+m)	Comments
2011	?	?	?	?	?	?	?	?		Yes	Yes	no report
2012	?	?	?	?	?	?	?	?		Yes	Yes	no report
2013	?	?	?	?	?	?	?	?		Yes	Yes	no report
2014	?	?	?	?	?	?	?	?		Yes	Yes	no report
2015	?	?	?	?	?	?	?	?		Yes	Yes	no report
2016	?	?	?	?	?	?	?	?		Yes	Yes	no report
2017									X	Yes	Yes	Member of The Agreement on the Conservation of Albatrosses and Petrels (ACAP) since 2003. National Plan of Action for the Conservation of Albatrosses and Petrels adopted in 2007
2018	?	?	?	?	?	?	?	?		Yes	Yes	no report
2019	?	?	?	?	?	?	?	?		Yes	Yes	no report
2020	?	?	?	?	?	?	?	?		Yes	Yes	no report
2021										Yes	Yes	Longline target species (Coryphaena hippurus and *Xiphias gladius*) have not been considered within the IATTC management and conservation measures
2022										Yes	Yes	Longline target species (Coryphaena hippurus and *Xiphias gladius*) have not been

												considered within the IATTC management and conservation measures
2023										Yes	Yes	Longline target species (Coryphaena hippurus and *Xiphias gladius*) have not been considered within the IATTC management and conservation measures

7.3.7. Table A.2.g. **Summary of EU-Portugal seabird reporting.**

EU-Portugal	Side-setting with bird curtains and weighted branch lines	Night setting with minimum deck lighting	*Tori* line	Weighted branch lines	Blue-dyed bait	Deep-setting line shooter	Underwater setting chute	Management of offal discharge	NPOA	Longliners (20+m) in RVR	Active Longliners (20+m)	Comments
2011	?	?	?	?	?	?	?	?		Yes	Yes	no report
2012			x (the vessel uses the lines as described in CMM 2007-04 since the begging of the fishing operations)	x (the vessel uses weights of 80 g attached to within 3,5 ms of the hook, for all hooks of the main line)	x (IATTC regs)	x		x (IATTC regs)		Yes	Yes	
2013	?	?	?	?	?	?	?	?		Yes	Yes	no report
2014	?	?	?	?	?	?	?	?		Yes	Yes	no report
2015	?	?	?	?	?	?	?	?		Yes	Yes	no report
2016	?	?	?	?	?	?	?	?		Yes	Yes	no report
2017	?	?	?	?	?	?	?	?		Yes	Yes	no report
2018	?	?	?	?	?	?	?	?		Yes	Yes	no report
2019	x (IATTC regs)		x (IATTC regs)			x (IATTC regs)				Yes	Yes	
2020	?	?	?	?	?	?	?	?		Yes	Yes	no report
2021	?	?	?	?	?	?	?	?		Yes	Yes*	no report
2022	x (IATTC regs)	x (IATTC regs)	x (IATTC regs)	x (IATTC regs)			x	x (IATTC regs)		Yes	Yes	
2023	x (IATTC regs)	x (IATTC regs)	x (IATTC regs)	x (IATTC regs)			x	x (IATTC regs)		Yes	Yes	

7.3.8. Table A.2.h. **Summary of EU-Spain seabird reporting.**

EU-Spain	Side-setting with bird curtains and weighted branch lines	Night setting with minimum deck lighting	*Tori* line	Weighted branch lines	Blue-dyed bait	Deep-setting line shooter	Underwater setting chute	Management of offal discharge	NPOA	Longliners (20+m) in RVR	Active Longliners (20+m)	Comments
2011	?	?	?	?	?	?	?	?		Yes	Yes	no report
2012		x (IATTC regs)	x (IATTC regs)	x (IATTC regs)	x (IATTC regs)	x (IATTC regs)		x (IATTC regs)		Yes	Yes	
2013		x (IATTC regs)	x (IATTC regs)	x (IATTC regs)	x (IATTC regs)	x (IATTC regs)	x (IATTC regs)	x (IATTC regs)		Yes	Yes	
2014	x (IATTC regs)	x (IATTC regs)	x (IATTC regs)	x (IATTC regs)	x (IATTC regs)	x (IATTC regs)	x (IATTC regs)	x (IATTC regs)		Yes	Yes	
2015		x (IATTC regs)	x (IATTC regs)	x (IATTC regs)	x (IATTC regs)	x (IATTC regs)	x (IATTC regs)	x (IATTC regs)		Yes	Yes	
2016	?	?	?	?	?	?	?	?		Yes	Yes	no report
2017		x (IATTC regs)	x (IATTC regs)	x (IATTC regs)	x (IATTC regs)	x (IATTC regs)	x (IATTC regs)	x (IATTC regs)		Yes	Yes	
2018		x (IATTC regs)	x (IATTC regs)	x (IATTC regs)	x (IATTC regs)	x (IATTC regs)	x (IATTC regs)	x (IATTC regs)	X	Yes	Yes	Member of The Agreement on the Conservation of Albatrosses and Petrels (ACAP) since 2004
2019		x (IATTC regs)	x (IATTC regs)	x (IATTC regs)	x (IATTC regs)	x (IATTC regs)	x (IATTC regs)	x (IATTC regs)		Yes	Yes	
2020	?	?	?	?	?	?	?	?		Yes	Yes	no report
2021	?	?	?	?	?	?	?	?		Yes	Yes	no report
2022		x (IATTC regs)	x (IATTC regs)	x (IATTC regs)	x (IATTC regs)	x (IATTC regs)	x (IATTC regs)	x (IATTC regs)		Yes	Yes	
2023	x (IATTC regs)	x (IATTC regs)	x (IATTC regs)	x (IATTC regs)	x (IATTC regs)	x (IATTC regs)	x (IATTC regs)	x (IATTC regs)		Yes	Yes	

7.3.9. Table A.2.i. Summary of FRA-French Polynesia seabird reporting.

FRA-French Polynesia	Side-setting with bird curtains and weighted branch lines	Night setting with minimum deck lighting	*Tori* line	Weighted branch lines	Blue-dyed bait	Deep-setting line shooter	Underwater setting chute	Management of offal discharge	NPOA	Longliners (20+m) in RVR	Active Longliners (20+m)	Comments
2011	?	?	?	?	?	?	?	?		Yes	Yes	no report
2012	?	?	?	?	?	?	?	?		Yes	Yes	no report
2013	?	?	?	?	?	?	?	?		Yes	Yes	no report
2014	?	?	?	?	?	?	?	?		Yes	Yes	no report
2015	?	?	?	?	?	?	?	?		Yes	Yes	no report
2016	?	?	?	?	?	?	?	?		Yes	Yes	no report
2017	?	?	?	?	?	?	?	?		Yes	Yes	no report
2018	?	?	?	?	?	?	?	?		Yes	Yes	no report
2019	?	?	?	?	?	?	?	?		Yes	Yes	no report
2020	?	?	?	?	?	?	?	?		Yes	Yes	no report
2021	?	?	?	?	?	?	?	?		Yes	Yes	no report
2022	?	?	?	?	?	?	?	?		Yes	Yes	no report
2023	?	?	?	?	?	?	?	?		Yes	Yes	no report

7.3.10. able A.2.j. Summary of Japan seabird reporting.

Japan	Side-setting with bird curtains and weighted branch lines	Night setting with minimum deck lighting	*Tori* line	Weighted branch lines	Blue-dyed bait	Deep-setting line shooter	Underwater setting chute	Management of offal discharge	NPOA	Longliners (20+m) in RVR	Active Longliners (20+m)	Comments
2011	followed IATTC measures, implementation of specific measures up to fishers									Yes	Yes	
2012	?	?	?	?	?	?	?	?		Yes	Yes	no report
2013	?	?	?	?	?	?	?	?		Yes	Yes	no report
2014			x (IATTC regs)					x (IATTC regs)		Yes	Yes	
2015	?	?	?	?	?	?	?	?		Yes	Yes	no report
2016			x (IATTC regs)					x (IATTC regs)	X	Yes	Yes	Update in 2016 to the 2001 NPOA
2017			x (IATTC regs)					x (IATTC regs)		Yes	Yes	
2018	?	?	?	?	?	?	?	?		Yes	Yes	no report
2019			x (IATTC regs)					x (IATTC regs)		Yes	Yes	
2020	?	?	?	?	?	?	?	?		Yes	Yes	no report
2021			x (IATTC regs)					x (IATTC regs)		Yes	Yes*	
2022			x (IATTC regs)					x (IATTC regs)		Yes	Yes*	
2023	?	?	?	?	?	?	?	?			Yes	no report

7.3.11. Table A.2.k. **Summary of Korea seabird reporting.**

Korea	Side-setting with bird curtains and weighted branch lines	Night setting with minimum deck lighting	*Tori* line	Weighted branch lines	Blue-dyed bait	Deep-setting line shooter	Underwater setting chute	Management of offal discharge	NPOA	Longliners (20+m) in RVR	Active Longliners (20+m)	Comments
2011	?	?	?	?	?	?	?	?		Yes	Yes	no report
2012	?	?	?	?	?	?	?	?		Yes	Yes	no report
2013	?	?	?	?	?	?	?	?		Yes	Yes	no report
2014	?	?	?	?	?	?	?	?	X	Yes	Yes	no report
2015	?	?	?	?	?	?	?	?		Yes	Yes	no report
2016	?	?	?	?	?	?	?	?		Yes	Yes	no report
2017	?	?	?	?	?	?	?	?		Yes	Yes	no report
2018										Yes	Yes	no fishing in resolution area
2019										Yes	Yes	no fishing in resolution area; encourages Tori line measure when in EPO
2020	?	?	?	?	?	?	?	?		Yes	Yes	no report
2021										Yes	Yes	no fishing in resolution area; encourages Tori line measure when in EPO
2022										Yes	Yes	no fishing in resolution area; encourages Tori line measure when in EPO

2023										Yes	Yes	no fishing in resolution area; encourages Tori line measure when in EPO

7.3.12. Table A.2.l. Summary of Panama seabird reporting.

Panama	Side-setting with bird curtains and weighted branch lines	Night setting with minimum deck lighting	*Tori* line	Weighted branch lines	Blue-dyed bait	Deep-setting line shooter	Underwater setting chute	Management of offal discharge	NPOA	Longliners (20+m) in RVR	Active Longliners (20+m)	Comments
2011	?	?	?	?	?	?	?	?		Yes	Yes*	no report
2012	?	?	?	?	?	?	?	?		Yes	Yes*	no report
2013	?	?	?	?	?	?	?	?		Yes	Yes*	no report
2014	?	?	?	?	?	?	?	?		Yes	Yes*	no report
2015	?	?	?	?	?	?	?	?		Yes	Yes*	no report
2016	?	?	?	?	?	?	?	?		Yes	Yes*	no report
2017	?	?	?	?	?	?	?	?		Yes	Yes*	no report
2018	?	?	?	?	?	?	?	?		Yes	Yes*	no report
2019	?	?	?	?	?	?	?	?		Yes	Yes*	no report
2020										Yes	Yes*	No fishing in resolution area
2021										Yes	Yes	No fishing in resolution area
2022			x (IATTC regs)	x (IATTC regs)						Yes	Yes	No fishing in resolution area
2023			x (IATTC regs)	x (IATTC regs)						Yes	Yes	No fishing in resolution area

7.3.13. Table A.2.m. Summary of Peru seabird reporting.

Peru	Side-setting with bird curtains and weighted branch lines	Night setting with minimum deck lighting	*Tori* line	Weighted branch lines	Blue-dyed bait	Deep-setting line shooter	Underwater setting chute	Management of offal discharge	NPOA	Longliners (20+m) in RVR	Active Longliners (20+m)	Comments
2011	?	?	?	?	?	?	?	?		Yes	No	no report
2012	?	?	?	?	?	?	?	?		Yes	No	no report
2013										Yes	No	no report
2014										Yes	No	no report
2015										Yes	No	no report
2016										Yes	No	no report
2017										Yes	No	no report
2018										Yes	No	no report
2019	?	?	?	?	?	?	?	?		Yes	Yes	no report
2020										Yes	No	no report
2021										Yes	No	no report
2022										Yes	No	no report
2023	x (IATTC regs)		x (IATTC regs)	x (IATTC regs)							No	

7.3.14. Table A.2.n. **Summary of United States-shallow set longline seabird reporting.**

USA - shallow set	Side-setting with bird curtains and weighted branch lines	Night setting with minimum deck lighting	*Tori* line	Weighted branch lines	Blue-dyed bait	Deep-setting line shooter	Underwater setting chute	Management of offal discharge	NPOA	Longliners (20+m) in RVR	Active Longliners (20+m)	Comments
2011	x (or other measures)	x (if not side (stern) setting)		x (45 grams within 1 meter of hook), if side setting	x (if not side (stern) setting)			x (if not side (stern) setting)		Yes	Yes	Applies across the whole range of the fishery - no spatial constraints. Also use BHRP
2012	x (or other measures)	x (if not side (stern) setting)		x (45 grams within 1 meter of hook), if side setting	x (if not side (stern) setting)			x (if not side (stern) setting)		Yes	Yes	Applies across the whole range of the fishery - no spatial constraints. Also use BHRP
2013	x (or other measures)	x (if not side (stern) setting)		x (45 grams within 1 meter of hook), if side setting	x (if not side (stern) setting)			x (if not side (stern) setting)		Yes	Yes	Applies across the whole range of the fishery - no spatial constraints. Also use BHRP
2014	x (or other measures)	x (if not side (stern) setting)		x (45 grams within 1 meter of hook), if side setting	x (if not side (stern) setting)			x (if not side (stern) setting)		Yes	Yes	Submitted August 2016; Applies across the whole range of the fishery - no spatial constraints. Also use BHRP

USA - shallow set	Side-setting with bird curtains and weighted branch lines	Night setting with minimum deck lighting	*Tori* line	Weighted branch lines	Blue-dyed bait	Deep-setting line shooter	Underwater setting chute	Management of offal discharge	NPOA	Longliners (20+m) in RVR	Active Longliners (20+m)	Comments
2015	?	?	?	?	?	?	?	?		Yes	Yes	Mitigation measures used not submitted in 2015 - but the same regulations as the previous years were in place. They did submit a report on interactions and made reference to Res C-11-02
2016	x (or other measures)	x (if not side (stern) setting)		x (45 grams within 1 meter of hook), if side setting	x (if not side (stern) setting)			x (if not side (stern) setting)		Yes	Yes	Applies across the whole range of the fishery - no spatial constraints. Also use BHRP
2017	?	?	?	?	?	?	?	?		Yes	Yes	Report submitted stating annual report was not yet available; Same regulations were in place however
2018	x (or other measures)	x (if not side (stern) setting)		x (45 grams within 1 meter of hook), if side setting	x (if not side (stern) setting)			x (if not side (stern) setting)		Yes	Yes	Applies across the whole range of the fishery - no spatial constraints. Also use BHRP

USA - shallow set	Side-setting with bird curtains and weighted branch lines	Night setting with minimum deck lighting	*Tori* line	Weighted branch lines	Blue-dyed bait	Deep-setting line shooter	Underwater setting chute	Management of offal discharge	NPOA	Longliners (20+m) in RVR	Active Longliners (20+m)	Comments
2019	x (or other measures)	x (if not side (stern) setting)		x (45 grams within 1 meter of hook), if side setting	x (if not side (stern) setting)			x (if not side (stern) setting)		Yes	Yes	Applies across the whole range of the fishery - no spatial constraints. Also use BHRP
2020	x (or other measures)	x (if not side (stern) setting)		x (45 grams within 1 meter of hook), if side setting	x (if not side (stern) setting)			x (if not side (stern) setting)		Yes	Yes	Applies across the whole range of the fishery - no spatial constraints. Also use BHRP
2021	x (or other measures)	x (if not side (stern) setting)		x (45 grams within 1 meter of hook), if side setting	x (if not side (stern) setting)			x (if not side (stern) setting)		Yes	Yes	Applies across the whole range of the fishery - no spatial constraints. Also use BHRP
2022	x (or other measures)	x (if not side (stern) setting)		x (45 grams within 1 meter of hook), if side setting	x (if not side (stern) setting)			x (if not side (stern) setting)		Yes	Yes	Applies across the whole range of the fishery - no spatial constraints. Also use BHRP
2023	x (or other measures)	x (if not side (stern) setting)		x (45 grams within 1 meter of hook), if side setting	x (if not side (stern) setting)			x (if not side (stern) setting)		Yes	Yes	Report submitted, provided interactions for 2023 and report of mitigation measures used for 2022 - measures were

USA - shallow set	Side-setting with bird curtains and weighted branch lines	Night setting with minimum deck lighting	*Tori* line	Weighted branch lines	Blue-dyed bait	Deep-setting line shooter	Underwater setting chute	Management of offal discharge	NPOA	Longliners (20+m) in RVR	Active Longliners (20+m)	Comments
												the same - I got the 2023 document off the internet.

7.3.15. Table A.2.o. **Summary of United States-deep set longline seabird reporting.**

USA - deep set	Side-setting with bird curtains and weighted branch lines	Night setting with minimum deck lighting	*Tori* line	Weighted branch lines	Blue-dyed bait	Deep-setting line shooter	Underwater setting chute	Management of offal discharge	NPOA	Longliners (20+m) in RVR	Active Longliners (20+m)	Comments
2011	x (or other measures)			x (45 grams within 1 meter of hook)	x (if not side (stern) setting)	x (if not side (stern) setting)		x (if not side (stern) setting)		Yes		Seabird regs only apply when fishing north of 23N
2012	x (or other measures)			x (45 grams within 1 meter of hook)	x (if not side (stern) setting)	x (if not side (stern) setting)		x (if not side (stern) setting)		Yes		Seabird regs only apply when fishing north of 23N
2013	x (or other measures)			x (45 grams within 1 meter of hook)	x (if not side (stern) setting)	x (if not side (stern) setting)		x (if not side (stern) setting)		Yes	Yes	Seabird regs only apply when fishing north of 23N
2014	x (or other measures)			x (45 grams within 1 meter of hook)	x (if not side (stern) setting)	x (if not side (stern) setting)		x (if not side (stern) setting)		Yes	Yes	Seabird regs only apply when fishing north of 23N
2015	?	?	?	?	?	?	?	?		Yes	Yes	Mitigation measures used not submitted in 2015 - but the same regulations as the previous years were in place. They did submit a report on interactions and made reference to Res C-11-02

USA - deep set	Side-setting with bird curtains and weighted branch lines	Night setting with minimum deck lighting	*Tori* line	Weighted branch lines	Blue-dyed bait	Deep-setting line shooter	Underwater setting chute	Management of offal discharge	NPOA	Longliners (20+m) in RVR	Active Longliners (20+m)	Comments
2016	x (or other measures)			x (45 grams within 1 meter of hook)	x (if not side (stern) setting)	x (if not side (stern) setting)		x (if not side (stern) setting)		Yes	Yes	Seabird regs only apply when fishing north of 23N
2017	?	?	?	?	?	?	?	?		Yes	Yes	Report submitted stating annual report was not yet available; Same regulations were in place however
2018	x (or other measures)			x (45 grams within 1 meter of hook)	x (if not side (stern) setting)	x (if not side (stern) setting)		x (if not side (stern) setting)		Yes	Yes	Seabird regs only apply when fishing north of 23N
2019	x (or other measures)			x (45 grams within 1 meter of hook)	x (if not side (stern) setting)	x (if not side (stern) setting)		x (if not side (stern) setting)		Yes	Yes	Seabird regs only apply when fishing north of 23N
2020	x (or other measures)			x (45 grams within 1 meter of hook)	x (if not side (stern) setting)	x (if not side (stern) setting)		x (if not side (stern) setting)		Yes	Yes	Seabird regs only apply when fishing north of 23N
2021	x (or other measures)			x (45 grams within 1 meter of hook)	x (if not side (stern) setting)	x (if not side (stern) setting)		x (if not side (stern) setting)		Yes	Yes	Seabird regs only apply when fishing north of 23N
2022	x (or other measures)			x (45 grams within 1 meter of hook)	x (if not side (stern) setting)	x (if not side (stern) setting)		x (if not side (stern) setting)		Yes	Yes	Seabird regs only apply when fishing north of 23N

USA - deep set	Side-setting with bird curtains and weighted branch lines	Night setting with minimum deck lighting	*Tori* line	Weighted branch lines	Blue-dyed bait	Deep-setting line shooter	Underwater setting chute	Management of offal discharge	NPOA	Longliners (20+m) in RVR	Active Longliners (20+m)	Comments
2023	x (or other measures)			x (45 grams within 1 meter of hook)	x (if not side (stern) setting)	x (if not side (stern) setting)		x (if not side (stern) setting)		Yes	Yes	Report submitted, provided interactions for 2023 and report of mitigation measures used for 2022 - measures were the same.

7.3.16. Table A.2.p. **Summary of Vanuatu seabird reporting.**

Vanuatu	Side-setting with bird curtains and weighted branch lines	Night setting with minimum deck lighting	*Tori* line	Weighted branch lines	Blue-dyed bait	Deep-setting line shooter	Underwater setting chute	Management of offal discharge	NPOA	Longliners (20+m) in RVR	Active Longliners (20+m)	Comments
2011	?	?	?	?	?	?	?	?		Yes	Yes*	no report
2012			x (IATTC regs)	x (IATTC regs)						Yes	Yes*	
2013			x (IATTC regs)	x (IATTC regs)						Yes	Yes*	
2014			x (IATTC regs)	x (IATTC regs)						Yes	Yes*	
2015	?	?	?	?	?	?	?	?		Yes	Yes*	no report
2016	?	?	?	?	?	?	?	?		Yes	Yes*	no report
2017	?	?	?	?	?	?	?	?		Yes	Yes*	no report
2018	?	?	?	?	?	?	?	?		Yes	Yes	no report
2019	?	?	?	?	?	?	?	?		Yes	Yes	no report
2020	?	?	?	?	?	?	?	?		Yes	Yes*	no report
2021			x (IATTC regs)							Yes	Yes*	Currently implementing this Resolution under its IPOA Seabirds
2022			x (IATTC regs)							Yes	Yes*	Implemented electronic monitoring
2023			x (IATTC regs)							Yes	Yes	Implemented electronic monitoring

7.3.17. Table A.2.q. **Summary of Venezuela seabird reporting.**

Venezuela	Side-setting with bird curtains and weighted branch lines	Night setting with minimum deck lighting	*Tori* line	Weighted branch lines	Blue-dyed bait	Deep-setting line shooter	Underwater setting chute	Management of offal discharge	NPOA	Longliners (20+m) in RVR	Active Longliners (20+m)	Comments
2011	?	?	?	?	?	?	?	?		Yes	No	no report
2012	?	?	?	?	?	?	?	?		Yes	No	no report
2013										Yes	No	no report
2014										Yes	No	no report
2015										Yes	No	no report
2016										Yes	No	no report
2017										Yes	No	no report
2018	?	?	?	?	?	?	?	?		Yes	Yes	no report
2019										Yes	No	No fishing in resolution area
2020										Yes	No	No fishing in resolution area
2021										Yes	No	No fishing in resolution area
2022										Yes	No	No fishing in resolution area
2023										Yes	Yes	No fishing in resolution area

7.4. Recommended updated specifications to the recommended seabird bycatch mitigation options.

7.4.1. Table A.3. Updated minimum standards and specifications for recommended seabird bycatch mitigation measures (adopted from ACAP, 2024).

Table A.3.a Branch line weighting
Minimum standard – must sink baits at a rate of 0.5 m/s to at least 5 m of depth
Configurations that meet this standard:
• 40 g or greater attached within 0.5 m of the hook; • 60 g or greater attached within 1 m of the hook; • 80 g or greater attached within 2 of the hook.

Table A.3.b Night setting
Minimum standard – 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.
Setting longlines across night and day does not represent night setting: either when setting commences at night and finishes after the nautical dawn, or when setting commences prior to the nautical dusk and continues into the night

Table A.3.c Bird scaring lines (BSL; tori lines) for vessels > 35 m
Minimum standards: Simultaneous use of two BSLs, one on each side of the sinking longline, provides maximum protection from bird attacks under different wind conditions. 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 meters outboard of the side of the vessel that baits are deployed.
• 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 in a way that prevent streamers from wrapping around the line (e.g. using unweighted swivels). 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 baitcasting machines, they should be adjusted so as to land baited hooks within the area bounded by the BSLs.

Table A.3.d Bird scaring lines (BSL; tori lines) for vessels < 35 m	
Minimum standards:	
To achieve a minimum recommended aerial extent of 75 m.	
• To achieve this minimum aerial extent, BSLs should be attached to the vessel such that it is suspended from a point a minimum of 6 m above the water at the stern. Sufficient drag must be created to maximise aerial extent and maintain the line directly behind the vessel during crosswinds. This may be achieved using either towed devices or longer in-water sections	
• 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:	
i.	mixed design that includes long and short streamers. Long streamers should be placed at 5 m intervals over at least the first 55 m of the BSL (Domingo et al. 2017). Streamers may be modified over the first 15 m to avoid tangling (Goad & Debski 2017); and,
ii.	design that only includes short streamers. In all cases, BSLs should be brightly coloured and 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).

Table A.3.d Hook shielding devices
Minimum standards:
• The device shields the hook until a prescribed depth of 10 m or immersion time of 10 minutes is reached; and
• The device meets current recommended minimum standards for branch line weighting described in Table A.3.a.; and
• Experimental research has been undertaken to allow assessment of the effectiveness, efficiency and practicality of the technology against the ACAP best practice seabird bycatch mitigation criteria developed for assessing and recommending best practice advice on seabird bycatch mitigation measures.

Table A.3.e Underwater bait setting device
Minimum standards:

• The device deploys encapsulated hooks in a vertical manner at the stern of the vessel until a minimum prescribed depth of 5 m is reached; and
• Branch lines meet current recommended minimum standards for branch line weighting described in Table A.3.a; and
• Experimental research has been undertaken to allow assessment of the effectiveness, efficiency and practicality of the technology against the ACAP best practice seabird bycatch mitigation criteria developed for assessing and recommending best practice advice on seabird bycatch mitigation measures.

Table A.3.f Side-setting with line weighting and bird curtain
Effectiveness in southern hemisphere fisheries has not been researched and consequently it is not recommended as a proven mitigation measure in these fisheries at this time (ACAP, 2024). This measure is only approved for IATTC vessels fishing North of 23°N.
Minimum standards:
• Clear definition of the distance forward of the stern, from where baits must be manually deployed (setting position), is required. • Hooks should be cast well forward of the setting position by hand, but close to the hull of the vessel, to allow hooks time to sink as far as possible before they reach the stern; and
• Branch lines must meet current recommended minimum standards for branch line weighting described in Table A.3.a; and
• A bird curtain must contain a horizontal pole with vertical streamers, positioned aft of the setting station, to deter birds from flying close to the side of the vessel.