Indian Ocean Tuna Commission
Commission des Thons de l'Océan Indien
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AN UPDATE ON SEABIRD DISCUSSIONS BY THE INDIAN OCEAN TUNA COMMISSION SCIENTIFIC COMMUNITY

PREPARED BY: IOTC SECRETARIAT, 14 FEBRUARY 2012

PURPOSE

To inform the CCSBT Ecologically Related Species Working Group (ERSWG) of the seabird discussions and recommendations arising from the Indian Ocean Tuna Commission's (IOTC) scientific processes in 2011.

BACKGROUND

At the 14th Session of the IOTC Scientific Committee (SC14), held in the Republic of Seychelles from 12–17 December, 2011, delegates discussed and agreed to a series of recommendations to the Commission relating to the conservation and management of seabirds within the IOTC area of competence. The relevant extracts from the SC14 report are provided at Appendix A for information purposes.

The discussions at SC14 revolved around the report of the Seventh Session of the IOTC Working Party on Ecosystems and Bycatch, held in the Republic of Maldives from 24–27 October, 2011. For information purposes, the complete discussions of the WPEB07 on seabird matters are provided at Appendix B.

In addition to the recommendations developed at SC14, delegates also agreed to an 'Executive Summary: Seabirds' for the Commission's consideration (provided at Appendix C).

DISCUSSION

Nil.

RECOMMENDATION

That the CCSBT Ecologically Related Species Working Group **NOTE** the updates provided by the IOTC Secretariat on the seabird discussions and recommendations arising from the IOTC scientific processes in 2011.

APPENDICIES

Appendix A: Extract of the Report of the Fourteenth Session of the IOTC Scientific Committee

Appendix B: Extract of the Report of the Seventh Session of the IOTC Working Party on Ecosystems and Bycatch

Appendix C: IOTC 'Executive Summary: Seabirds'

APPENDIX A

Extract of the Report of the Fourteenth Session of the IOTC Scientific Committee (SC14)

(IOTC–2011–SC14–R; SECT. 7.4, PAGES 22–24. Note: paragraph numbers refer to SC14 report)

Seabirds

72. The SC **AGREED** that the current area of application for seabird bycatch mitigation measures contained in Resolution 10/06, i.e. south of 25°S, was supported by the available evidence and should not be revised at this point.

73. The SC **NOTED** that three measures ─ weighting of branchlines, night setting of longlines and use of bird scaring lines (tori lines) ─ are proven and recommended measures for use in pelagic longline gear, and that other measures, including the three which are currently included in Resolution 10/06 ─ blue-dyed squid bait, offal discharge control and use of a line shooting device ─ are not considered to be effective mitigation measures following ACAPs (Agreement on the Conservation of Albatrosses and Petrels) review of available mitigation measures for the following reasons:

- Blue dyed squid bait has been insufficiently researched and cannot be recommended.
- Line shooting device. There is no experimental evidence that line shooters reduce seabird bycatch in pelagic longline fisheries; therefore, they should not be considered a seabird bycatch mitigation option, although they will continue to be used on many vessels because they are considered to improve fishing efficiency and they avoid bycatch of epipelagic species
- Offal discharge control. Appropriate management of offal is encouraged as good operating practice but is not considered a primary mitigation measure in pelagic fisheries as there are much smaller quantities of fish waste derived from fishing operations, in direct contrast to the situation in demersal fisheries. The inclusion of offal management as a mitigation measure in Resolution 10/06 most likely has been taken from use of this measure in CCAMLR and other demersal longline fisheries, where it is much more important.

74. The SC **AGREED** that:
- A combination of weighted branchlines, bird scaring lines and night setting are best practice mitigation in reducing bycatch of seabirds to the lowest possible level in pelagic longline fisheries. These measures should be applied in high risk areas, i.e. South of 25°S, within the IOTC area of competence.
- Currently, no single mitigation measure can reliably prevent the incidental mortality of seabirds in most pelagic longline fisheries. The most effective approach is to use the measures described in combination. Other factors such as safety, practicality and the characteristics of the fishery should also be recognised when framing conservation measures.
- The current recommended minimum standards for branchline weighting configurations are:
    i. Greater than a total of 45 g weight attached within 1 m of the hook; or
    ii. Greater than a total of 60 g weight attached within 3.5 m of the hook; or
    iii. Greater than a total of 98 g weight attached within 4m of the hook.
- Positioning weight farther than 4 m from the hook is not recommended.

75. The SC **NOTED** that for bird scaring lines (BSL), ACAP best practice advice recognises that vessel size is an important determinant in their practical use, with respect to the aerial extent that can be achieved, and the ability to deploy single or twin BSLs. For vessels that exceed 35 m in length, an aerial extent of 100 m and use of two BSLs is recommended; for smaller vessels an aerial extent of 75 m and use of a single BSL is recommended.

76. Taking into account the information presented at the WPEB (WPEB working papers IOTC–2011–WPEB07–43, IOTC–2011–WPEB07–44 and IOTC–2011–WPEB07–54) and to the SC, the SC **AGREED** that a combination of weighted branchlines, bird scaring lines and night setting is best practice mitigation in reducing bycatch of seabirds to the lowest possible level in pelagic longline fisheries.

77. The SC further **NOTED**, in agreement with the WPEB, that if this proposal was accepted, together with the proposal to remove blue-dyed squid bait, line shooters and offal discharge control from the existing measure, the 'two column' approach used in Resolution 10/06 would be abandoned in favour of an approach that specifies the three measures to be applied in areas of seabird interaction risk (Table 4), of which two shall be implemented by the vessels operating south of 25°S.

Table 4. Seabird bycatch mitigation measures.

Mitigation measure	Description
Night setting with minimum deck lighting	No setting between nautical dawn and before nautical dusk. Deck lighting to be kept to a minimum
Bird scaring lines (Tori lines)	Bird scaring lines shall be deployed before longline setting starts and for the entire setting operation to deter birds from approaching the branch line
Line weighting	Line weights to be deployed on the branch line prior to setting

78. The SC **AGREED** that at this stage, line weighting should be seen as an adaptive management response to the seabird bycatch problem. Continued refinement of line weighting configurations (mass, number and position of weights and materials) through controlled research and application in fisheries, is highly desirable to find configurations that are most safe, practical and effective. The regimes recommended above should be implemented in working fisheries, monitored through observer programmes, and reviewed and modified if found to be inadequate in reducing bycatch to acceptable levels.

Recommendations

79. The SC **RECOMMENDED** that the specifications for the design and deployment of bird scaring lines be amended in order to take into account different specifications depending on the size of the longline fishing vessel, as follows:

    Bird-scaring line design

    1. The bird-scaring line shall be a minimum aerial extent of 100 m in length for vessels that exceed 35 m in length and of 75 m in length for vessel less or equal to 35 m in length. If the bird-scaring line is less than 150 m in length, it will include an object towed at the seaward end to create tension to maximise aerial coverage. The section above water shall be a strong fine line of a conspicuous colour such as red or orange.

    Deployment of bird scaring lines

    1. The bird scaring line shall be deployed before longlines enter into the water.
    2. The vessels exceeding 35 m in length should deploy two lines with an aerial extent of 100 m minimum. The vessels that are less or equal to 35 m in length could deploy a single line with an aerial extent of 75 m minimum. To achieve this coverage the line shall be suspended from a point a minimum of 5 metres above the water at the stern on the windward side of the point where the branch line enters the water.

80. The SC further **NOTED** the benefits for the IOTC to harmonize its Conservation and Management Measure for seabirds with that from ICCAT (Supplementary recommendation by ICCAT on reducing incidental bycatch of seabirds in ICCAT longline fisheries, PA4-813A/2011), as there are a number of longline fishing vessels operating in both the Atlantic and Indian Ocean south of 25°S.

81. The SC **RECOMMENDED** that Resolution 10/06 be strengthened in order to make the reporting of seabird interactions mandatory for vessels fishing for species under the IOTC mandate.

82. The SC **RECOMMENDED** that any amendment to Resolution 10/06 should allow sufficient time for orderly implementation, to allow training and redevelopment of gears and operations.

83. The SC **RECOMMENDED** that the Commission consider revising Resolution 10/06 *On Reducing the Incidental Bycatch of Seabirds in Longline Fisheries*, noting the technical specifications and other considerations outlined and agreed to by the SC in paragraphs 73 to 82 of the report of the SC14.

84. The SC **AGREED** that seabird identification can be very difficult, even for trained scientific observers, and **RECOMMENDED** that observers take photographs of seabirds caught by fishing vessels and submit them to seabird experts, or to the IOTC Secretariat, for confirmation of identification.

85. As a matter of consistency and to increase the reporting of seabird interactions, the SC **RECOMMENDED** that the recording of interactions with seabirds (as a group) be included in the minimum requirements for logbooks or through observer programmes for all fleets.

86. The SC further **RECOMMENDED** the Commission consider that more research is conducted on the identification of hot spots of interactions of seabirds with fishing vessels.

APPENDIX B

Extract of the Report of the Seventh Session of the IOTC Working Party on Ecosystems and Bycatch (WPEB07)

(IOTC–2011–WPEB07–R; SECT. 10, PAGES 34–41. Note: paragraph numbers refer to WPEB07 report)

10. SEABIRDS

10.1 Review of new information on the status of seabirds

180. The WPEB **NOTED** paper IOTC–2011–WPEB07–38 which provided new information on distribution of albatrosses and petrels breeding in the Indian Ocean and assessment of potential overlap with the IOTC fisheries, including the following abstract provided by the authors:

> *"The paper presents recent data and analysis on the distribution of the different life-history stages (juveniles, immatures, and of different populations for several species of albatrosses and petrels, based on tracking studies from French Territories. One objective was to estimate the degree of overlap with fisheries, based on recently available data on zones of high bycatch of Taiwanese and Japanese fisheries within the IOTC. The study shows that extensive overlap exists between zones of high bycatch and zones of high densities of albatrosses and petrels, with strong heterogeneities between life history stages, and show that young naïve birds (juveniles) occur in zones of high bycatches. The study shows also that different populations of the same species may have very different rates of overlap with fisheries, and that the zones of high bycatch of two fisheries examined have very different degree of overlap according to species, and within species according to life history stages and populations, that have thus different susceptibility to bycatch. The study suggests that this heterogeneity has to be taken into account in future analyses, that more information is needed on bycatch rates and band recoveries by different fisheries, and collaboration between seabird biologist and fishery scientist is highly recommended*."

181. The WPEB **NOTED** that reporting information from birds that have leg-bands are a very important source of data for seabird biology. The WPEB **NOTED** that observers are important to ensure returning of band recovery information, and that there was a need to educate more fishers about the need to return band information. It was suggested that schemes to incentivise returning of bands/band data be investigated.

182. The WPEB **REQUESTED** that when band recovery information is submitted, that the relevant banding scheme acknowledge the submission and return the banding information (species identity, island of origin, age/time of banding, etc.) as a courtesy to the individual who submitted the data.

183. The WPEB **NOTED** that because some seabird species range widely, into other ocean basins, it is desirable to harmonise technical specifications for mitigation measures (e.g. tori line design) among RFMOs where possible and appropriate.

184. The WPEB **NOTED** the widespread distributions of species known to be vulnerable to bycatch in fisheries for tuna and tuna-like species in the Indian Ocean. It further noted the variability in ranges based on life cycle phase, age, sex, etc., and the incomplete coverage from all populations/life cycles/ages.

185. The WEPB **NOTED** the joint effort of seabird biologists and the Japanese Fisheries Agency to better understand relationships between seabird distribution and zones of high by-catch and encourage further cooperative work.

186. The WPEB **RECOMMENDED** that the Scientific Committee note that the current area of application for seabird bycatch mitigation measures was supported by the available evidence and should not be revised at this point.

187. The WPEB **NOTED** paper IOTC–2011–WPEB07–38 which provided an overview of the National Plan of Action for the conservation of the Amsterdam albatross *Diomedea amsterdamensis*: potential risks from longline fisheries in the IOTC zone, including the following abstract provided by the authors:

> "*The paper presents the French National Plan of Action for the conservation of Amsterdam albatross Diomedea amsterdamensis, launched in 2010. It details various actions planned in the next 5 years. The critically endangered Amsterdam albatross is one of the rarest bird species, with only ~30 pairs breeding on Amsterdam Island and a total population of only ~200 individuals remaining. Demographic modelling indicates that the additional mortality of only 5 birds per year would cause a decrease of >3% per year. This would cause the Amsterdam albatross to become extinct within a few decades. Its foraging range at all life history stages overlaps completely with tuna longline fisheries in the southern zone of the IOTC, in areas where high mortalities are reported, causing concern for potential negative*

interactions. The talk stressed the importance of obtaining information on bycatch in the range of the species, and of band recoveries, since the species is difficult to distinguish at sea from wandering albatrosses, but the entire population is banded. We suggest that particular efforts should be taken to eliminate mortality risks for seabirds in the range of the species, and additional observations in the central Indian Ocean fisheries where the species forages: specific funding is available through the Action Plan to fund observers on board of longliners studying occurrence of species around longliners and bycatch processes."

188. The WPEB **NOTED** that through the French National Plan, funds have been earmarked for observers to go on tuna longliners operating in the range of this species. Japan expressed interest in assistance with getting observers onboard these vessels. The WPEB encouraged the French, Japanese, and other governments and scientists to pursue this collaborative effort to place experienced, international observers onboard vessels fishing on the High Seas within the range of the Amsterdam Albatross.

189. The WPEB **NOTED** paper IOTC–2011–WPEB07–41 which provided an overview of modelling work on Crozet wandering albatrosses and impact of longline fisheries in the IOTC zone, including the following abstract provided by the authors:

"*This paper presents a population assessment for Crozet wandering albatross Diomedea exulans population using demographic data from 1960-2009. This can be considered as a Level 3 Ecological Risk Assessment. An age, sex, life-stage and spatially structured model is described that is conditioned upon breeding population size, breeding success, adult and juvenile survival rates and observed bycatch rate data. The model includes comprehensive data on the spatial and temporal distributions of fishing effort and foraging distributions to estimate temporal overlaps, fishery catchability and consequent bycatch. Results show that the model was not able to replicate the observed data without making some broad assumptions about seabird catchability from the pelagic longline fleets and seabird behaviour. Consequently, the rapid decline in breeding pairs observed between the late 1960s and the early 1970s could not be explained without assuming that (i) the southern Japanese pelagic longline fleet had a substantially higher rate of capture than other fleets, and (ii) a distinct seabird behaviours (shy-bold / attracted/not attracted by fishing boats - behavioural types) exist that lead to an increased susceptibility to capture of only one part of the population. The more recent decline in breeding pairs (from the late 1990s) was not able to be explained without assuming that the Indian Ocean Taiwanese fresh longline fleet has a greater rate of capture in comparison with other pelagic longline fleets (including that of the Taiwanese deep freezing fleet). The results suggest that research should be addressed to confirm these assumptions, especially to obtain more comprehensive effort statistics for the pelagic longline fleets, in particular the Taiwanese fresh longline fleet*."

190. The WPEB **NOTED** that there are ongoing studies to check for individual seabird foraging strategies to see if some birds track vessels consistently and others don't.

191. The WPEB **NOTED** that there is uncertainty as to what fishing gear and techniques characterize the Taiwan,China fresh tuna fishery. This highlights the need to have detailed characterizations of fishing operations, and the observer programme should continue to collect and report on these features.

192. The WPEB **RECOMMENDED** that targeted observer effort be deployed in specific fisheries where high seabird bycatch is known or suspected.

193. The WPEB **NOTED** paper IOTC–2011–WPEB07–40 which provided an preliminary view of bycatch hotspots: bycatch distribution in the IOTC area of the southern hemisphere, including the following abstract provided by the authors:

"*Information was presented on the distribution of seabird bycatch across the IOTC area based on data collected by Japanese observers from 1997-2009/2010. Shy-type albatrosses, which do not breed in the Indian Ocean, were caught more than some albatross species which have a colony in the Indian Ocean. This indicates bycatch of non-breeding individuals or/and such mobility of broad range in albatrosses. From this result, it would be reasonable to integrate three oceans (Indian, Pacific and Atlantic) for discussing seabird bycatch hotspots. Bycatch CPUE patterns differ substantially between albatross species which have colonies in the Indian Ocean. For example, many more wandering albatrosses were recorded caught than sooty Phoebetria fusca and light-mantled albatrosses P. palpebrata, despite similar population numbers. Data from Japanese longliners identified bycatch of albatrosses in the southern hemisphere concentrated off southern African waters, especially in the SE Atlantic between April to September, and in the southeastern Indian Ocean in April to December, and these areas and seasons can be considered seabird bycatch hotspots. Considering numbers and seasonality of albatrosses and petrels bycatch, the current seabird mitigation approach (two-column approach)*

adopted by IOTC should be replaced with more stringent mitigation measures for these hotspots by considering their effectiveness, safety and practicability.

194. The WPEB **NOTED** the Procellariiform seabird bycatch from Japanese tuna longliners in the IOTC area between 1992–2009, and total breeding pairs per species and major breeding locations in the Indian Ocean, as provided in Table 11.

TABLE 11. Procellariiform seabird bycatch (by species) from Japanese tuna longliners in the IOTC area between 1992–2009, and total breeding pairs per species and major breeding locations in the Indian Ocean: o indicates breeding site, x indicates no breeding at site. Bycatch data were derived from a total of 14,813,680 hooks observed.

Species	Number of bycatch	Number of pairs	Iles Kerguelen	Iles Crozet	Prince Edward Island
Wandering albatross	117	22,437	o	o	o
Black-browed albatross	241	600,852	o	o	x
Shy albatross	191	13,000	x	x	x
Yellow-nosed albatross	234	41,580	o	o	o
Grey-headed	435	99,000	o	o	o
Sooty albatross	25	19,000	o	o	o
Light-mantled albatross	37	24,000	o	o	o
Northern giant petrel	113	11,500	o	o	o
White-chinned petrel	147	unknown	o	o	o

195. The WPEB **NOTED** that presenting bycatch figures only, without reference to relative fishing or observer effort, makes interpretation of spatial 'hotspots' difficult. The WPEB further **NOTED** that a collaborative effort between scientists from Japan, EU,France, ACAP and BirdLife International to examine this and species identification issues is ongoing, and requested that an update be provided at the next WPEB meeting.

196. The WPEB **AGREED** that training of observers to identify seabirds is needed and CPCs should welcome seabird scientists onboard their vessels to assist with this.

10.2 Review of any National Plans of Action for reducing incidental catches of seabirds in longline fisheries

197. The WPEB **NOTED** that no new NPOA-Seabirds had been adopted in last 12 months. Currently only four CPCs have an NPOA-Seabirds, with two others in preparation (Appendix X).

198. The WPEB **REITERATIED** its recommendation (para.79) that CPCs fulfill their FAO obligation to assess the need for an NPOA-seabirds and develop plans if appropriate. To assist in this the IOTC Secretariat should revise annually the table summarising progress towards the development of NPOA-Seabirds by CPCs for the consideration as each WPEB and Scientific Committee meeting.

10.3 Research on interaction between seabirds and tuna fisheries in the Indian Ocean

199. The WPEB **NOTED** paper IOTC–2011–WPEB07–40 which provided a preliminary report of 2010 weighted branchline trials in the tuna joint venture fishery in the South African EEZ, including the following abstract provided by the authors:

"*The lack of comprehensive research developing and comparing seabird bycatch mitigation technologies appropriate to pelagic longline fisheries has led to considerable debate regarding best-practice mitigation to prevent seabird mortality in pelagic tuna fisheries. Research in the South African tuna joint venture fishery in 2009 obviated the need to shrink the area astern of the vessel that birds have access to baited hooks via weighted branchlines to force seabird interactions into an area that can be successfully defended with streamer lines – a concept that has become known as 'shrink and defend'. Taking this philosophy further, in 2010 the performance of revised "hybrid" streamer lines deployed with weighted (W) and un-weighted (UW) branchlines were compared on two Japanese vessels fishing in the South Africa EEZ. Seventeen seabird species attended the vessel during line setting, but only four made primary attacks on baits and were killed. White-chinned petrels were the most abundant bird; they were present during all sets, attacked baits at the highest rate and were the species most killed. Albatross attack rates were nearly two orders of magnitude lower than that of white-chinned petrels but eight were killed, suggesting strongly that secondary attacks – birds stealing baits from other birds having made a primary attack – drove albatross mortality. Twenty-four of the 27 bird mortalities occurred after nautical dawn. All three birds caught at night were on UW lines. Weighting branchlines with hybrid streamer lines dramatically reduced seabird attacks, secondary attacks and seabird mortalities with little effect on fish catch. Four of 27 bird mortalities (2 white-chinned petrels, 1 shy albatross, and 1 cape gannet) were on W branchlines – a reduction in seabird bycatch rate of 86 % compared to UW (UW = 0.290 and W = 0.040 birds/1,000 hook). Mean tuna catch was near equal on*

the two branchline types, but W branchlines tangled on themselves three times more often than UW branchlines. No crew injuries occurred from either branchline type."

200. The WPEB **AGREED** that these preliminary results indicate that the 'shrink and defend' conceptual framework of seabird bycatch mitigation is effective at reducing seabird interactions with pelagic longline fishing gear. Specifically, these results strongly suggest that two hybrid streamer lines together with weighted branchlines and night setting constitute best-practice seabird bycatch mitigation for the joint venture fleet operating in the South Africa EEZ and other white-chinned petrel dominated fishing areas. These results also suggest that the Column A and Column B mitigation approach adopted by WCPFC (CMM 2007-04) and IOTC (Resolution 10/06 *on reducing incidental bycatch of seabirds in longline fisheries*), as currently written, would not prompt the simultaneous use of two hybrid streamer lines, branchline weighting and night setting, and therefore, falls short of the best-practice mitigation identified in this study.

201. The WPEB **NOTED** paper IOTC–2011–WPEB07–43 which provided a review of seabird bycatch mitigation measures for pelagic longline fishing operations, including the following abstract provided by the authors:

"*A review of recent research on seabird mitigation measures for pelagic longline gear was conducted by ACAP's Seabird Bycatch Working Group (SBWG), which met in Guayaquil, Ecuador in August 2011. The SBWG comprises global experts in seabird bycatch mitigation research and implementation and advises ACAP on actions that will assist in assessment, mitigation and reduction of negative interactions between fishing operations and seabirds*."

202. The WPEB **NOTED** that one of the major products coming out of the ACAP SBWG meeting was an updated review of current mitigation research for pelagic longline fisheries. The products of this work include a summary review, presented in IOTC–2011–WPEB07–43.

203. The WPEB **NOTED** that three measures ─ weighting of branchlines, night setting of longlines and use of bird scaring lines ─ are proven and recommended measures for use in pelagic longline gear. The WPEB **RECOMMENDED** that the Scientific Committee note that other measures, including the three which are currently included in Resolution 10/06 ─ blue-dyed squid bait, offal discharge control and use of a line shooting device ─ are not considered to be effective mitigation measures following ACAPs review of available mitigation measures:

- Blue dyed squid bait has been insufficiently researched and cannot be recommended.
- Line shooting device. There is no experimental evidence that line shooters reduce seabird bycatch in pelagic longline fisheries; therefore, they should not be considered a seabird bycatch mitigation option, although they will continue to be used on many vessels because they are considered to improve fishing efficiency.
- Offal discharge control. Appropriate management of offal is encouraged as good operating practice but is not considered a primary mitigation measure in pelagic fisheries as there are much smaller quantities of fish waste derived from fishing operations, in direct contrast to the situation in demersal fisheries. The inclusion of offal management as a mitigation measure in Resolution 10/06 most likely has been taken from use of this measure in CCAMLR and other demersal longline fisheries, where it is much more important.

204. The WPEB **NOTED** paper IOTC–2011–WPEB07–44 which provided a summary of best practice advice for reducing the impact of pelagic longline gear on seabirds, including the following abstract provided by the authors:

"*Recognising that most (84%) breeding albatrosses overlap with the pelagic longline fisheries for tuna and swordfish managed by the five tuna RFMOs, the adoption of best practice seabird conservation in these fisheries is a high priority. A combination of weighted branchlines, bird scaring lines and night setting are best practice mitigation in reducing bycatch of seabirds to the lowest possible level in pelagic longline fisheries. These measures should be applied in high risk areas such as the high latitudes of southern hemisphere oceans to reduce the incidental mortality of seabirds to the lowest possible levels. Other factors such as safety, practicality and the characteristics of the fishery should also be recognised. Currently, no single mitigation measure can reliably prevent the incidental mortality of seabirds in most pelagic longline fisheries. The most effective approach is to use the measures described in combination*."

205. The WPEB **NOTED** that this paper provided a distillation of the review of mitigation measures available for pelagic longline gear reported on in paper IOTC–2011–WPEB07–43.

206. The WPEB **RECOMMENDED** that the Scientific Committee note that:

- A combination of weighted branchlines, bird scaring lines and night setting are best practice mitigation in reducing bycatch of seabirds to the lowest possible level in pelagic longline fisheries.

These measures should be applied in high risk areas within the Indian Ocean and other southern hemisphere oceans.

- Currently, no single mitigation measure can reliably prevent the incidental mortality of seabirds in most pelagic longline fisheries. The most effective approach is to use the measures described in combination. Other factors such as safety, practicality and the characteristics of the fishery should also be recognised when framing conservation measures.
- The current recommended minimum standards for branchline weighting configurations are:
  i. Greater than 45 g weight attached within 1 m of the hook; or
  ii. Greater than 60 g weight attached within 3.5 m of the hook; or
  iii. Greater than 98 g weight attached within 4m of the hook.
- Positioning weight farther than 4 m from the hook is not recommended.

207. The WPEB **AGREED** that setting longlines at night, between nautical twilight and nautical dawn, is highly effective at reducing incidental mortality of seabirds because the majority of vulnerable seabirds are inactive at night.

208. The WPEB **NOTED** that for bird scaring lines (BSL), ACAP best practice advice recognises that vessel size is an important determinant in their practical use, with respect to the aerial extent that can be achieved, and the ability to deploy single or twin BSLs. For vessels that exceed 35 m in length, an aerial extent of 100 m and use of two BSLs is **RECOMMENDED**; for smaller vessels an aerial extent of 75 m and use of a single BSL is **RECOMMENDED**.

209. Taking into account the information presented in working papers IOTC–2011–WPEB07–43, IOTC–2011–WPEB07–44 and IOTC–2011–WPEB07–54, the WPEB **AGREED** that a combination of weighted branchlines, bird scaring lines and night setting is best practice mitigation in reducing bycatch of seabirds to the lowest possible level in pelagic longline fisheries. The WPEB **RECOMMENDED** that Resolution 10/06 be amended to reflect this advice, and to incorporate the technical specifications outlined in the paragraphs above (paras. 203, 206, 208).

210. Further, the WPEB **NOTED**, in agreement with IOTC–2011–WPEB07–40, that if this **RECOMMENDATION** was accepted, together with the **RECOMMENDATION** to remove blue-dyed squid bait, line shooters and offal discharge control from the existing measure, the 'two column' approach used in Resolution 10/06 would be abandoned in favour of an approach that specifies the three measures to be applied in areas of seabird interaction risk.

211. The WPEB **RECOMMENDED** that at this stage, line weighting should be seen as an adaptive management response to the seabird bycatch problem. Continued refinement of line weighting configurations (mass, number and position of weights and materials) through controlled research and application in fisheries, is highly desirable to find configurations that are most safe, practical and effective. The regimes recommended above should be implemented in working fisheries, monitored through observer programmes, and reviewed and modified if found to be inadequate in reducing bycatch to acceptable levels.

212. The meeting **NOTED** that the development of the mitigation measures outlined in the papers presented was the result of excellent collaboration between fishers, seabird experts and mitigation technologists with specialist expertise. Many IOTC members will lack capacity to collect such data, but it is imperative that this be done if further progress is to be made. The WPEB **RECOMMENDED** that CPCs look to establish collaborative relationships with other CPCs, NGOs and IGOs with the relevant skill set to provide the necessary training and build capacity.

213. The WPEB **NOTED** that the development of a revised seabird Conservation and Management Measure, that adopts the use of the three best practice mitigation measures, needs to take into consideration socio-economic factors relevant to fishers, and the need to ensure ongoing collection of data to refine mitigation measures.

214. The WPEB **NOTED** that it was desirable to harmonise mitigation measures across ocean basins, where feasible, to assist fishers in gaining experience in the use of best practice mitigation measures, and to improve fishing efficiency through eliminating the need to change fishing gear when fishing in different areas.

10.4 Identification sheets for observers

215. The WPEB **NOTED** ACAP's SBWG recently discussed the development of seabird identification guides for use in observer programmes and agreed that guides designed to identify bird corpses were of much greater use for aiding the identification of seabirds caught at sea than those based on live birds. Such guides have been developed in Canada, Ecuador, Japan and the United States of America. It was **NOTED** that ACAP'S

Secretariat has now commenced work on the development of this guide, and will provide this to IOTC and other tuna RFMOs when it is complete.

216. The WPEB **NOTED** that identification of dead seabirds was not a simple task and required considerable training of observers. It was not realistic to expect that all fishing masters would possess the necessary skills to reliably observe seabirds killed in fisheries, and reliable data would most likely only come from trained and experienced observers.

217. The WPEB **RECOMMENDED** that any amendment to Resolution 10/06 allow sufficient time for orderly implementation, to allow training and redevelopment of gears and operations.

10.5 Review of Resolutions and Recommendations on seabirds:

218. The WPEB **NOTED** paper IOTC–2011–WPEB07–16 which aimed to encourage the WPEB to review the existing Conservation and Management Measures (CMMs) relating to seabirds, and as necessary to 1) provide recommendations to the Scientific Committee on whether modifications may be required; and 2) recommend whether other CMMs may be required.

219. The WPEB **AGREED** that although IOTC Recommendation 05/09 *on incidental mortality of seabirds* has not been revoked, it became obsolete with the adoption of Resolution 10/06, and **RECOMMENDED** that it be removed from the list of current Conservation and Management Measures of the Commission.

220. The WPEB **AGREED** that the current wording of Resolution 10/06 does not make mandatory the reporting of interactions between fishing vessels catching species under the IOTC Agreement and seabirds when this information is deemed necessary to assess the status of these species.

221. The WPEB strongly **RECOMMENDED** that the Resolution 10/06 be amended in order to make the reporting of seabird interactions mandatory for vessels fishing for species under the IOTC mandate. In addition and as a matter of consistency, to increase the reporting of these interactions, the WPEB further **RECOMMENDED** that the recording of interactions with seabirds be included in the minimum requirements for logbooks for all fleets.

10.6 Develop recommendations to the Scientific Committee

222. The WPEB **RECOMMENDED** the following management advice for seabirds in the Indian Ocean, for the consideration of the Scientific Committee:

MANAGEMENT ADVICE

Stock status. No assessment has been undertaken by the IOTC WPEB for seabirds due to the lack of data being submitted by CPCs. However, the current International Union for Conservation of Nature (IUCN) threat status for each of the seabird species reported as caught in IOTC fisheries to date is provided in Table 12. It is important to note that a number of international global environmental accords (e.g. Convention on Migratory Species (CMS), Convention on Biological Diversity (CBD)), as well as numerous fisheries agreements obligate States to provide protection for these species. While the status of seabirds is affected by a range of factors such as degradation of nesting habitats and targeted harvesting of eggs, the level of mortality of seabirds due to fishing gear in the Indian Ocean is poorly known, although where there has been rigorous assessments of impacts in areas south of 25 degrees (e.g. in South Africa), very high seabird bycatch rates have been recorded in the absence of a suite of proven bycatch mitigation measures.

Outlook. Resolution 10/06 *On Reducing the Incidental Bycatch of Seabirds in Longline Fisheries* includes an evaluation requirement (para. 8) by the Scientific Committee in time for the 2011 meeting of the Commission. However, given the lack of reporting of seabird interactions by CPCs to date, such an evaluation cannot be undertaken at this stage. Unless IOTC CPCs become compliant with the data collection and reporting requirements for seabirds, the WPEB will continue to be unable to address this issue. Notwithstanding this, it is acknowledged that the impact on seabird populations from fishing for tuna and tuna-like species, particularly using longline gear may increase if fishing pressure increases. Any fishing in areas with high abundance of procellariiform seabirds is likely to cause incidental capture and mortality of these seabirds unless measures that have been proven to be effective against Southern Ocean seabird assemblages are employed.

TABLE 12. Status of seabirds in the Indian Ocean – IUCN threat status for all seabird species reported as caught in fisheries within the IOTC area of competence

Common name	Scientific name	IUCN threat status
Albatross		
Atlantic Yellow-nosed	*Thalassarche*	Endangered
Black-browed albatross	*Thalassarche*	Endangered
Indian yellow-nosed albatross	*Thalassarche carteri*	Endangered
Shy albatross	*Thalassarche cauta*	Near Threatened
Sooty albatross	*Phoebetria fusca*	Endangered
Tristan albatross	*Diomedea dabbenena*	Critically Endangered
Wandering albatross	*Diomedia exulans*	Vulnerable
White-capped albatross	*Thalassarche steadi*	Near Threatened
Petrels		
Cape/Pintado petrel	*Daption capense*	Least Concern
Great-winged petrel	*Pterodroma macroptera*	Least Concern
Grey petrel	*Procellaria cinerea*	Near Threatened
Northern giant-petrel	*Macronectes halli*	Least Concern
White-chinned petrel	*Procellaria aequinoctialis*	Vulnerable
Others		
Cape gannet	*Morus capensis*	Vulnerable
Flesh-footed shearwater	*Puffinus carneipes*	Least Concern

223. The WPEB **RECOMMENDED** that the Scientific Committee consider the following:
    - The available evidence indicates considerable risk to the status of seabirds in the Indian Ocean.
    - The primary source of data that drive the ability of the WPEB to determination a status for the Indian Ocean, total interactions by fishing vessels, is highly uncertain and should be addressed as a matter of priority.
    - Current reported interactions are known to be a severe underestimate.
    - Maintaining or increasing effort in the Indian Ocean without refining and implementing appropriate mitigation measures, will likely result in further declines in biomass.
    - That appropriate mechanisms are developed by the Compliance Committee to ensure CPCs comply with their data collection and reporting requirements for seabirds.
    - Resolution 10/06 on reducing the incidental bycatch of seabirds in longline fisheries includes an evaluation requirement (para. 8) by the Scientific Committee in time for the 2011 meeting of the Commission, noting that this deadline is now overdue.

10.7 Update of seabirds Executive Summary

224. The WPEB **NOTED** paper IOTC–2011–WPEB07–16 which aimed to encourage the Working Party on Ecosystems and Bycatch (WPEB) to develop a clear and concise draft Executive Summary for seabirds in the Indian Ocean, for the consideration of the Scientific Committee.

225. The WPEB **RECOMMENDED** that the IOTC Secretariat update the draft seabirds Executive Summary with the latest 2010 interaction data, including the number of breeding pairs for each species, and for these to be provided to the Scientific Committee for its consideration.

APPENDIX C

Extract of the Report of the Fourteenth Session of the IOTC Scientific Committee (SC14)

(IOTC–2011–SC14–R; APPENDIX XXVI, PAGES 190–198)

EXECUTIVE SUMMARY: SEABIRDS

Indian Ocean Tuna Commission
Commission des Thons de l'Océan Indien
iotc ctoi

Status of Seabirds in the Indian Ocean

TABLE 1. IUCN threat status for all seabird species reported as caught in fisheries within the IOTC area of competence.

Common name	Scientific name	IUCN threat status[1]
Albatross		
Atlantic Yellow-nosed Albatross	*Thalassarche chlororynchos*	Endangered
Black-browed albatross	*Thalassarche melanophrys*	Endangered
Indian yellow-nosed albatross	*Thalassarche car teri*	Endangered
Shy albatross	*Thalassarche cauta*	Near Threatened
Sooty albatross	*Phoebetria fusca*	Endangered
Light-mantled albatross	*Phoebetria palpebrata*	Near Threatened
Amsterdam albatross	*Diomedea amsterdamensis*	Critically Endangered
Tristan albatross	*Diomedea dabbenena*	Critically Endangered
Wandering albatross	*Diomedia exulans*	Vulnerable
White-capped albatross	*Thalassarche steadi*	Near Threatened
Petrels		
Cape/Pintado petrel	*Daption capense*	Least Concern
Great-winged petrel	*Pterodroma macroptera*	Least Concern
Grey petrel	*Procellaria cinerea*	Near Threatened
Northern giant-petrel	*Macronectes halli*	Least Concern
White-chinned petrel	*Procellaria aequinoctialis*	Vulnerable
Others		
Cape gannet	*Morus capensis*	Vulnerable
Flesh-footed shearwater	*Puffinus carneipes*	Least Concern

INDIAN OCEAN STOCK – MANAGEMENT ADVICE

Stock status. No assessment has been undertaken by the IOTC WPEB for seabirds due to the lack of data being submitted by CPCs. However, the current International Union for Conservation of Nature (IUCN) threat status for each of the seabird species reported as caught in IOTC fisheries to date is provided in Table 1. It is important to note that a number of international global environmental accords (e.g. Convention on Migratory Species (CMS), Convention on Biological Diversity (CBD)), as well as numerous fisheries agreements obligate States to provide protection for these species. While the status of seabirds is affected by a range of factors such as degradation of nesting habitats and targeted harvesting of eggs, the level of mortality of seabirds due to fishing gear in the Indian Ocean is poorly known, although where there has been rigorous assessment of impacts in areas south of 25 degrees (e.g. in South Africa), very high seabird bycatch rates have been recorded in the absence of a suite of proven bycatch mitigation measures.

Outlook. Resolution 10/06 *On Reducing the Incidental Bycatch of Seabirds in Longline Fisheries* includes an evaluation requirement (para. 8) by the Scientific Committee in time for the 2011 meeting of the Commission. However, given the lack of reporting of seabird interactions by CPCs to date, such an evaluation cannot be undertaken at this stage. Unless IOTC CPCs become compliant with the data collection and reporting requirements for seabirds, the WPEB will continue to be unable to address this issue. Notwithstanding this, it is acknowledged that the impact on seabird populations from fishing for tuna and tuna-like species, particularly using longline gear may increase if fishing pressure increases. Any fishing in areas with high abundance of procellariiform seabirds is likely to cause incidental capture and mortality of these seabirds unless measures that have been proven to be effective against Southern Ocean seabird assemblages are employed.

[1] The process of the threat assessment from IUCN is independent from the IOTC and is presented for information purpose only

The SC **RECOMMENDED** the following:

- The available evidence indicates considerable risk to the status of seabirds in the Indian Ocean.
- The primary source of data that drive the ability of the WPEB to determination a status for the Indian Ocean, total interactions by fishing vessels, is highly uncertain and should be addressed as a matter of priority.
- Current reported interactions are a known to be a severe underestimate.
- That more research is conducting on the identification of hot spots of interactions between seabirds and fishing vessels.
- Maintaining or increasing effort in the Indian Ocean without refining and implementing appropriate mitigation measures, will likely result in further declines in biomass.
- That appropriate mechanisms are developed by the Compliance Commission to ensure CPCs comply with their data collection and reporting requirements for seabirds.
- Resolution 10/06 on reducing the incidental bycatch of seabirds in longline fisheries includes an evaluation requirement (para. 8) by the Scientific Committee in time for the 2011 meeting of the Commission, noting that this deadline is now overdue.

SUPPORTING INFORMATION

(Information collated from reports of the Working Party on Ecosystems and Bycatch and other sources as cited)

CONSERVATION AND MANAGEMENT MEASURES

Seabirds in the Indian Ocean are currently subject to a number of conservation and management measures adopted by the Commission:

- Resolution 10/06 *On Reducing the Incidental Bycatch of Seabirds in Longline Fisheries* recognizes the threatened status of some of the seabird species found in the Indian Ocean and that longline fishing operations can adversely impact seabirds. The Resolution makes mandatory for vessels fishing south of 25°S, the use of at least two seabird bycatch mitigation measures selected from a table, including at least one measure from Column A (Table shown below) aimed at effectively reducing the mortality of seabirds due to longline operations. In addition, CPCs are required to provide to the Commission all available information on interactions with seabirds. However, it does not include a mandatory requirement for CPCs to record seabird interactions while fishing for tuna and tuna-like species in the IOTC area of competence, but rather to report "*all available information on interactions with seabirds*".

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

- Resolution 10/02 *Mandatory Statistical Requirements For IOTC Members and Cooperating non-Contracting Parties (CPC's)* encourages CPCs to record and report data on seabird interactions. However, if a CPC chooses not to record data on seabird interactions, as permitted under Resolution 10/02, then the requirements of Resolution 10/06 *on Reducing the Incidental Bycatch of Seabirds in Longline Fisheries* become void, as the wording of Resolution 10/06 only requires reporting of data where it is available.
- Resolution 11/04 *on a Regional Observer Scheme* (commenced on 1 July 2010) requires data on seabird interactions to be recorded by observers and reported to the IOTC within 150 days. The Regional Observer Scheme (ROS) aims to collect scientific observer data on catch and bycatch on, at least, 5% of the fishing operations of vessel over 24m and vessel under 24m fishing outside their EEZ. The requirement under Resolution 11/04 in conjunction with the reporting requirements under Resolution 10/06, means that all CPCs should be reporting seabird interactions as part of their annual report to the Scientific Committee.

RESOLUTION 10/06 ON REDUCING THE INCIDENTAL BYCATCH OF SEABIRDS IN LONGLINE FISHERIES:

7. CPCs shall provide to the Commission, as part of their annual reports, information on how they are implementing this measure and all available information on interactions with seabirds, including bycatch by fishing vessels carrying their flag or authorised to fish by them. This is to include details of species where available to enable the Scientific Committee to annually estimate seabird mortality in all fisheries within the IOTC area of competence;

RESOLUTION 10/02 MANDATORY STATISTICAL REQUIREMENTS FOR IOTC MEMBERS AND COOPERATING NON-CONTRACTING PARTIES (CPC'S):

3. Catch and effort data:

(…)CPC's are also encouraged to record and provide data on species other than sharks and tunas taken as bycatch.

RESOLUTION 11/04 ON A REGIONAL OBSERVER SCHEME

10. Observers shall:

b) Observe and estimate catches as far as possible with a view to identifying catch composition and monitoring discards, by-catches and size frequency.

CONSERVATION AND MANAGEMENT MEASURES IN OTHER REGIONS

Evidence from areas where seabird bycatch was formerly high but has been reduced (e.g. Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR) and South Africa) has shown that it is important to employ, simultaneously, a suite of mitigation measures. Research conducted in South Africa by Japanese and US researchers (Melvin et al. 2010) showed that bird scaring lines (BSL, also known as tori or streamer lines) displace seabird attacks on baits, but only as far astern as the BSL extends. If baits are sufficiently close to the surface behind the aerial extent of the BSL, the rate of attack by seabirds on baited hooks, and hence risk of bycatch, remains high. This research shows clearly that appropriate sink rates must be used in tandem with BSLs and that unweighted branch lines or those with small weights placed well away from the hook pose the highest risks to seabirds. The research also suggests no negative effect of line-weighting on target catches, but limited sample sizes preclude definitive analysis (Melvin et al. 2010). In addition, experience from CCAMLR and elsewhere has indicated a number of additional factors contribute to successful reduction of seabird bycatch (FAO 2008; Waugh et al. 2008). These include research to optimise the effectiveness of mitigation measures and their ease of implementation, the use of onboard observer programs to collect seabird bycatch data and evaluate the effectiveness of bycatch mitigation measures, training of both fishermen and observers in relation to the problem and its solutions, and ongoing review of the effectiveness of these activities. Mitigation measures recommended by ACAP (Agreement on the Conservation of Albatrosses and Petrels) as effective include weighted branch lines that ensure that baits quickly sink below the reach of diving seabirds, night setting, and appropriate deployment of well designed BSLs.

Reduction of seabird bycatch may even bring benefits to fishing operations, for example by reducing the loss of bait to seabirds. Recent research in Brazil showed a reduction of 60% of the capture of seabirds and higher catch rates (20–30%) of target species when effective mitigation measures were applied (Mancini et al. 2009). However, more detailed economic assessments across a diversity of regions, fishing gears and seasons are required to get a fuller picture of economic benefits.

The International Commission for the Conservation of Atlantic Tunas (ICCAT) established a new conservation measure for seabirds at the November 2011 meeting of the Commission. In keeping with scientific advice given to the ICCAT, which is harmonious with the advice from the WPEB 2011, the new measure requires the use of only three technologies to reduce risk to seabirds, namely bird scaring lines, line weighting and night setting. In areas of high bycatch (or bycatch risk), currently defined in the South Atlantic as of 25˚S, longline fishing vessels are required to use two of the three measures.

INDICATORS – FOR SEABIRD SPECIES KNOWN OR LIKELY TO BE VULNERABLE TO MORTALITY FROM FISHING OPERATIONS IN THE IOTC AREA OF COMPETENCE.

Seabirds are species that derive their sustenance primarily from the ocean and which spend the bulk of their time (when not on land at breeding sites) at sea. Seventeen species of seabirds known to interact with longline fisheries for tuna and tuna-like species in the Indian Ocean are listed in Table 1. However, not all reports identify birds to species level and, overall, information on seabird bycatch in the IOTC area remains very limited (Gauffier 2007; IOTC–2011–SC13–R). Due to gaps in tracking and observer data, it is likely that there are other species at risk of bycatch which are not identified in this Executive Summary.

Worldwide, 17 of the 22 species of albatross are listed by the IUCN as globally threatened, with bycatch in fisheries identified as the key threat to the majority of these species (Robertson and Gales 1998). Impacts of longline fisheries on seabird populations have been demonstrated (e.g. Weimerskirch and Jouventin 1987; Weimerskirch et al. 1997; Croxall et al. 1990; Tuck et al. 2001; Nel et al. 2003). In general, other IOTC gear types (including purse seine, bait boats, troll lines, and gillnets) are considered to have low incidental catch of seabirds, however data remain limited. The Convention on Migratory Species (CMS) is finalising a global review of the bycatch levels in gillnet fisheries, and the findings of this report may be relevant to seabird bycatch in gillnet fisheries operating in the IOTC.

Range and stock structure

Eleven seabird families occur within the IOTC area of competence as breeding species. They are typically referred to as penguins (Spheniscidae), albatrosses (Diomedeidae), petrels and allies (Procellariidae), storm-petrels (Hydrobatidae), diving-petrels (Pelecanoididae), tropicbirds (Phaethonidae), gannets and boobies (Sulidae), cormorants (Phalocrocoracidae), frigatebirds (Fregatidae), skuas (Stercorariidae), gulls and terns (Laridae). Of these, the Order Procellariiformes (albatrosses and petrels) are most susceptible to being caught as bycatch in longline fisheries (Wooller et al. 1992, Brothers et al. 1999), and therefore are most susceptible to direct interactions with IOTC fisheries.

The southern Indian Ocean is of global importance in relation to albatross distribution: seven of the 18 species of southern hemisphere albatrosses have breeding colonies on Indian Ocean islands[2]. In addition, all but one[3] of the 18 southern hemisphere albatrosses forage in the Indian Ocean at some stage in their life cycle. The Indian Ocean is particularly important for Amsterdam albatross (*Diomedea amsterdamensis* – Critically Endangered) and Indian yellow-nosed albatross (*Thalassarche carteri* – Endangered), which are endemic to the southern Indian Ocean, white-capped albatross (*Thalassarche steadi* – endemic

[2] Amsterdam, black-browed, grey-headed, Indian yellow-nosed, light-mantled, sooty and wandering albatrosses

[3] Atlantic yellow-nosed albatross (*Thalassarche chlororhynchos)*

to New Zealand), shy albatross (*T. cauta* – endemic to Tasmania, and which forage in the area of overlap between IOTC and WCPFC), wandering albatross (*D. exulans* – 74% global breeding pairs), sooty albatross (*Phoebetria fusca* – 39% global breeding pairs), light-mantled sooty albatross (*P. palpebrata* – 32% global breeding pairs), grey-headed albatross (*T. chrysotoma* – 20% global breeding pairs) and northern and southern giant-petrel (*Macronectes halli and M. giganteus* – 26% and 30% global breeding pairs, respectively).

In the absence of data from observer programs reporting seabird bycatch, risk of bycatch has been identified through analysis of the overlap between albatross and petrel distribution and IOTC longline fishing effort, based on data from the Global Procellariiform Tracking Database (ACAP 2007). A summary map indicating distribution is shown in Figure 1 and the overlap between seabird distribution and IOTC longline fishing effort is shown in Table 2. The 2007 analysis of tracking data indicated that albatrosses breeding on Southern Indian Ocean islands spent 70–100% of their foraging time within areas overlapping with IOTC longline fishing effort. The analysis identified the proximity of the Critically Endangered Amsterdam albatross and Endangered Indian yellow-nosed albatross to high levels of pelagic longline effort. Wandering, shy, grey-headed and sooty albatrosses and white-chinned petrels showed a high overlap with IOTC longline effort. Data on distribution during the non-breeding season was lacking for many species, including black-browed albatrosses and white-capped albatrosses (known from bycatch data to be amongst the species most frequently caught).

In 2009 and 2010, new tracking data were presented to the Working Party on Ecosystems and Bycatch (WPEB) which filled a number of gaps from the 2007 analysis, particularly for sooty albatross, and for distributions of juveniles of wandering, sooty and Amsterdam albatrosses, white-chinned and northern giant petrels (Delord and Weimerskirch 2009; 2010). This analysis indicated substantial overlap with IOTC longline fisheries.

Longevity, maturity, breeding season

Seabirds are long-lived, with natural adult mortality typically very low. Seabirds are characterised as being late to mature and slow to reproduce; some do not start to breed before they are ten years old. Most lay a single egg each year, with some albatross species only breeding every second year. These traits make any increase in human-induced adult mortality potentially damaging for population viability, as even small increases in mortality can result in population decreases.

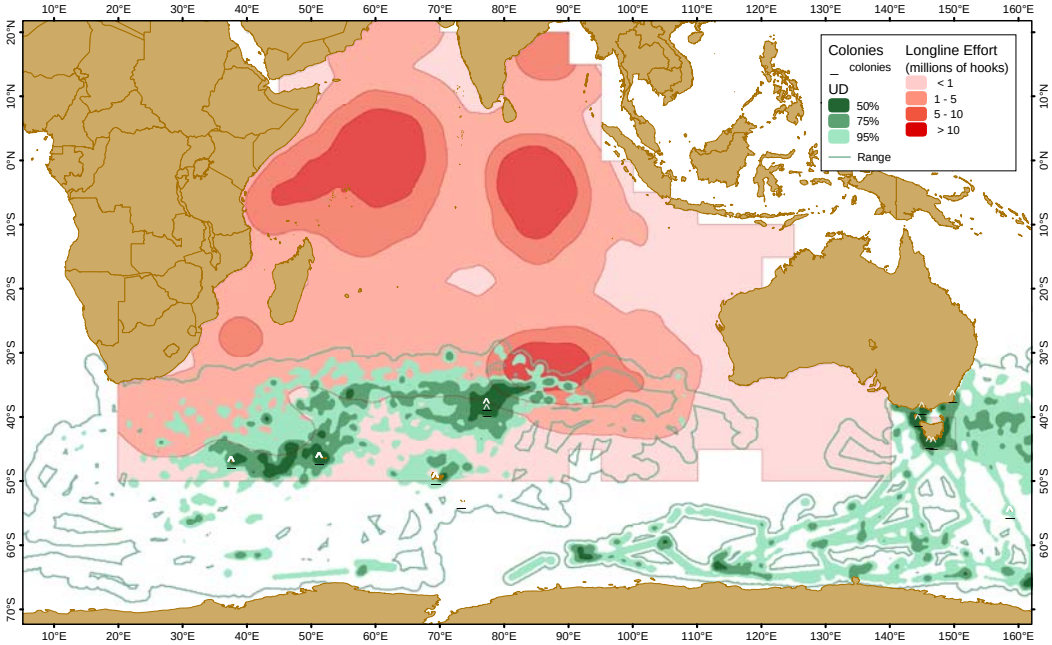

Fig. 1. Distribution of breeding albatrosses, petrels and shearwaters in the Indian Ocean (see Table 2 for a list of species included), and overlap with IOTC longline fishing effort for all gear types and fleets (average annual number of hooks set per 5° grid square from 2002 to 2005).

TABLE 2. Overlap between the distribution of breeding and non-breeding albatrosses, petrels and shearwaters and IOTC fishing effort* (Distributions derived from tracking data held in the Global Procellariiform Tracking Database.

Species/Population – Breeding	Global Population (%)	Overlap (%)
Amsterdam albatross (Amsterdam)	100	100
Antipodean (Gibson's) albatross		
Auckland Islands	59	1
Black-browed albatross		1
Iles Kerguelen	1	88
Macquarie Island	<1	1
Heard & McDonald	<1	
Iles Crozet	<1	
Buller's Albatross		2

Solander Islands	15	1
Snares Islands	27	2
Grey-headed albatross		7
Prince Edward Islands	7	70
Iles Crozet	6	
Iles Kerguelen	7	
Indian yellow-nosed albatross		
Ile Amsterdam	70	100
Ile St. Paul	<1	
Iles Crozet	12	
Iles Kerguelen	<1	
Prince Edward Island	17	
Light-mantled albatross	39	
Shy albatross		
Tasmania	100	67
Sooty albatross		
Iles Crozet	17	87
Ile Amsterdam	3	
Ile St. Paul	<1	
Iles Kerguelen	<1	
Prince Edward Island	21	
Wandering albatross		75
Iles Crozet	26	93
Iles Kerguelen	14	96
Prince Edward Islands	34	95
Northern giant petrel	26	
Southern giant petrel	9	
White-chinned Petrel		
Iles Crozet	?	60
Iles Kerguelen	?	
Prince Edward Island	?	
Short-tailed shearwater		
Australia	?	3
Species/Population – Non-breeding	**Global Population (%)**	**Overlap (%)**
Amsterdam albatross (Amsterdam)	100	98
Antipodean (Gibson's) albatross		9
Antipodes Islands	41	3
Auckland Islands	59	13
Black-browed albatross		
South Georgia (GLS data)	16	3
Heard & McDonald Islands	<1	
Iles Crozet	<1	
Iles Kerguelen	1	
Buller's albatross		13
Solander Islands	15	9
Snares Islands	27	15
Grey-headed albatross		
South Georgia (GLS data)	58	16
Iles Crozet	6	
Iles Kerguelen	7	
Prince Edward Island	7	
Indian yellow-nosed albatross		
Light-mantled albatross		
Northern royal albatross		3
Chatham Islands	99	3
Taiaroa Head	1	1
Shy albatross		
Tasmania	100	72
Sooty albatross		
Southern royal albatross		
Wandering albatross		59
White-capped albatross		
Northern giant petrel		
Southern giant petrel		
White-chinned petrel		

Westland petrel Short-tailed shearwater		

*Fishing data are based on the average annual number of hooks set per 5° grid square from 2002 to 2005. Overlap is expressed as the percentage of time spent in grid squares with longline effort, and is given for each breeding site as well the species' global population where sufficient data exists. Shaded squares represent species/colonies for which no tracking data were available).

Availability of information on the interactions between seabirds and fisheries for tuna and tuna-like species in the Indian Ocean

Bycatch data from onboard observer programs

Globally it is recognized that onboard observer programs are vital for collecting data on catches of non-target species, particularly those species which are discarded at sea. More specifically, observers need to observe hooks during setting and monitor hooks during the hauling process to adequately assess seabird bycatch and evaluate the effectiveness of mitigation measures in use. Levels of observer coverage significantly in excess of 5% are likely to be needed to accurately monitor seabird bycatch levels in IOTC fisheries.

The IOTC has implemented data collection measures using onboard observers to better understand the nature and extent of the interactions between fisheries for tuna and tuna-like species in the Indian Ocean and seabirds. Subsequently, IOTC members have implemented a number of national observer programmes that are providing information on the levels of seabird interactions. Observer data from all fleets and gears remains very low with only Australia and South Africa reporting levels of seabird interactions to date (Table 3). However, data from other sources and in other regions indicate that threats to seabirds are highest from longline gear.

TABLE 3. Members and Cooperating Non-Contracting Parties reporting of seabird interactions for the years 2008–2010 to the IOTC (to be updated before the 14th Session of the SC in December 2011).

CPC's	2008	2009	2010	Remarks
Australia	0	2	0	
Belize	0	0	0	Nil discards reported; no observers on board
China			0	Non-raised observer data
Taiwan,China				
Comoros	n.a.	n.a.	n.a.	No longline activity
European Union**				
Eritrea				
France (territories)	n.a.	n.a.	n.a.	No longline activity
Guinea				
India				Bycatch levels reported for research vessels
Indonesia			42	42 seabirds caught between 2005 and 2010 (non-raised observer data)
Iran, Islamic Republic of	n.a.	n.a.	n.a.	No longline activity
Japan			11	Non-raised observer data
Kenya				
Korea, Republic of		94	72	Non-raised observer data
Madagascar				
Malaysia				
Maldives, Republic of				No longline activity
Mauritius				
Oman, Sultanate of				
Pakistan	n.a.	n.a.	n.a.	No longline activity
Philippines	0	0	0	Nil discards reported; no observers on board
Seychelles				
Sierra Leone				
Sri Lanka				
Sudan				
Tanzania				
Thailand				
United Kingdom (BIOT)	n.a.	n.a.	n.a.	No longline activity
Vanuatu				
Mozambique*	n.a.	n.a.	n.a.	No longline activity
Senegal*	n.a.	n.a.	n.a.	No longline activity
South Africa*	157	467	162	

Green = CPC reported level of seabird interactions; Red = CPC did not report level of seabird interactions

*Cooperating non-Contracting Party

**Observer data was reported for the French purse-seine fleet for 2009 as well as for the La Réunion longline fleet. Moreover, the observer programme on-board the EU Purse-seine fleet has been discontinued because of piracy activities.

Longline

Observer data from longline fisheries occurring north of 20˚S is very sparse (Gauffier 2007). While seabird bycatch rates in tropical areas are generally assumed to be low, a number of threatened seabirds forage in these northern waters. Due to their small population sizes, bycatch at significant levels could be occurring but not, or almost never being observed.

Others gears

The impact of purse-seine fishing on tropical seabird species, including larids (gulls, terns and skimmers) and sulids (gannets and boobies), is generally considered to be low, but data remain sparse and there are anecdotal observations which suggest that these interactions might merit closer investigation. However, no observation of incidental catch of seabird in the purse-seine fishery has been made in the Indian Ocean since the beginning of the fishery 25 years ago. The scale and impacts of gillnet fishing impacts on seabirds in the IOTC convention area is unknown. Outside the convention area, gillnet fishing has been recorded as catching high numbers of diving seabird species, including shearwaters and cormorants (e.g. Berkenbusch and Abraham 2007). The large coastal gillnet fisheries in the northern part of the IOTC clearly merit closer investigation, and should be considered a priority, as should the impact of lost or discarded gillnets (ghost fishing) on seabirds.

Indirect impacts of fisheries

Many tropical seabird species forage in association with tunas, which drive prey to the surface and thereby bring them within reach of the seabirds. The depletion of tuna stocks could therefore have impacts on these dependent species. More widely, the potential 'cascade' effects of reduced shark and tuna abundances on the ecosystem is largely unknown. Although these kinds of impacts are difficult to predict, there are some examples that suggest meso-predator release has occurred in the Convention area (e.g. Romanov and Levesque 2009)

ASSESSMENT

A number of comprehensive assessments of the status of Indian Ocean seabirds are available, in addition to the IUCN threat status:

- Modelling work on Crozet wandering albatrosses and impact of longline fisheries in the IOTC zone (Tuck et al. 2011).
- ACAP Species assessment for: Amsterdam Albatross, Indian Yellow-nosed Albatross, Northern Royal Albatross, Southern Royal Albatross, Shy Albatross, Sooty Albatross, Wandering Albatross, Northern Giant Petrel, Southern Giant Petrel, Grey Petrel, Spectacled Petrel, White-chinned Petrel (http://www.acap.aq/acap-species).

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