Seabird Bycatch Rates in IOTC Longline Fisheries

Dr. Orea Anderson, Dr. Ross Wanless, Dr. Cleo Small
BirdLife International Global Seabird Programme

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1. ABSTRACT

- Despite the requirements placed on all Contracting Parties and Cooperating Non-Contracting Parties (hereafter referred to as CPCs) under **Resolution 08/03** (**On Reducing the Incidental Bycatch of Seabirds in Longline Fisheries**) that all available information on interactions with seabirds be submitted to the Commission in the annual reports; the current state of bycatch information in IOTC is scarce at best. All reported information on bycatch that could be found for IOTC fisheries is included in this paper. However, because of the sheer scarcity of information, no bycatch estimates have been attempted based on this data. This is because the gaps in the data are too large for any meaningful extrapolations to be made.

- Currently, observer coverage within IOTC longline fisheries is very low (typically <1% of effort within a fleet, if not zero coverage). An improvement in the level and spread of observer coverage would greatly enhance the ability of IOTC to estimate seabird mortality in its fisheries. The new **Resolution 09/04** (**On a Regional Observer Scheme**) could make considerable inroads on this data shortage, provided the necessary data collection protocols and reporting requirements relevant to seabird bycatch are firmly established within the requirements for CPCs.

2. INTRODUCTION

Importance of IOTC area to seabirds

Results from the Global Procellariiform Tracking Database demonstrate the importance of particular sections of the IOTC region for albatrosses and petrels. There is a high degree of overlap between seabird distributions and IOTC longline fishing effort, particularly for those species that breed on islands in the Southern Indian Ocean. Seventeen of 18 Southern hemisphere albatrosses forage in the Indian Ocean at some stage in their life cycle. The critically endangered (CR) Amsterdam albatross (*Diomedea amsterdamensis*) and the endangered (EN) Indian yellow-nosed albatross (*Thalassarche carteri*) are endemic to the IOTC region. Both forage almost exclusively in areas fished by IOTC longline fleets, close to the area of highest longline effort south of 30°S. Grey-headed (*Thalassarche chrysostoma*), wandering (*Diomedea exulans*) and shy albatrosses (*Thalassarche cauta*) also have a high degree of overlap with IOTC longline fishing effort. The addition of tracking data from other colonies of grey-headed albatross in the Indian Ocean would probably increase the overlap identified, especially with the region of high-intensity longline effort between 80 and 90°E (IOTC-2007-WPEB-R[E]).

Status of data on seabird bycatch in IOTC

To date, the IOTC Secretariat has received very few reports from CPCs on estimates of total seabirds caught incidentally by their vessels. The only information available on seabird bycatch comes from a few national observer programmes, but these are by no means widespread among CPCs at the current time (see Table 1). The information available must be considered very preliminary, due to the low number of observers onboard and the low levels of coverage this represents, in relation to total fishing effort in any one particular fleet (IOTC-2008-WPEB-04).

Some information on seabird bycatch is available to the Secretariat through the provision of data by CCSBT (see section on Japanese bycatch below). Unfortunately, the paucity of information available (both via CCSBT and within IOTC itself) makes any meaningful overall estimate of seabird bycatch for the region impossible (IOTC-2008-WPEB-04). However, it remains worthwhile to collate all known information on seabird bycatch rates within IOTC, to assess on a broad-scale, the potential extent of the problem, as well as to demonstrate the ongoing need for improvements in data collection and reportage among IOTC CPCs.

3. METHODS

Data on seabird bycatch in IOTC fisheries were obtained from comprehensive searches of the IOTC website and documents therein (http://www.iotc.org/English/documents/index.php). These included documents submitted to the Working Parties, Scientific Committee, or Commission. Data on effort by country and by year were obtained directly from the IOTC Secretariat as 1,000 hooks set per annum for the whole IOTC area.

No bycatch data were found reported to IOTC from Japan, but bycatch data were available through CCSBT records, as this fishery overlaps to a considerable extent with the geographic boundaries of IOTC. For this reason, CCSBT bycatch rates have been incorporated into the report, although it is recognised that there is considerable difficulty in separating total fishing effort for a CPC that is a member of, and reports data to, both IOTC and CCSBT.

No extrapolations, to obtain a total bycatch estimate for each fleet, have been attempted due to the lack of information on incidental mortality in the region overall. It is not known whether there are particular 'hot spots' of incidental mortality, other than it is more likely to occur for albatrosses south of 30ºS.

4. RESULTS

Details of Fisheries Observer Programmes in the Indian Ocean

The levels of fisheries observer coverage within IOTC industrial longline fleets are typically very low (see Table 1). There is the potential for data on seabird bycatch to be reported through existing fisheries observer schemes, and indeed this does occur in some instances, e.g. the Australian Western Tuna and Billfish Fishery (WTBF). WTBF reports seabird bycatch rates at a national level. However, because the number of vessels operating in this fishery has reduced in recent years, confidentiality requirements mean that seabird bycatch rates are not reported at the regional level.

Table 1. Overview of fisheries observer programmes in the Indian Ocean (taken from IOTC-2008-WPEB-R[E]. (PS=purse seine, LL=longline)

Observer Programme	Coverage
France (EC)	PS: Starting in 2005 2 % of total sets in 2005, 4 % in 2006; and increasing up to 10 % in 2007. PS: Since 2005, some coverage of foreign purse-seiners fishing inside the French EEZ surrounding the Iles Eparses and Mayotte. LL: Since March 2007, some coverage of the longline fleet targeting swordfish from La Réunion.
Spain (EC)	PS: Since 2003, 5 % of total sets in 2003, 6 % in 2004, 7 % in 2005, 5 % in 2006, and 10 % coverage of Spanish purse-seiners in 2007. LL: In 2005, 2 Spanish longline vessels observed.
South Africa	LL: 100% coverage of foreign fishing vessels fishing in the South African EEZ. Coverage of domestic vessels is low.
Japan	LL: In 2006, 88 longline operations (286,997 hooks) were observed in the period from May 2006 to February 2007.
Taiwan China	LL: There were 23 observer trips from 2002 to 2006 in the Indian Ocean large-scale tuna longline fleets. The coverage rate by trips was 1.48% in average. The observed days were 1904.
British Indian Ocean Territory (BIOT): inside the Fisheries, Conservation and Management Zone surrounding the Chagos Archipelago	PS and LL: Since 1994, around 3% coverage of purse seine and longline operations.
Madagascar, domestic and foreign longliners in the Malagasy EEZ	Since 2002, 30 observers are deployed on various fishing fleets. Coverage rate for the tuna longline fishery is not known.
The Australian Western Tuna and Billfish Fishery (WTBF)	A pilot observer programme was initiated in 2003 and concluded in 2006. Observers monitored 18 longline trips, covering 161 daily operations, which deployed 217,055 hooks. The observer coverage amounted to 4% of longline fishing effort during the period. The ongoing target level of observer coverage for the WTBF is set at 5% although due to the low levels of effort in the fishery, actual coverage varies each year.

France (EC)

An observer programme commenced in the longline fishery for swordfish based in La Reunion in 2007. In this year, 46,984 hooks were observed, representing about 1.6% of the total fishing effort. Extrapolating total fishing effort from these figures, results in a figure of 2,936,500 hooks set in 2007. The total number of seabirds observed caught in 2007 was one, *Catharacta lonnbergi*. Extrapolating a bycatch rate from this, a figure of 0.02 birds/1,000 hooks can be arrived at. However, due to the small number of birds caught over the period of observation, and the low percentage of the total fishing effort observed, it would not be appropriate to place much weight on this figure (IOTC-2008-WPED-13).

Taiwan

Taiwan was one of the first CPCs to launch an observer programme within its high seas Indian Ocean longline fleet. There were 23 observer trips conducted between 2002 and 2006, with an average observer coverage rate by trip of 1.48%. A total of 6,407,000 hooks were observed between 2002 to 2006, although an annual figure is not reported. They observed an average bycatch rate of 0.048 birds/1,000 hooks, which varied from 0 to 0.22 birds/1,000 hooks in different 5x5 degree grid squares. They noted that seabird bycatch rates were highest between 30-45°S and 25°W to 35°E and between 25-35°S and 65-95°E. They reported a range in fishing effort for the Taiwanese fleet between 2002 and 2006 of 197,793,000 to 281,473,000 hooks, and an average fishing effort of 253,412,000 hooks. They predicted an average number of seabirds caught for the Taiwanese longline fleet to be 1,512 birds per year, based on variable temporal and spatial bycatch rates, seabird distributions and fishing activities (see IOTC-2008-WPEB-17).

South Africa

Of the 20 foreign-flagged vessels operating in the South African fishery during 2007 and 2008, 19 fished in the IOTC area (Ryan et al. in prep). Fishing effort in the IOTC area was similar in each year: There were 1,105 sets and 2,670,000 hooks in 2007 compared to 1,054 sets and 2,846,000 hooks in 2008. Most effort took place inside the South African Exclusive Economic Zone (EEZ), with little difference between years (92% in 2007 and 94% in 2008). Total seabird bycatch rates were 0.296 birds/1,000 hooks in 2007 but this dropped dramatically in 2008 to 0.050 birds/1,000 hooks. Ryan et al. (in prep) noted that the decrease in bycatch rates from 2007 to 2008 was accompanied by increased compliance with mitigation measures. With this fishery, the observer coverage of the foreign-flagged vessels was 100%, therefore the estimated bycatch rate is also the actual bycatch rate. The total number of birds killed in 2007 was 791, and in 2008 was 141. Nine species of seabirds were caught in the observed longline fishery across both years. As in previous studies of this fishery (Ryan et al. 2002, Peterson et al., in press), white-chinned petrels (*Procellaria aequinoctialis*) were the dominant species caught (69%), followed by Shy Albatrosses (*Thalassarche cauta*) (21%), Indian Yellow-nosed Albatrosses (*Thalassarche carteri*) (4%). and Black-browed Albatrosses (*T. melanophris*) (4%) (Ryan et al., in prep). The observer programme in the South African foreign-flagged fleet remains at the forefront of seabird bycatch reporting within the IOTC region, and it is hoped that other CPCs will swiftly follow suit in terms of both levels of coverage and data collection protocols.

Spain

The only available information on seabird bycatch within the Spanish Indian Ocean longline fleet comes from experimental cruises conducted in 2005. Scientific observers were placed onboard two surface longline vessels from the commencement of experimental cruises in the south-western Indian Ocean since November 2004 (IOTC-2006-WPBy-04). The area covered by the cruises was between 25-35°S and 30-50°E. A total of 539 sets, made up of 531,916 hooks, were observed. Only 3 seabirds were observed caught (2 albatrosses and 1 petrel) and these occurred over only two days (16-17 October 2005). All incidents occurred in Area 5. This equates to a bycatch rate of 0.0056 birds/1,000 hooks, however it should be recognised that this bycatch rate applies to an experimental cruise where varying fishing methods were used, e.g. different hook designs, coloured bait, etc. Hence, the bycatch rates from this fishery may not be comparable to others operating in the same region.

Australia – Western Tuna and Billfish Fishery (WTBF)

Within the Western Tuna and Billfish Fishery (WTBF), fishing effort peaked at around 6,000,000 hooks per year in 2000–02, before declined markedly to 4,000,000 hooks in 2003 and 1,500,000 in 2004. From 2004, catch and effort data were no longer available publicly due to the low number of vessels remaining within the fleet, and in 2007, only one vessel remained in the fishery. For this reason, bycatch rates and likely birds caught per annum are reported as for 2004 levels. Observer coverage was 4% of effort (200,000 hooks) during 2002-2004, and a bycatch rate of 0.02 birds/1,000 hooks was reported. This leads to an estimation of 30 birds caught per annum, based on 2004 rates. Moreover, no albatrosses were observed caught during this period (AFMA, unpublished data). The relatively low bycatch rate has been attributed to the four active vessels at that time all fishing at night to target broadbill swordfish (Baker et al. 2007). It should also be noted that no birds were reported as being killed during 2007.

A subsequent analysis of observer data collected between April 2003 and June 2006 indicated that seabird interactions were occurring at a rate of 0.055 birds per 1000 hooks (0.032 non-fatal, 0.023 fatal). All birds caught were flesh-footed shearwaters and the non-fatal interactions were entanglements that occurred during hauling (AFMA 2007). Overall, 446,729 hooks were deployed in the fishery in 2007. Of these 10,500 were observed, resulting in an overall observer coverage of 2.4%. Within the WTBF, longline vessels are now required to carry an approved

bird-scaring line, to use it and set their longlines only at night when operating south of 30° S, and to not discharge offal during line setting and hauling (Baker and Finley 2008).

Japan – CCSBT Data

Estimates of annual incidental take of seabirds in Japanese Southern Bluefin Tuna longline fishery for 2005 fishing year were updated based on the data collected through the Real Time Monitoring Programme (RTMP) and observer programmes. Incidental catch rate in 2005 was 0.055 birds/1,000 hooks (95% CIs 0.036-0.074 birds/1,000 hooks) and total estimate of bycatch for Japanese longline fleet operating under CCSBT was 2,339 birds (95% CIs 1,548-3,160 birds) (Kiyota & Takeuchi, 2007). It should be noted that levels of observer coverage varied dramatically depending on which area of the CCSBT region that fleets were operating in. For example, in Areas 6, 7 and 8 the level of observer coverage was 0.20% (5,994,724 hooks deployed, 11,913 hooks observed), while in Areas 9 and 10 the level of observer coverage was 5.16% (23,748,476 hooks deployed, 1,226,242 hooks observed). Because the areas over which CCSBT bycatch data were reported spanned not just IOTC waters, but also waters that fall under the jurisdiction of ICCAT and WCPFC, it was not possible to obtain an overall estimate of seabird bycatch for the Japanese fleet within IOTC alone. However, it is likely that a considerable proportion of the total seabird bycatch estimate for Japanese fleets reporting under CCSBT are caught within IOTC waters, given that Japan set over 121 million hooks in IOTC waters in 2007 alone (IOTC, 2008). Reportage of seabird bycatch specifically to IOTC would greatly improve our understanding of the potential scale of the problem.

5. DISCUSSION

Need for Further Data Reportage and Standardisation

The new **Resolution 09/04 (On a Regional Observer Scheme)** requires alls CPCs to have at least 5% observer coverage of operations/sets for each gear type when fishing in the IOTC area. This applies to all vessels over 24m in length, and under 24m in length if fishing outside their EEZ. In relation to seabird bycatch, a crucial aspect of calculating the extent of interactions between seabirds and the fishery is the access to data on fishing effort in 1,000 hooks per year. This is improved further by accessing information on particular areas, as many of the most serious bycatch issues with albatrosses and petrels predominantly occur south of 30°S, hence it is

important to be able to access fishing effort data per CPC fleet in sub-areas rather than for the whole of the IOTC area. In addition, if we are to be able to quantify the reliability of any estimate of bycatch based on birds/1,000 hooks (or Birds Per Unit Effort – BPUE) then it is important that any observer coverage is reported in the same metric, i.e. observed hooks set in 1,000 hooks per fleet per year. Lastly, it is important that data is collected on bycatch in sufficient resolution, i.e. it is important that observers can record not only that seabirds are being caught, but also what species are being caught. Without this level of resolution in the data collected, it is impossible to accurately measure the likely impact of bycatch within an area to individual populations. For example, the loss of one or two individuals to a Great Shearwater population is not hugely significant, but if Amsterdam Albatrosses are being caught in these numbers then impact on a population (of less than 25 breeding pairs) quickly becomes catastrophic.

6. CONCLUSIONS

This report demonstrates the available information on seabird bycatch within IOTC longline fisheries to date, and clearly highlights the urgent need for greater levels of observer coverage and reportage of bycatch information to the Secretariat, to accurately quantify the scale of the problem. It is likely that the highest levels of interactions, and hence mortality, between albatrosses, petrels, and other vulnerable seabirds are likely to be in the southern waters (below 30ºS), an area where considerable longline effort is exerted within IOTC waters. We would expect to see relatively high levels of bycatch occurring among the fleets that regularly operate in these waters, i.e. Taiwan, China, Japan, Korea, the EC and Indonesia (IOTC-2008-WPEB-04).

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