Commission for the Conservation of
Southern Bluefin Tuna

みなみまぐろ保存委員会

CCSBT-ERS/1703/Info01 (Rev.1)

Update on the status of IOTC seabird work
IOTC における海鳥関連作業の進捗状況

Introduction
はじめに

The purpose of this document is to provide the Ecologically Related Species Working Group (ERSWG) with brief background information on work by the IOTC in relation to seabird assessments.
本文書の目的は、生態学的関連種作業部会（ERSWG）に対し、海鳥の評価に関して IOTC が実施している作業に関する簡潔な背景情報を提供することである。

In response to a request for information on work that the IOTC has commenced in relation to seabird assessments, the IOTC Secretariat has provided the attached paper, which reviews the latest data available to the IOTC on seabird-fishery interactions.
IOTC 事務局は、IOTC が開始した海鳥の評価に関する作業にかかる情報の提供要請に応え、IOTC における海鳥と漁業の交互作用について利用可能な最新のデータをレビューした添付文書を提供した。

Prepared by the Secretariat
事務局作成文書

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

IOTC–2016–SC19–INF02[E]

A REVIEW OF THE RESPONSE TO THE SEABIRD DATA CALL IN IOTC CIRCULAR 2016-043

PREPARED BY: IOTC SECRETARIAT[1], 30 NOVEMBER 2016

PURPOSE

To provide the Scientific Committee (SC) with an opportunity to review the information received in response to IOTC circular 2016-043 and evaluate this with respect to IOTC Resolution 12/06 *On reducing the incidental bycatch of seabirds in longline fisheries*.

BACKGROUND

At its annual meeting in 2015:

The SC **REQUESTED** that CPCs with significant fishing effort south of 25°S undertake their own assessments on the levels and nature of implementation of Resolution 12/06 by their fleets, and present papers, similar to that presented in paper IOTC–2015–WPEB11–37 Rev_1, to the WPEB meeting in 2016 (SC18, para. 40).

The SC **RECOMMENDED** that CPCs bring data to the WPEB meeting in 2016, as the Commission via Resolution 12/06 required the WPEB and SC to undertake this task in 2015, which has not been possible due to insufficient data, and that a collaborative analysis of the impacts of Resolution 12/06 be undertaken during the WPEB meeting, if feasible. CPC review papers and datasets should include the following information/data from logbooks and/or observer schemes, where appropriate and should cover the period 2011 to 2015:

- Total effort south of 25°S by area and time, at the finest scale possible
- Observed effort south of 25°S by area and time, at the finest scale possible
- Observed seabird mortality rates south of 25°S by area and time, at the finest scale possible
- Descriptions of fleet structure /target species by time and area, and an indication of observer coverage per fleet/target species for effort south of 25°S
- Data on which seabird bycatch mitigation measures were used, on a set-by-set/cruise basis if possible or per vessel, or at the finest scale possible
- Descriptions of the specifications of seabird bycatch mitigation measures used according to the fields in the Regional Observer Scheme manual and in relation to the specifications given in Res 12/06 (SC18, para. 41).

Following this recommendation a '*call for data submissions and review papers*' relevant to the upcoming review of IOTC Resolution 12/06 *on reducing the incidental bycatch of seabirds in IOTC longline fisheries* was sent out on behalf of the WPEB Chair and Vice-Chair persons in IOTC circular (2016-043).

In September 2016, the WPEB12 reviewed the information submitted by CPCs to the IOTC Secretariat in response to the data call and *"**NOTED** that the difficulties of securing accurate, complete and timeous submissions of data from CPCs have thus far prevented a full assessment of the effectiveness of Resolution 12/06 (On reducing the incidental bycatch of seabirds in longline fisheries). The WPEB **AGREED** that the WPEB Chair, Vice Chairs, IOTC Secretariat and other interested parties would work intersessionally to develop the analyses further, based on data that has already been submitted, for presentation to the SC*".

REVIEW OF INFORMATION AVAILABLE

The interaction between seabirds and IOTC fisheries is likely to be significant only in the southern Indian Ocean (south of 25° south), an area where most of the effort is exerted by longliners. Incidental catches are, for this reason,

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likely to be of importance only for longline fleets with vessels operating in these areas. The fleets reporting longline fishing effort since 1955 in this area are: EU-France, EU-Portugal EU-Spain, EU, UK, Malaysia, Mauritius, South Africa, Seychelles, China, Australia, Rep. of Korea, Taiwan,China and Japan. The majority of effort reported in this area is by Japan (accounting for 61%) and Taiwan,China (accounting for 35%) (Figure 1). Figure 2 shows the spatial distribution of reported effort exerted by longliners for fleets fishing south of 25° south. These figures indicate reported effort, but this is incomplete for some reporting fleets, i.e. for Malaysia, South Africa, Seychelles, Rep. of Korea and China(Taiwan) the effort is likely to be higher. It is also important to note that these are only the countries that are reporting some information on effort, while it is expected that a number of other longline fleets also fish in this area based on the presence of temperate species in their catch data. These include Indonesia, Madagascar, Tanzania, Philippines, Mozambique and Belize. The effort from some of these CPCs is also likely to be substantial, given the catch quantities of temperate species (e.g. Indonesia National Report Fig; 3b IOTC-2016-SC19-NR01).

Six CPCs (Australia, EU-Portugal, EU-Spain, EU-France, Japan, Rep. of Korea, Taiwan,China and South Africa) of the 15 CPCs which report effort or are likely to exert longline fishing effort south of 25°S to IOTC submitted data in response to the call for data submission on seabirds (IOTC Circular 2016-043). The most recent data submission was received on 28th November 2016. In addition, three CPCs submitted substantive papers on seabird bycatch to the WPEB12: China (Gai & Dai 2016), EU-Spain (Fernández-Costa et al. 2016), and Japan (Inoue 2016a, b, Yokawa et al. 2016, Katsumata et al. 2016).

Table 1 provides a summary of the data submitted by the six CPCs. These data generally conform to the request of the data call, although total effort, observed effort, and bycatch numbers were provided at various spatial scales depending on the CPC. The type of mitigations measures used were provided at the finest resolution (by set) by EU-France and EU-Portugal, Japan provided mitigations measures as an aggregated annual proportion of effort, while others reported by fleet and others provided no information on mitigation measures used (Table 2). Observer coverage of reported effort varied by year and among CPCs, averaging about 10% for EU-France and EU-Portugal, 6% for Japan, 13% for Rep. of Korea and 20% for Taiwan,China over the timeframe of the data-call. As the observer data submitted for South Africa included a combination of both foreign and national vessels, while effort was for only the South African flagged vessels, the coverage rate could not be calculated. The spatial distribution of observed captures by year (2011-2015) is shown in Figure 3, where data were aggregated to 5 by 5 degree grid cells. Figure 4 shows the bycatch rates by area, where effort units were standardised to the common unit of hooks (EU,Portugal reported an average of 1319 hooks per set so this approximation was used to covert sets to hooks). Captures of seabirds were distributed throughout the area with the highest catches in the coastal areas east of South Africa and west of Australia. Catch rates showed a similar pattern, but the hot spots in the very eastern and western areas were more dominant, a trend that is particularly notable in 2013. Catch rates were also higher between 30 and 40°S than further north (25-30°S). In terms of fleet-specific trends, annual observed bycatch numbers were highest for Japan, Taiwan,China, and South Africa (Table 3), whereas the bycatch rates were highest for South Africa, Australia and Japan. The relatively high bycatch rates of Japanese longline fleet in recent years (Table 4) despite the use of mitigation measures (Table 2) were explored in the information papers presented to the WPEB12 (Inoue 2016a, b), although no definitive conclusion was drawn from these studies (see below the brief review of these information papers).

Mortality information was missing from some records, however, where information was reported, the mortality rate was generally high for most species, and the mean mortality rate across all years and fleets was 71.9% (Table 4).

A number of information papers studying the seabird bycatch from the Japanese longline fleet were submitted to the WPEB12 in 2016. Yokawa et.al. (2016) and Katusmata et.al. (2016) described and summarised operational characteristics of Japanese longline effort south of 25°S, focusing on the potential implications for seabird bycatch. Inoue et al. (2016 a, b) identified and analysed factors affecting seabird bycatch rates using statistical modelling approaches.

Yokawa et.al. (2016) summarized the operational pattern of Japanese longliners operating south of 25°S in the Atlantic and Indian Oceans. The analysis indicated that the main fishing grounds of the Japanese longline fleet are in the eastern and western areas of the Indian Ocean off the coasts of South Africa and Australia, mainly targeting southern bluefin and other tuna species. The effort has gradually shifted further south since 2013 due to the change in species targeting to southern bluefin from other tuna species. Off the coast of South Africa (in both the Atlantic and Indian Oceans), catch composition was largely determined by environment conditions, as influenced by the warm Agulhas Current, and changed at relatively small spatial scale (less than 5x5 degrees). Thus, the relationship between seabird bycatch rates and longline catch composition, environmental conditions and seabird distribution patterns should be investigated to gain a better understanding of seabird bycatch occurrences in this region (Katusmata et.al., 2016).

Katusmata et.al. (2016) documented the increasing use of seabird bycatch mitigation measures by the Japanese fleet in recent years. However, despite this there has been a corresponding increasing trend in the nominal CPUE of bird bycatch observed over the same time period. The potential cause of this may be due to the non-random observer coverage; observers predominantly monitor sets targeting southern bluefin tuna, which are associated with higher seabird bycatch rates based on their overlapping distributions. As the catch quota of southern bluefin tuna allocated to Japan has increased and therefore the observer coverage of southern bluefin tuna targeting sets has correspondingly increased, this may explain the surprising increase in seabird bycatch rates. This issue is currently being explored further by the National Research Institute of Far Seas Fisheries.

Inoue et al. (2016a) investigated the effects of spatial, temporal, and oceanic factors on the seabird bycatch using observers onboard Japanese longline vessels fishing south of 20°S in the ICCAT convention area and IOTC Area of Competence, focusing on key species groups including albatross and petrel. Results suggested associations between bycatch occurrence rates and location, season, and environmental factors (e.g. SST, wind speed, lunar phase, and distance to colony). Inoue et al. (2016b) further investigated the spatial variations in bycatch occurrence rates using General Additive Models (GAM). The results showed that the bycatch occurrence rates from the waters south of 35°S were higher than those from the waters north of 35°S, and peaked around 100°E and between 120°E and 150°E longitude, but the pattern of the occurrence rate in the east-west direction changed among years and seasons.

Inoue et al. (2016a) found that bycatch occurrence rates decreased when weighted branch lines were used and that this effect was significant for petrels due to their deep-diving behaviours. Night setting is also considered to be an effective bycatch mitigation measure, but the authors noted that not all night setting operations were completed before sunrise. Seabird bycatch was negatively related to albacore catches, but positively related to catches of southern bluefin tuna, porbeagle and blue sharks, due to the overlap in species distribution. The species composition of bycatch also differed with latitude with seabird catches dominated by yellow-nosed albatross north of 35°S or and dominated by grey-headed albatrosses south of 35°S (Inoue et al. 2016b).

DISCUSSION

The information provided highlights some general trends in seabird bycatch rates across the Indian Ocean with higher catch rates at higher latitudes, even within the area south of 25°S (Inoue et al., 2016b) and higher catch rates in the coastal areas in the eastern and western parts of the southern Indian Ocean. These spatial trends correspond to the trends in catch rates reported by fleet which were lower for those fleets operating in more central waters and at lower latitudes (EU fleets) and higher for those fleets operating in the coastal regions at higher latitudes (Australia, Japan, and South Africa). Korea and Taiwan,China also had relatively lower seabird bycatch rates, despite operating at high latitudes.

Because the reporting of effort has been low (some CPCs fishing south of 25°S in the Indian Ocean did not report any effort while for others it was incomplete), and the observer coverage is relatively low (though improving) for many fleets, data submitted through the data-call is unlikely to be able to provide reliable estimates of total bycatch of seabirds from the longline fishery south of 25°S latitude in the Indian Ocean and so extrapolations of the information to total Indian Ocean captures were not undertaken. Bycatch mortality, where reported, was high but there is a lack of information on post release mortality/survival as well as total effort which means that the total fishery induced mortality on the seabird populations cannot be estimated.

In terms of mitigation measures, the low bycatch rates reported by EU,France, EU,Portugal and EU,Spain suggests that night setting and line weighting may be effective mitigation measures in these fisheries and this conclusion is further supported by the study by Inoue et al., (2016a). The EU,Portugal fleet and the Rep. of Korea use a combination of night setting with tori lines and no or extremely low bird captures were reported for these fleets.

Nevertheless, there were also some more conflicting results for some other fleets: catch rates were high for Australia even though the use of tori lines and line weighting is mandatory and statistical analyses carried out by Japan indicated that the mitigation measures that have been implemented in recent years have not significantly reduced seabird bycatch rates and did not explain the patterns of seabird bycatch (Katusmata et.al., 2016). The information available suggests that the mitigation measures may be proving effective in some cases, but there are also some aspects that need to be explored further.

While some overall trends have been described in this paper, the summary observer data provided through the data call is unlikely to be representative of the full suite of factors which potentially affect seabird bycatch rates. The lack of detailed information on the specifications of the mitigation measures used, the low resolution of the data (not set level) and lack of information on other potential covariate explanatory factors hinders the assessment of the measures and suggests that information collated at the regional level is most useful for summarising general trends while analysing the impact of specific measures would be best done with the fine scale data at the fleet level.

The summary of basic information such as total effort and captures in the region is, however, best assessed at the regional level and so it is important that this information is provided to the IOTC in order for the Scientific Committee to be able to monitor and review overall trends.

REFERENCES

Gai, C.; Dai, X. (2016). Estimating the composition and capture status of bycatch using Chinese longline observer data in the Indian Ocean. IOTC–2016–WPEB12–16.

Inoue, Y.; Kanaiwa, M.; Yokawa, K.; Oshima, K. (2016a). Examination of factors affecting seabird bycatch occurrence rate in southern hemisphere in Japanese longline fishery with using random forest. IOTC–2016–WPEB12–INF07.

Inoue, Y.; Kanaiwa, M.; Yokawa, K.; Oshima, K. (2016b). MODELING OF BYCATCH OCCURRENCE RATE OF SEABIRDS FOR JAPANESE LONGLINE FISHERY OPERATED IN SOUTHERN HEMISPHERE. IOTC–2016–WPEB12–INF08.

Yokawa, K.; Oshima, K.; Inoue, Y.; Katsumata, N. (2016). Operational pattern of Japanese longliners in the south of 25S in the Atlantic and the Indian Ocean for the consideration of seabird bycatches. IOTC–2016–WPEB12–INF09.

Katsumata, N.; Yokawa, K.; Oshima, K. (2016). Information of seabirds bycatch in area south of 25 S latitude in 2010 from 2015. IOTC–2016–WPEB12–INF10.

Fernández-Costa J.; Ramos-Cartelle, A.; Carroceda, A.; Mejuto, J. (2016). Interaction between seabirds and Spanish surface longline targeting swordfish in the Indian Ocean (≥ 25º South) during the period 2011-2015. IOTC–2016–WPEB12–29.

Table 1. Summary of information provided by CPC

CPC	Dates	Spatial data	Species-specific	Mitigation measures	Comments
Australia	2015	None (Indian Ocean)	Yes	Mandatory measures for WTBF listed	-
EU, France (Reunion)	2009 - 2015	5 by 5	No	Yes, by set	-
EU,Portugal	2011 – 2015	5 by 5	Yes	Yes, by set	Effort provided in sets (converted to hooks using an approximation of 1319 hooks per set)
EU,Spain	2011 - 2015	Aggregate	Yes	Yes	-
Japan	2011 – 2014	5 by 5	-	Yes	Mitigation measures by annual proportion of effort. No information on post release survival
Korea	2013-2015	5 by 5	Yes	Yes	-
South Africa	2012 – 2015	1 by 1	Yes		Data submission includes foreign and national vessels. Some captures recorded where no effort was observed
Taiwan,China	2011 - 2015	5 by 5	Yes	No	-

Table 2. Summary of mitigation measures used by fleet

Fleet	Mitigation measures used
AUS	Tori lines used with line weighting[2]. No offal discharged while setting.
EU,ESP	Night setting with minimum deck lighting and line weighting and line shooting device and offal discharge control
EU,PRT	Night setting with minimum deck lighting and tori lines or branchline weighting used for all sets
EU,FRA-REU	Night setting and branchline weighting (80 – 160g 4.5-6m from hook) used for all sets
JPN	At least 2 of the 3 requirements in Resolution 12/06 were used an average of 76% of sets between 2011 and 2014. This has increased over time to 98% in 2014.
KOR	Bird scaring lines used with line weighting.
TWN,CHN	*No information provided*
ZAF	*No information provided*

On 7 March 2017, Australia advised the CCSBT Secretariat that this number should be zero.

Table 3. Annual observed captures by fleet and year

Fleet	2009	2010	2011	2012	2013	2014	2015
AUS							13
EU,ESP			0	0	13	2	4
EU,PRT			0	0	22	0	0
FRA-REU	0	0	0	0	0	0	0
JPN			165	40	28	76	
KOR					6	2	2
TWN,CHN			4	42	84	47	21
ZAF				92	104	144	98
Total	**0**	**0**	**169**	**174**	**257**	**271**	**138**

On 7 March 2017, Australia advised the CCSBT Secretariat that this number should be zero.

Table 4. Annual capture rates (numbers per 1000 hooks) by fleet and year

Fleet	2009	2010	2011	2012	2013	2014	2015	Mean
AUS							0.155	0.155
EU,ESP			0.000	0.000	0.072	0.029	0.087	0.038
EU,PRT			0.000	0.000	0.050	0.000	0.000	0.010
EU,FRA-REU	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
JPN			0.171	0.065	0.133	0.086		0.113
KOR					0.008	0.001	0.002	0.003
TWN,CHN			0.002	0.015	0.028	0.018	0.007	0.017
ZAF				0.172	0.204	0.633	0.255	0.326
Mean capture rate			0.113	0.066	0.087	0.141	0.055	0.093

[2] Mandatory Seabird Mitigation Measures in the WTBF (Available at: www.afma.gov.au/wp-content/uploads/2014/08/WTBF-management-arrangements-booklet-2016-FINAL.pdf)

Table 5. Mortality rates by species

Row Labels	Average mortality rate
Albatrosses nei	72.78%
Antarctic giant petrel	100.00%
Atlant. yellow-nosed albatross	20.17%
Black-browed albatross	55.69%
Boobies and gannets nei	0.00%
Cape gannet	0.00%
Flesh footed shearwater	100.00%
Grey-headed albatross	50.00%
Hall's giant petrel	100.00%
Indian yellow-nosed albatross	47.52%
Light-mantled sooty albatross	100.00%
Northern royal albatross	100.00%
Petrels nei	72.02%
Procellariidae	100.00%
Shearwater	100.00%
Short tailed shearwater	100.00%
Shy albatross	83.53%
Sooty albatross	100.00%
Wandering albatross	92.86%
White-capped albatross	91.07%
White-chinned petrel	91.04%
Yellow-nosed albatross	100.00%
Unidentified seabirds	87.50%
Mean	**71.85%**

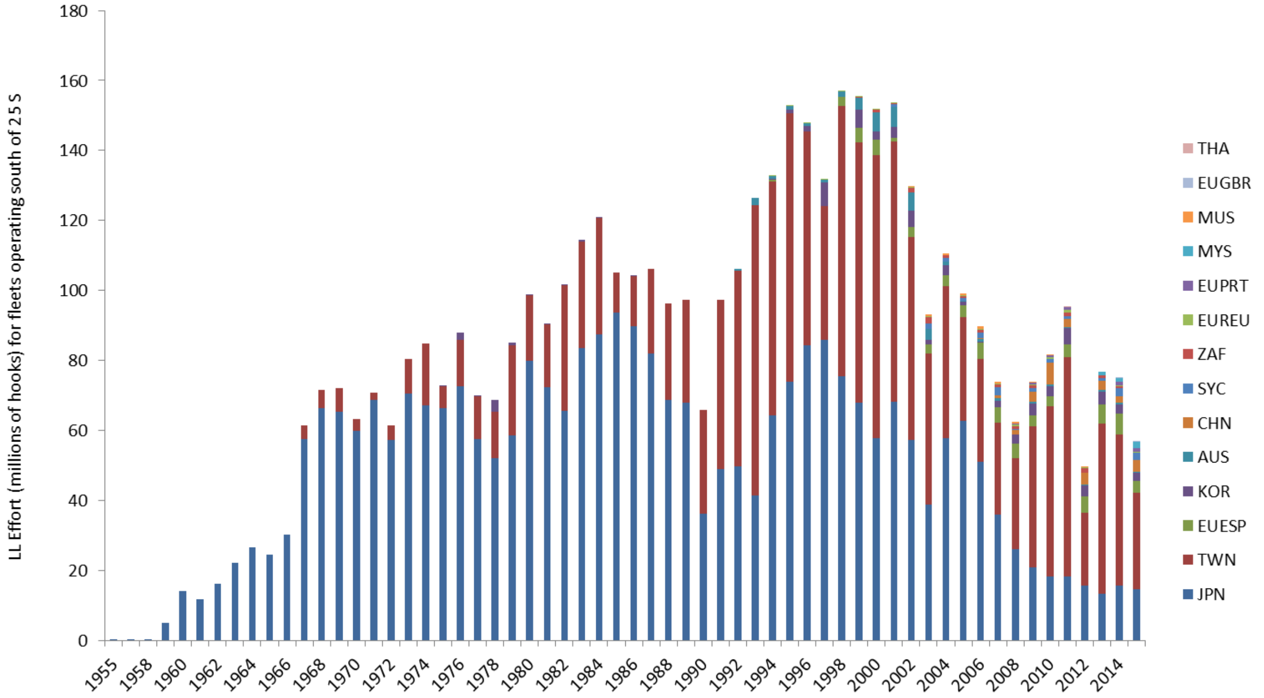

Figure 1. Reported longline effort for fleets operating south of 25° south between 1955 and 2015. (THA = Thailand, EUGBR = EU,UK, MYS = Malaysia, EUPRT = EU,Portugal, EU,REU = EU,France, MUS = Mauritius, ZAF, = South Africa, SYC = Seychelles, CHN = China, AUS = Australia, EUESP = EU,Spain, KOR = Rep. of Kora, TWN = Taiwan,China, JPN = Japan).

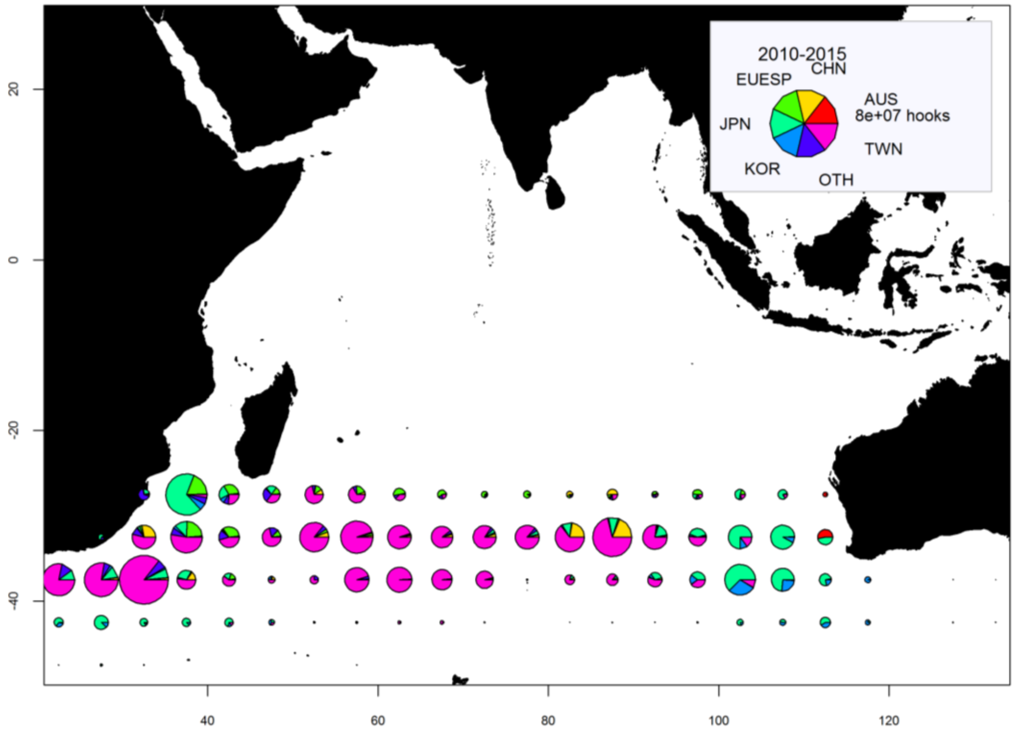

Figure 2. Reported longline effort for fleets operating south of 25° south between 2010 and 2015.

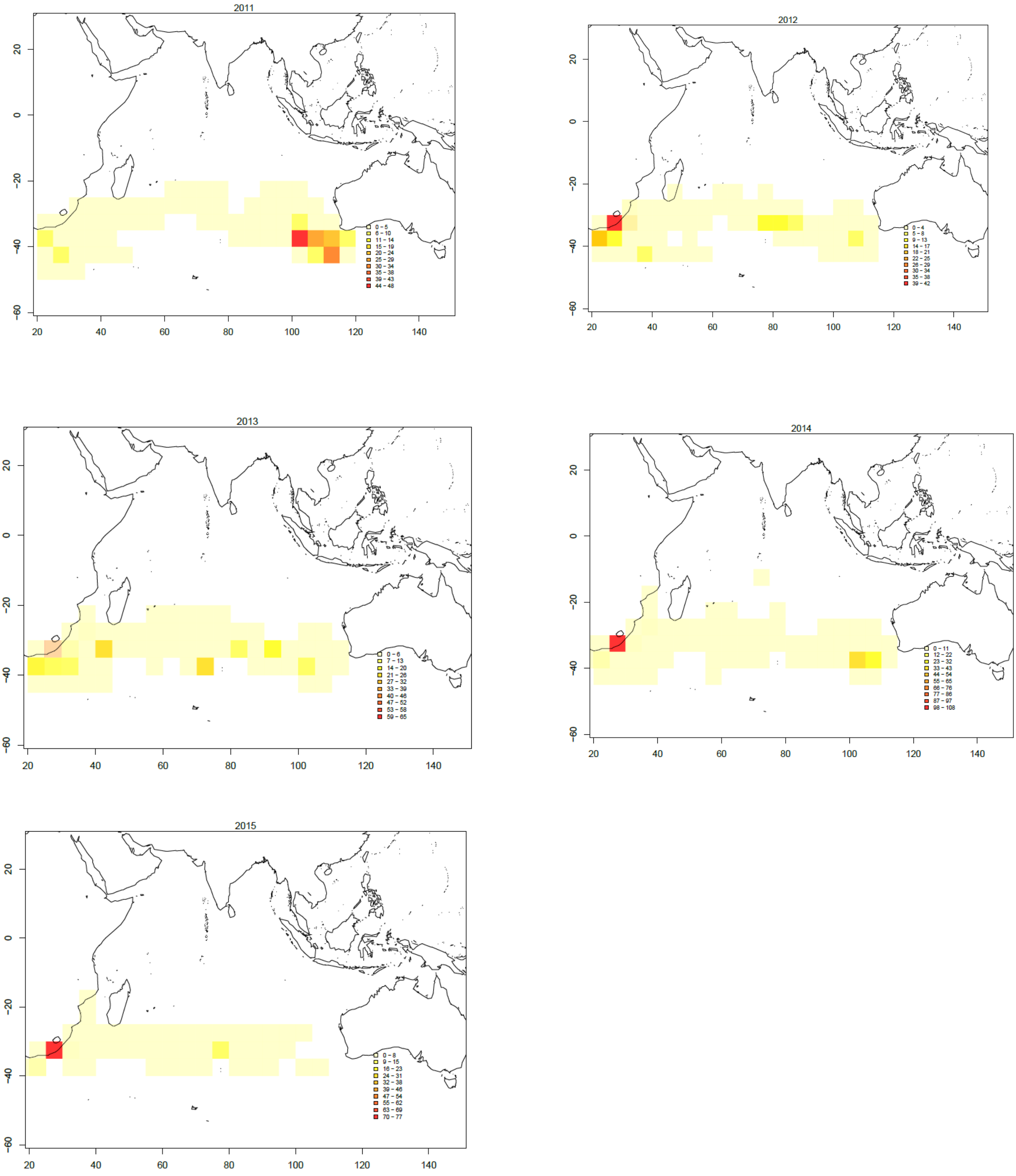

Figure 3. Captures of seabirds by all fleets reporting data for the study (EU,France, EU,Portugal, Japan, Rep. of Korea, South Africa and Taiwan,China) . NB data provided by South Africa includes observers on Japanese vessels.

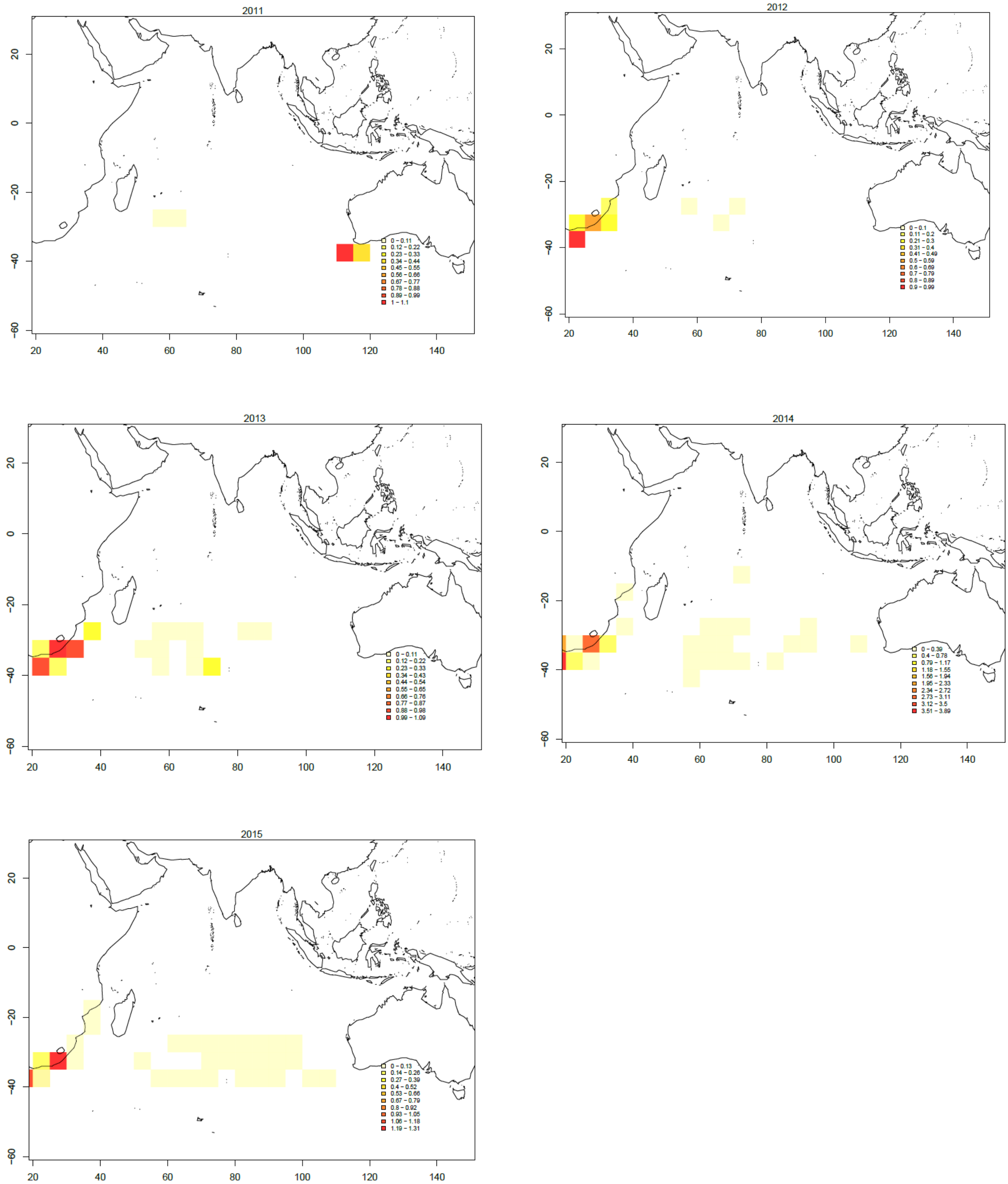

Figure 4. Captures of seabirds per 100 hooks set for all fleets reporting data for the study (EU,France, EU,Portugal, Japan, Rep. of Korea, South Africa and Taiwan,China). NB data provided by South Africa includes observers on Japanese vessels.