SCRS/2016/164

Information of seabirds bycatch in area south of 25 S latitude in 2010 from 2015

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SUMMARY

In the present study, seabird bycatch data collected by on-board observers in the area south of 25S in the Atlantic and the Indian Ocean in recent years is quickly reviewed. Results revealed there is common tendency in between the southern bluefin tuna catch pattern and seabird bycatch pattern. Seabird bycatch pattern is also suggested to be influenced by geographical area as well as environmental condition. The results of this study is also indicate that the recent increasing trend of the nominal CPUE of seabird is biased by the recent increase of the observer data in the area with higher seabird CPUE. These finding would offer some important information for the catch and effort analysis of seabird bycatch.

KEYWORDS: Catch/effort, Longline, bycatch, seabird

1. Introduction

High latitudinal area of the south Atlantic and the south Indian Oceans are one of important regions for Japanese far seas longliners to catch high quality tunas like southern bluefin tuna. At the same time, longline operations in this region is known to have bycatch of seabirds, many of them need to be conserved due to their low stock condition. In the present study, observer reported catch and effort data of seabirds analyzed to the benefit of the evaluation of the impact of operations of Japanese longliners on seabird stocks.

2. Material and Methods

Same observer data used in the analysis of positive catch ratio of seabird (Inoue et. al., 2016). Those are mainly composed by CCSBT observers, and data collected by ICCAT and IOTC observers are also included. The data used in this analysis is limited to the one collect in the area south of 25S in the Atlantic and Indian Oceans where new seabird mitigation measures are mandated recently (ICCAT Rec11-09, IOTC Res12/06).

Species identification of bycaught seabirds were conducted by National Research Institute of Far Seas fisheries Japan and Birdlife International using photo taken by observers on-board in the manner designated in the observer manual. For the simplification of the analysis, bycaught seabird species are classified into 13 groups shown in Table 1. In general, Japanese on-board observers to the longline boats cannot monitor whole gear retrieving process but only cover 80 – 90 % of it. Thus, the number of hooks covered by observer in each set is used as the amount of effort for the analysis of catch and effort data of seabirds in this study. To analyze spatial pattern of bycatch, subareas are designated as shown in Figure 1, and quarter of the year was used for the analysis of seasonal pattern of bycatch.

Japanese observers are requested to report target species in each set through the questionnaire to the skipper, and this data is used for the target species determination. When multiple species are reported as target in single set, species having higher market value is adopted as the target species in this study. In the high latitudinal area of southern hemisphere in the Atlantic and Indian Oceans, southern bluefin tuna has highest market values for Japanese longliners, and second highest is bigeye tuna, 3rd is yellowfin tuna, 4th is albacore and values of other fishes are generally lower than these four tuna species.

3. Results and discussions

Almost sets monitored by on-board observers in the Atlantic was southern bluefin tunas in the period analyzed (Table 2). This is primarily due to the fact that almost observers dispatched to the Atlantic were CCSBT observers. Because some large number of other tunas than southern bluefin tuna are also caught in the south of 25S in the Atlantic (Yokawa et. al., 2016), this also indicates that sets targeted bigeye tuna, yellowfin tuna and albacore are not well monitored by observers. Sets targeting fishes other than southern bluefin tuna should also be monitored in the future. In the Indian Ocean, sets targeting other fishes than southern bluefin tuna seemed to be monitored to some extent (Table 2). The effect of target species on seabird bycatch is not sufficiently evaluated, but it should be conducted as the result of Table 2 indicates the fact that observers not randomly monitor sets from the view point of target fish.

The nominal CPUEs (n / 1000 hooks) showed general increasing trend in both Atlantic and Indian Oceans (Figure 2). The subarea specific nominal CPUE in two major fishing grounds of Japanese longliners in the south of 25S in the Atlantic and Indian Oceans (off South Africa and the southwest Indian Ocean) showed rather fluctuating patterns (Figures 3 and 6). One of the reason of this are the insufficient coverage of the data (Figures 5 and 8), which necessitate strengthening of monitoring, fluctuation of CPUEs are also seen in subareas some large number of data are continuously available (e.g. subareas 6 and 7 (ICCAT)). Investigation of the cause for the nominal CPUE fluctuation would be important for the better understanding of the mechanism of seabird bycatch.

No strong and consistent increasing trends seemed not to be observed in the subarea specific CPUE trends, some notable higher level of CPUEs can be observed in almost subareas in both two major fishing ground, especially in 2015. In earlier years, some of the subareas had rather low or zero CPUE and this supposed to be due to insufficient monitoring. One of the main reason of recent increase of the observer coverage should be due to the increase of allocation of southern bluefin tuna to Japan (CCSBT 2015). Seabird bycatch rate suggested to be higher in the higher operational area (Inoue et. al., 2016) and southern bluefin tuna target set conducted highest latitudinal area in the Southern Ocean (Yokawa et. al., 2016), the increase of quota raised number of observer data in the area of higher seabird bycatch and would contributed to the increase of nominal CPUE. This indicates that the observed increasing trend of the nominal CPUEs in the Atlantic and Indian Oceans would be biased by the recent increase of observer data.

Considering the fact that the introduce of new mitigation major is believed to reduce seabird CPUE substantially (Melvin et. al., 2014), observed seabird CPUE level of Japanese longliners in most recent years is too high. National Research Institute of Far Seas Fisheries is now actively investigating its reason. This should be clarified as soon as possible to attain sound and prompt protection of seabirds. Effective countermeasure should be developed soon after that.

In the off South Africa region, majority of seabird bycatch reported in the subareas south of 35S – 45S latitudinal band (Figure 4). In the Atlantic side (subareas 7 and 8 (ICCAT)), Grey-headed group and Black browed group were two major seabird groups, and wandering and Dark-colored groups also appeared constantly. In the Indian side, ratio of Grey-headed group decrease and White-chinned petrel appeared instead. Because catch species composition of Japanese longliners changes largely by relatively small geographical scale such as 5 degrees' latitude and this is suggested to be due to the influence of strong Agulhas warm current, relationship among seabird bycatch distribution pattern (Yokawa et. al., 2016), catch composition of longline, environmental condition and known seabird distribution pattern should be investigated to have better understanding of the mechanism of seabird bycatch occurrences. For this purpose, observer data before 2010 can also be used.

The bycatch composition of seabirds reported by Japanese observers drastically changed in the southwestern Indian Ocean (Figure 7). Yellow-nosed group is most popular in this region, and Gray-headed, Shy groups as well as petrels seemed to appear constantly. In general, the level of CPUE of seabird seemed to be somewhat lower in this region from the one in the off South Africa (Figures 3 and 6), and this would be partially due to less variable environmental condition than one in the off South Africa region (Yokawa et. al, 2016).

Quarterly catch patterns by species group indicate that highest catch of seabird observed in 2nd quarter in subarea 6 (in the ICCAT region) where largest number of seabird recently caught in the off South Africa region (Figure 9). No apparent change of seasonal catch composition can be seen in between the period of 2010 – 2013 and 2014 – 2015, while the number of reported bycatch in the 3rd quarter increased in the later period. The largest catch of seabirds obtained in the 3rd quarter in subarea 6 and 14 (in the IOTC region) and some large number of bycatch also seen in the 2nd quarter. Catch species compositions are seemed not to be changed largely in between the period of 2010 – 2013 and 2014 – 2015, while the number of reported bycatch in the 2rd quarter increased in the later period.

In the present study, seabird bycatch data collected by on-board observers in the area south of 25S in the Atlantic and the Indian Ocean in recent years is quickly reviewed in the same strategy as the review of log-book data (Yokawa et. al., 2016). Results of this study revealed there is common tendency in between the southern bluefin tuna catch pattern and seabird bycatch pattern. Seabird bycatch pattern is also suggested to be influenced by geographical area as well as environmental condition. These finding would offer some important information for the catch and effort analysis of seabird bycatch, and thus, further study using additional data like the ones in before 2010 as well as ones of other fleets should be conducted.

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Table 1. Groping of seabirds used in this study.

Group name	Species name	Scientific name
Wandering group	Wandering Albatross	*Diomedea exulans*
	Tristan Albatross	*Diomedea dabbenena*
	Gibsoni Albatross	*Diomedea gibsoni*
	Antipodean Albatross	*Diomedea antipodensis*
Royal group	Southern Royal Albatross	*Diomedea epomophora*
	Northern Royal Albatross	*Diomedea sanfordi*
Black-browed group	Black-browed Albatross	*Thalassarche melanophris*
	Campbell Albatross	*Thalassarche impavida*
Yellow-nosed group	Atlantic Yellow-nosed Albatross	*Thalassarche chlororhynchos*
	Indian Yellow-nosed Albatross	*Thalassarche carteri*
Shy group	Shy Albatross	*Thalassarche cauta*
		Thalassarche steadi
	Salvin's Albatross	*Thalassarche salvini*
	Chatham Albatross	*Thalassarche eremita*
Grey-headed group	Grey-headed Albatross	*Thalassarche chrysostoma*
Buller's group	Buller's Albatross	*Thalassarche bulleri*
Dark-colored group	Sooty Albatross	*Phoebetria fusca*
	Light-mantled Albatross	*Phoebetria palpebrata*
Macronectes	Hall's Giant-Petrel	*Macronectes halli*
	Antarctic Giant-Petrel	*Macronectes giganteus*
White-chinned petrel		*Procellaria aequinoctialis*
Grey petrel		*Procellaria cinerea*
Flesh-footed shearwater		*Puffinus carneipes*
Other petrels		

Table 2. Ratio of sets by target species by year. Information reported by on-board observer was used. When multiple target species were reported

ICCAT region

Species name	Scientific name	2010	2011	2012	2013	2014	2015
Southern bluefin tuna	*Thunnus maccoyii*	0	86.5	89.8	77.0	95.0	86.1
Bigeye tuna	*Thunnus obesus*	0	2.7	5.6	7.0	2.5	8.4
Yellowfin tuna	*Thunnus albacares*	0	0	0	3.5	0.3	0.3
Albacore	*Thunnus alalunga*	0	0	0	10.9	0.3	4.2
Other		100	10.8	4.6	1.6	1.9	1.1
Total operation		104	148	108	256	321	380

IOTC region

Species name	Scientific name	2010	2011	2012	2013	2014	2015
Southern bluefin tuna	*Thunnus maccoyii*	0	44.7	63.6	44.8	59.0	52.5
Bigeye tuna	*Thunnus obesus*	0	15.4	29.3	53.6	15.4	33.8
Yellowfin tuna	*Thunnus albacares*	0	0	1.7	0	1.2	9.8
Albacore	*Thunnus alalunga*	0	0	0	0.6	24.4	2.5
Other		100	39.8	5.4	1.1	0	1.3
Total operation		243	492	297	181	410	396

Table 3. Seabird bycatch mitigation measures reported by observers on-boarded during 2010 – 2015.

	TP	LW	NS	TP+LW	TP+NS	LW+NS	TP+LW+NS	Unknown
2010	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.0
2011	1.1	0.0	0.0	0.0	22.6	0.0	0.0	76.3
2012	67.8	0.0	0.0	0.9	0.7	0.0	27.6	3.0
2013	27.9	0.0	0.0	0.0	46.0	15.1	10.5	0.4
2014	19.7	2.0	0.0	36.0	3.9	6.0	22.8	9.7
2015	36.8	16.5	0.7	22.8	1.6	5.0	0.0	16.6

TP: Tori line, LW:line weight, NS: night setting

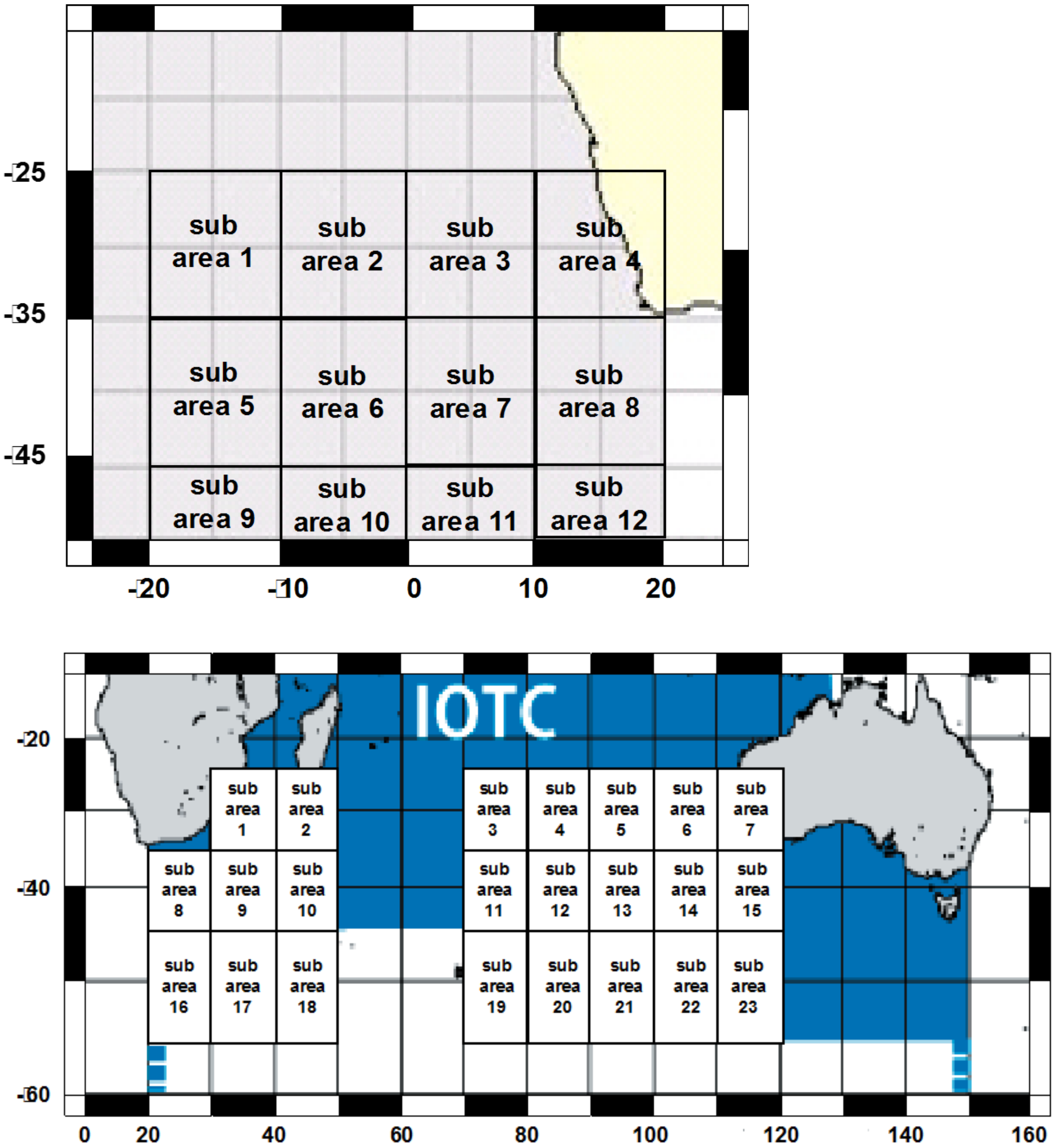


Figure 1, Subarea stratification in the Atlantic Ocean (upper) and Indian Ocean (lower) used in this study.

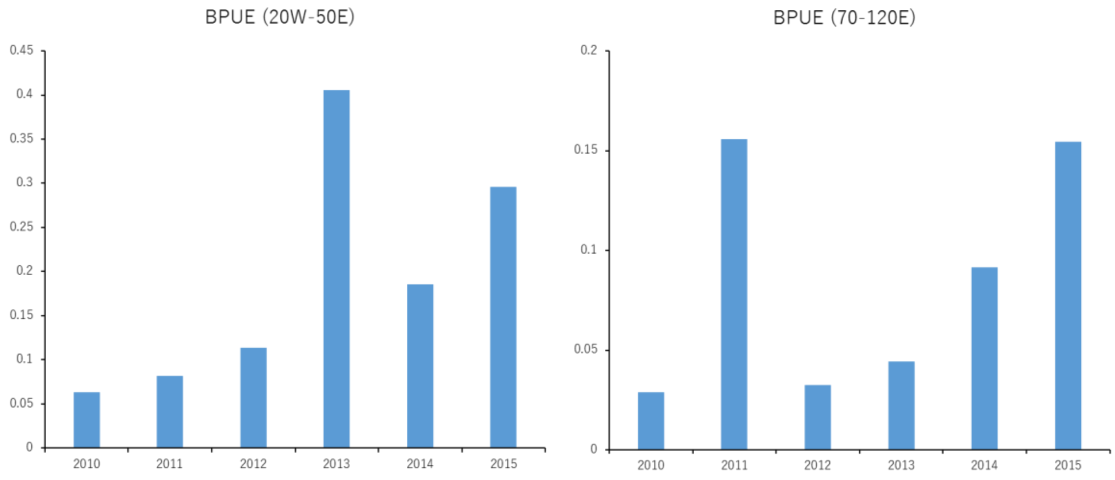


Figure 2. Nominal CPUE (n / 1000 hooks) of seabird by catch in two major fishing ground of Japanese longliners in the Atlantic and Indian Oceans. Left panel shows the CPUE in off South Africa (20W – 50E, 25S – 55S) and right panel shows one in the southwest Indian Ocean (70E – 120E)

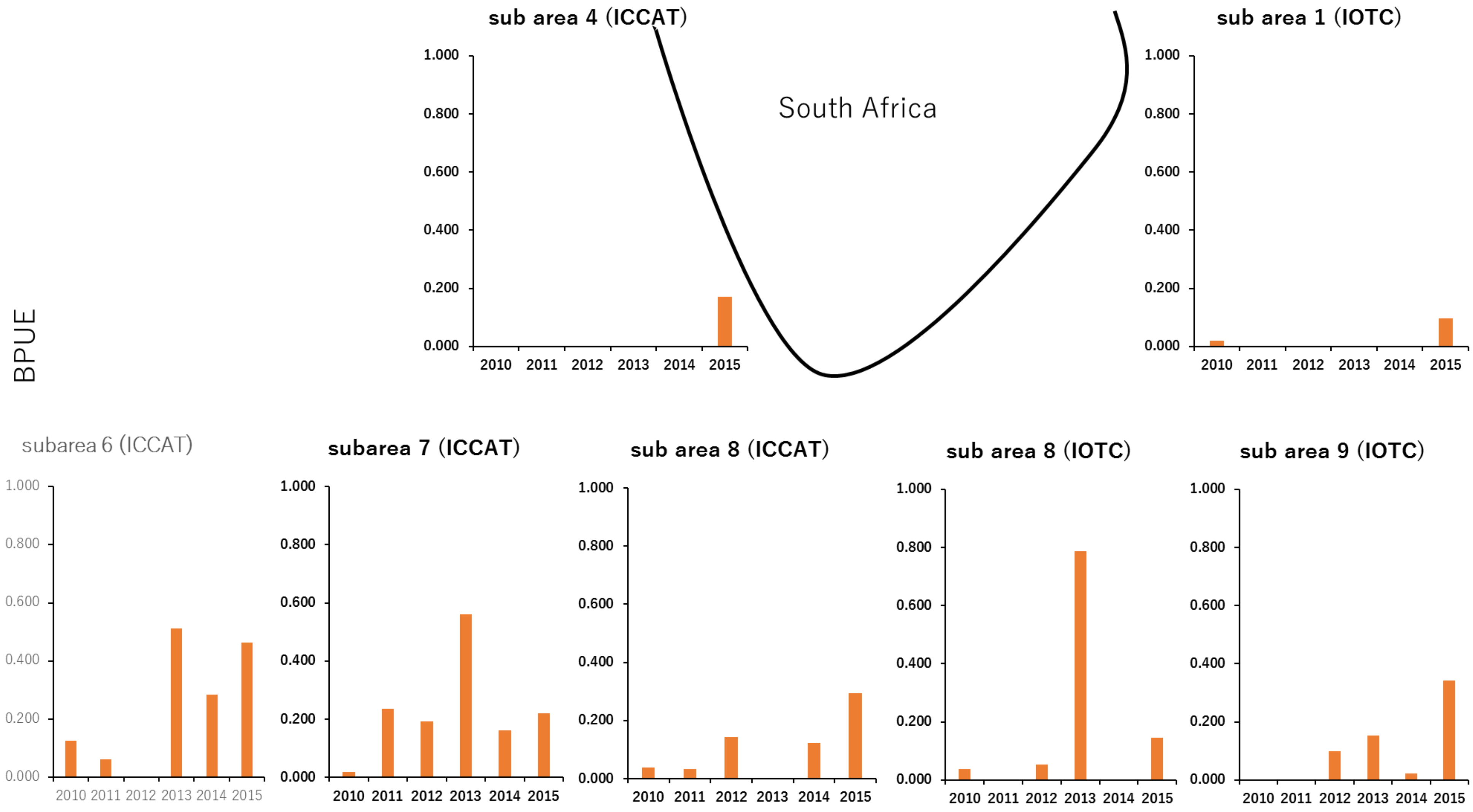


Figure 3: Schematic figure of area specific nominal CPUE (n / 1000 hooks) trend of seabird in the period between 2010 – 2015 in off South Africa region.. CPUE calucurate by data collected by on-board observers for Japanese longliners.

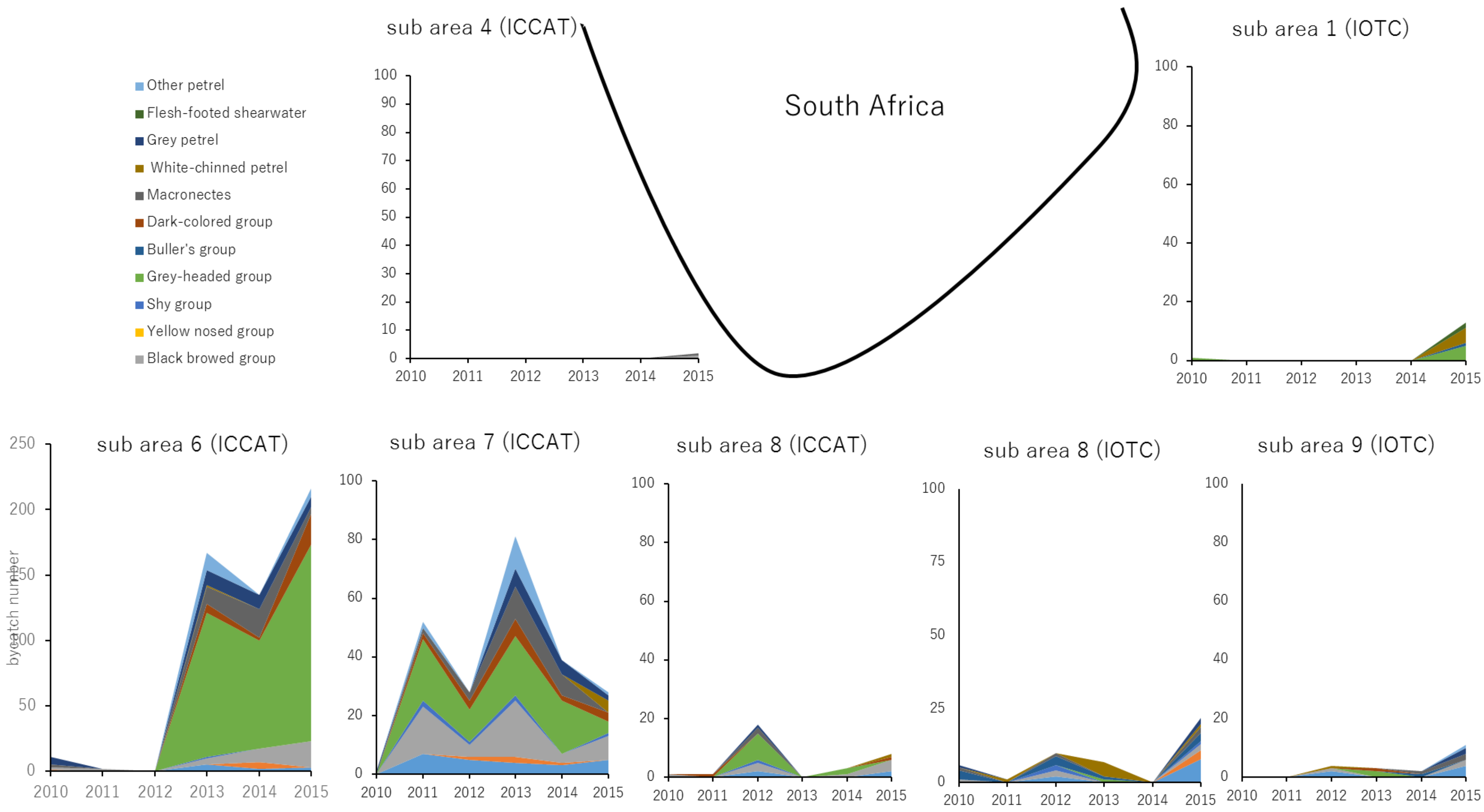


Figure 4: Schematic figure of area specific catch number of seabird by species group in the period between 2010 – 2015 in off South Africa region.. Data collected by on-board observers for Japanese longliners.

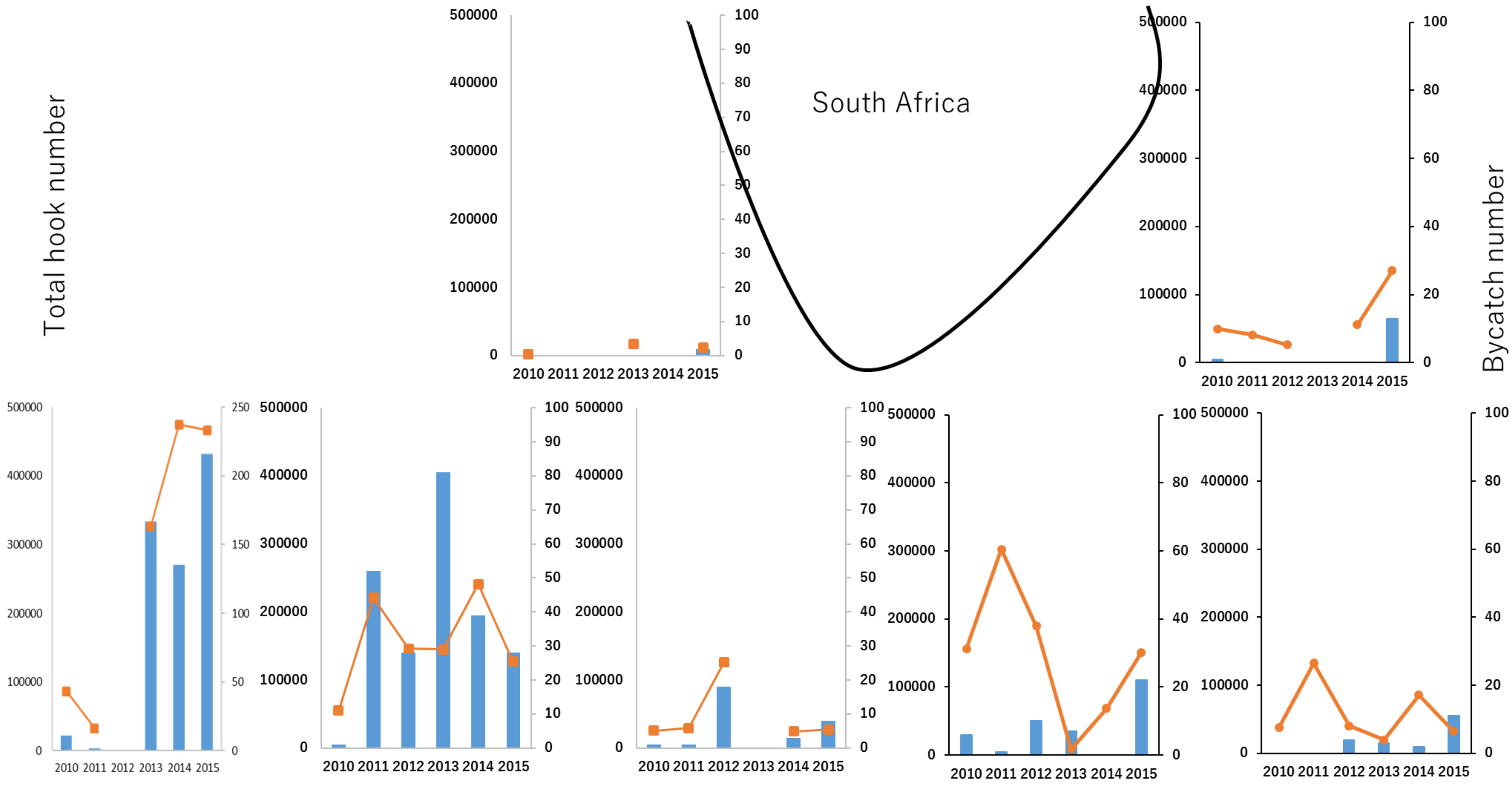


Figure 5: Schematic figure of area specific annual catch number of seabird (orange line) and annual number of hooks (blue bar) Iin the period between 2010 – 2015 in off South Africa region. Data collected by on-board observers for Japanese longliners.

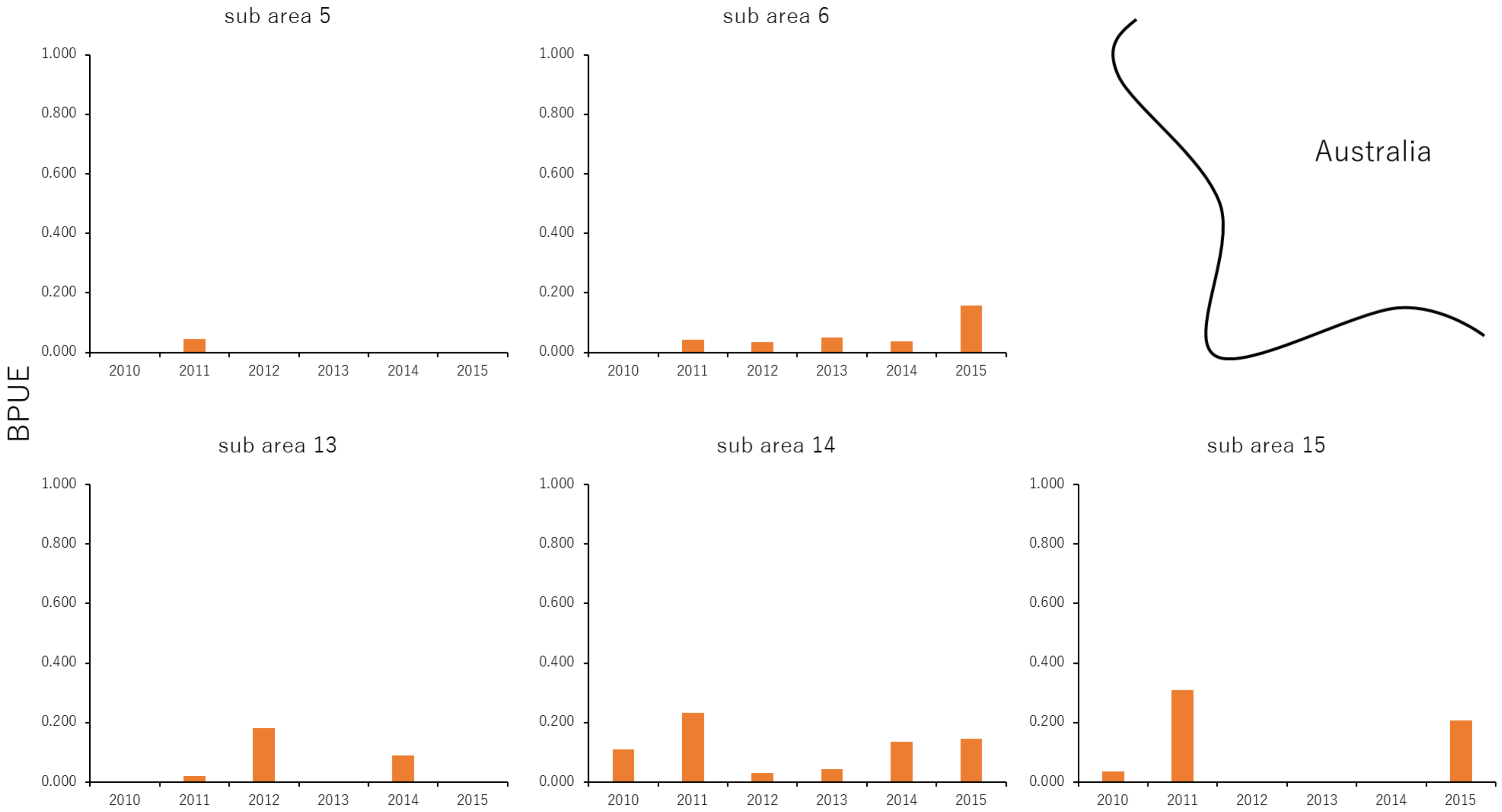


Figure 6: Schematic figure of area specific catch number of seabird by species group in the period between 2010 – 2015 in the southwest Indian Ocean.. Data collected by on-board observers for Japanese longliners.

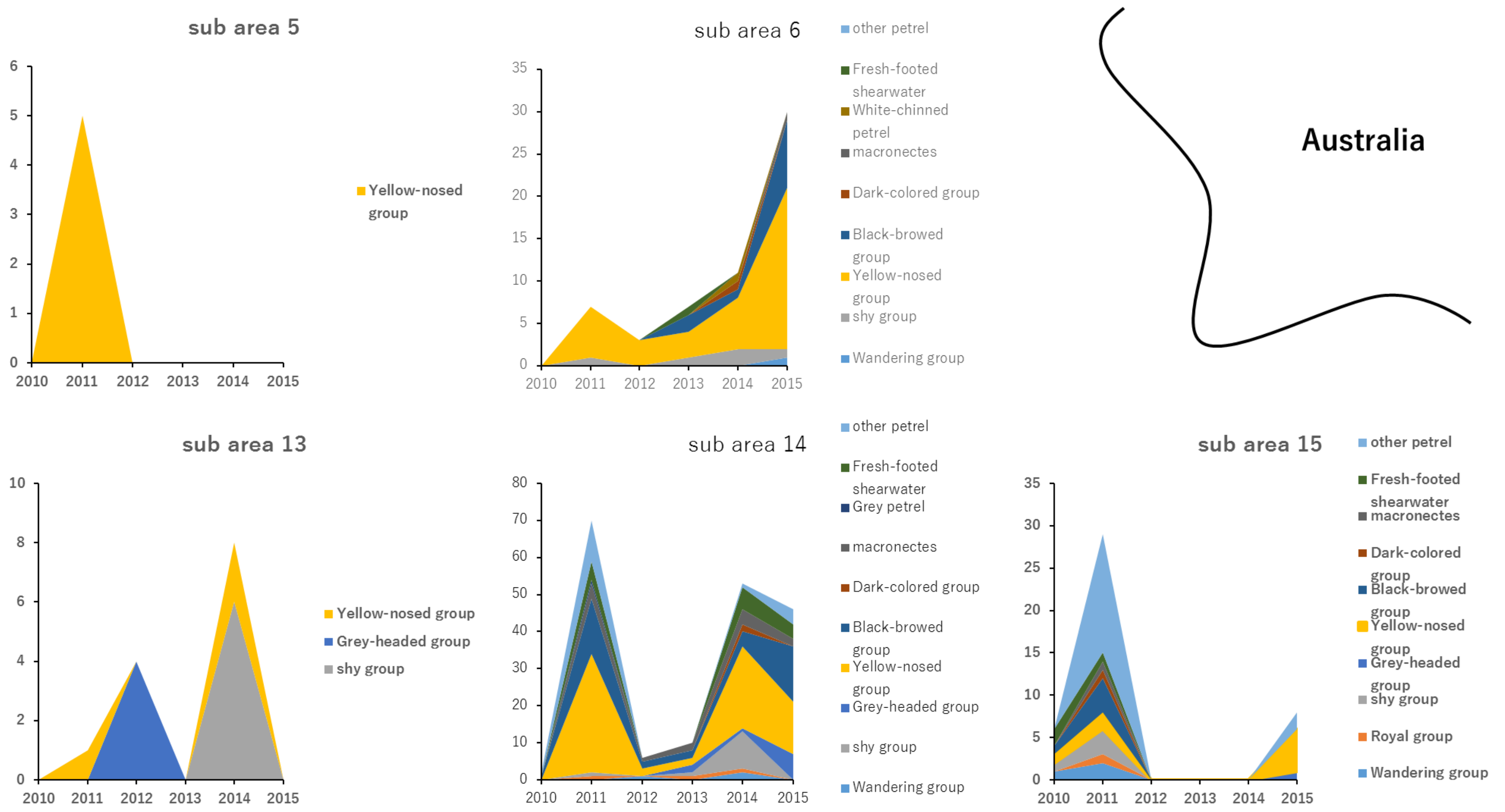


Figure 7: Schematic figure of area specific catch number of seabird by species group in the period between 2010 – 2015 in the southwest Indian Ocean. Data collected by on-board observers for Japanese longliners.

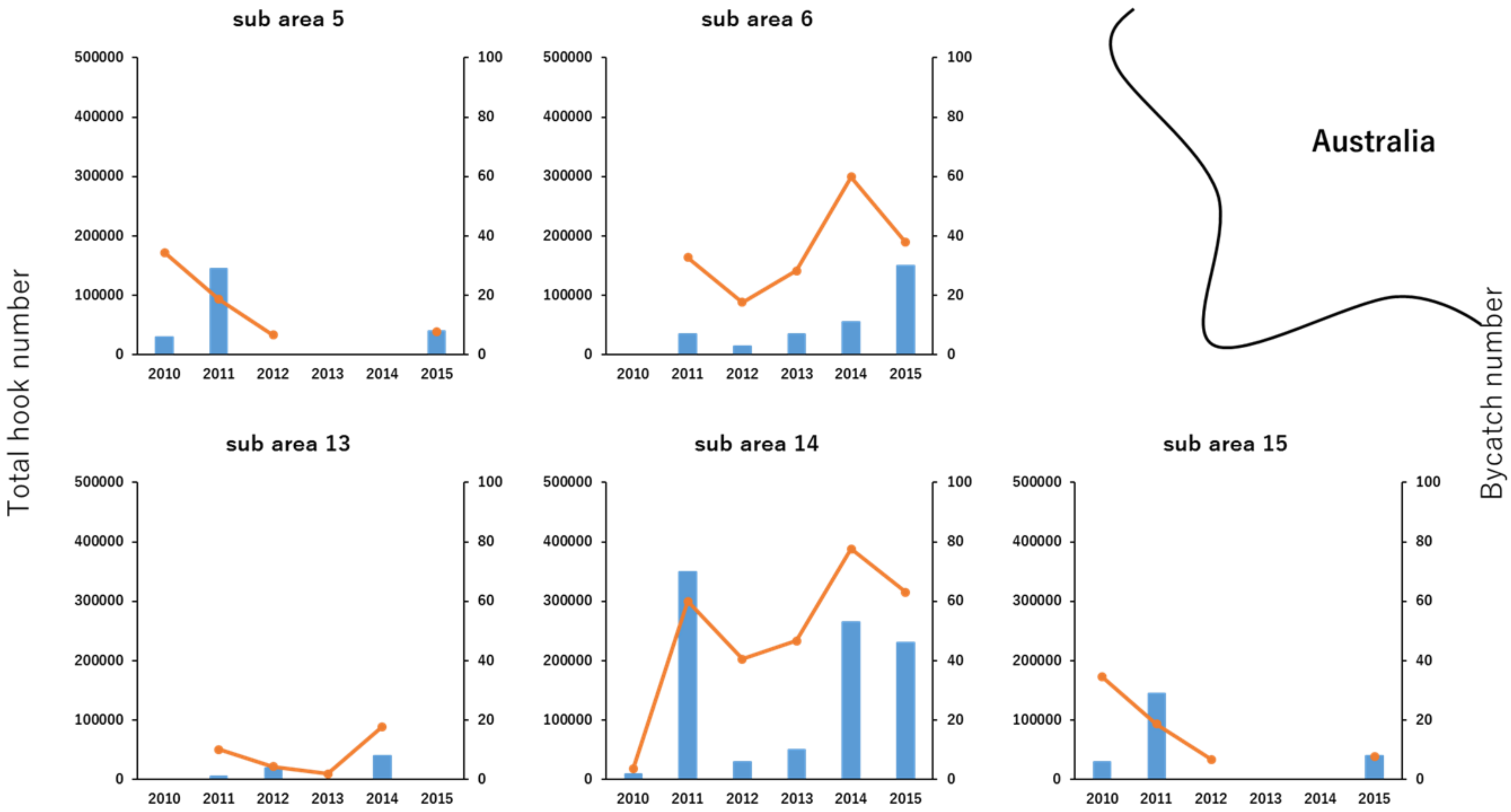


Figure 8: Schematic figure of area specific annual catch number of seabird (orange line) and annual number of hooks (blue bar) Iin the period between 2010 – 2015 in the southwest Indian Ocean. Data collected by on-board observers for Japanese longliners.

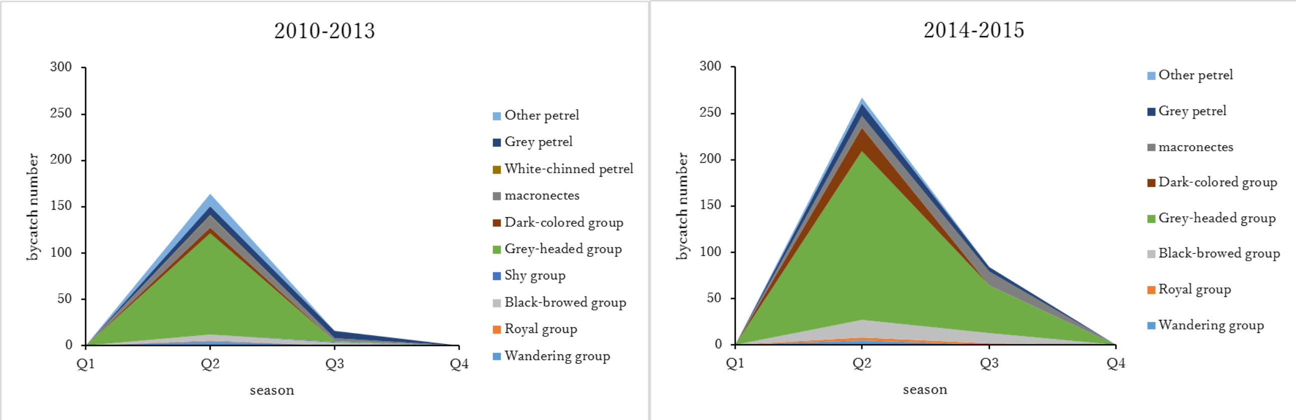


Figure 9. Quarterly bycatch number of seabird in subarea 6 in the ICCAT region (off South Africa) during the period of 2010 – 2013 (left) and 2014 – 2015 (right). Data collected by on-board observers was used.

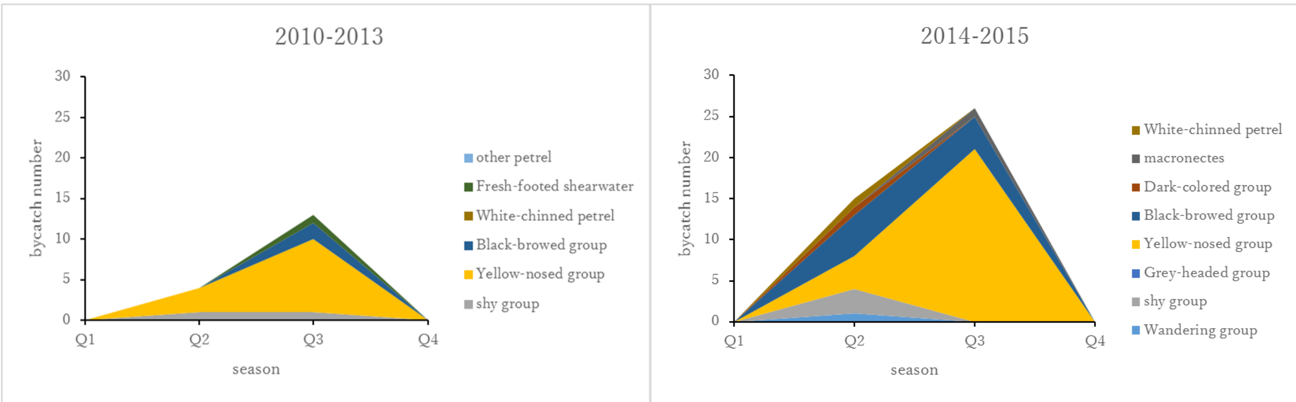


Figure 10. Quarterly bycatch number of seabird in subarea 6 in the IOTC region (southwest Indian) during the period of 2010 – 2013 (left) and 2014 – 2015 (right). Data collected by on-board observers was used.

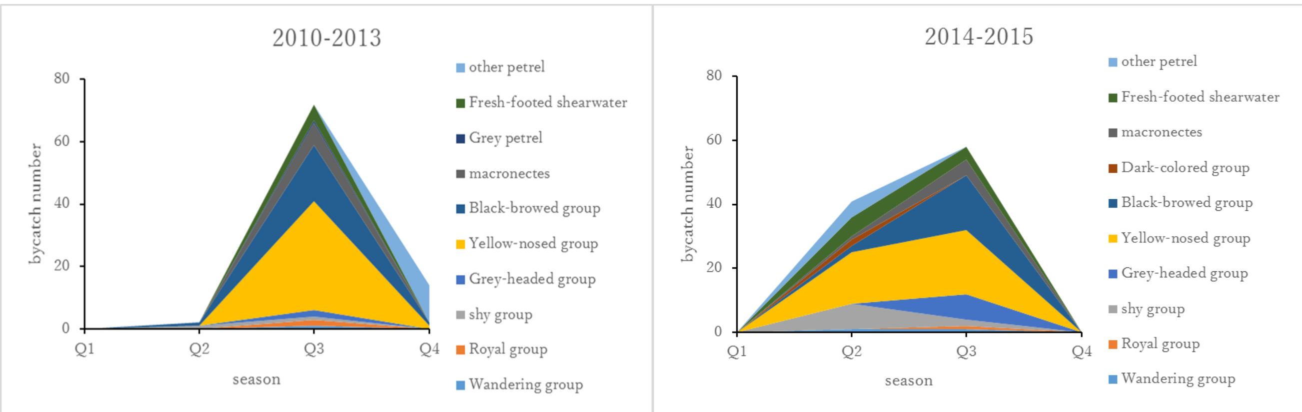
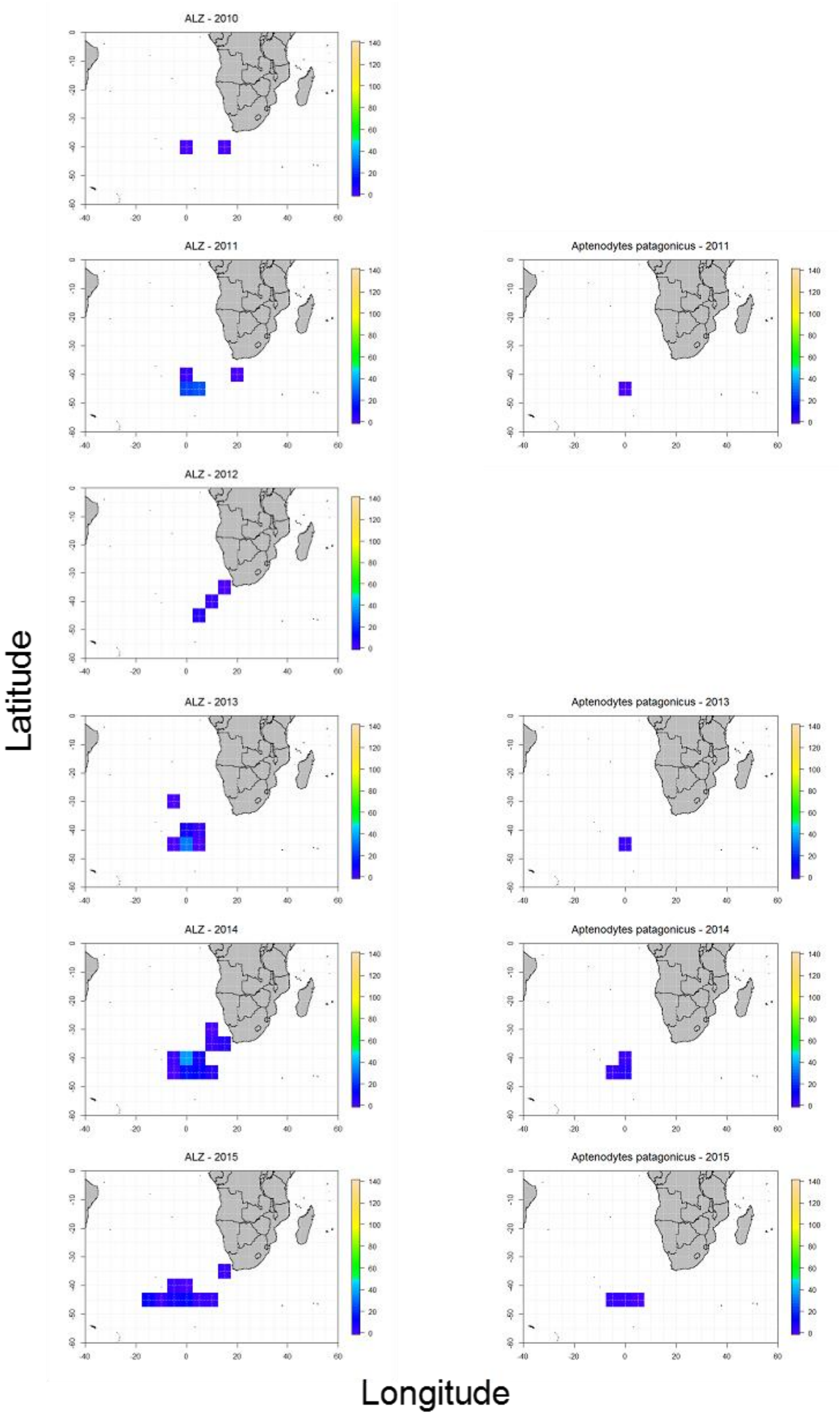


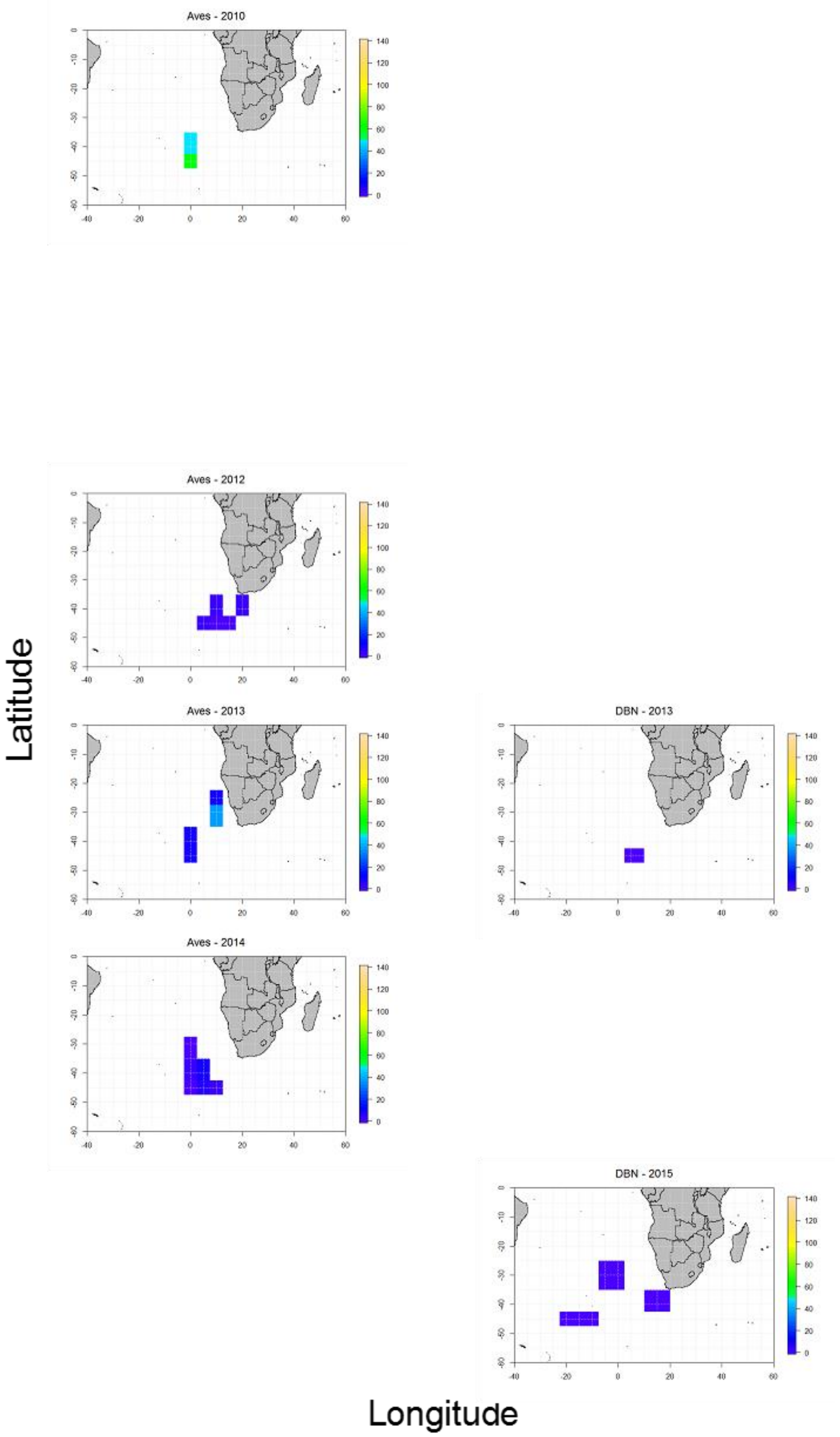
Figure 11. Quarterly bycatch number of seabird in subarea 14 in the IOTC region (southwest Indian) during the period of 2010 – 2013 (left) and 2014 – 2015 (right). Data collected by on-board observers was used.

APPENDIX; Annual Bycatch distribution map of seabird by species group in 2010 - 2015

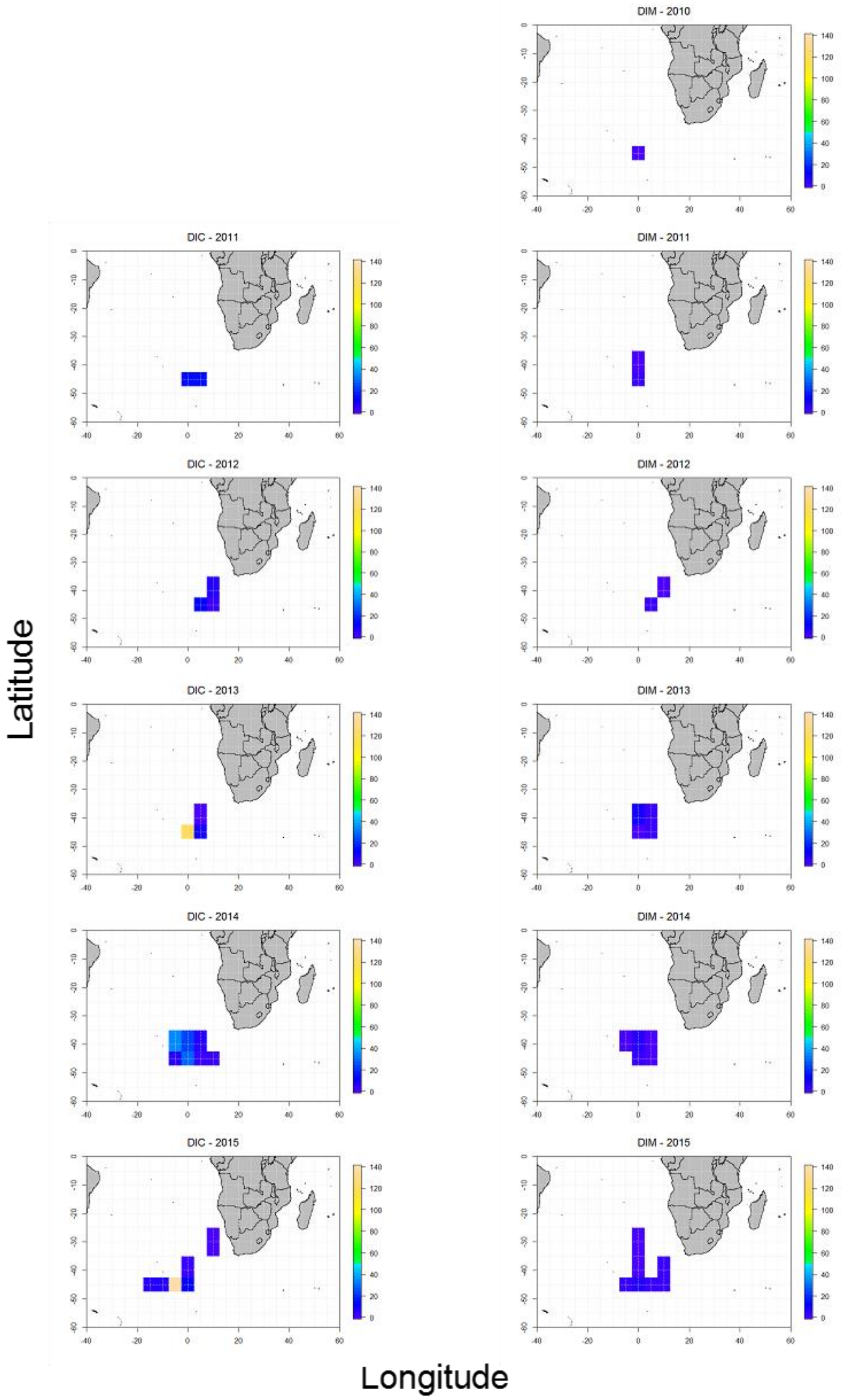
ALZ: Large albatross, Aptenodytes patagpnicu: king penguin.



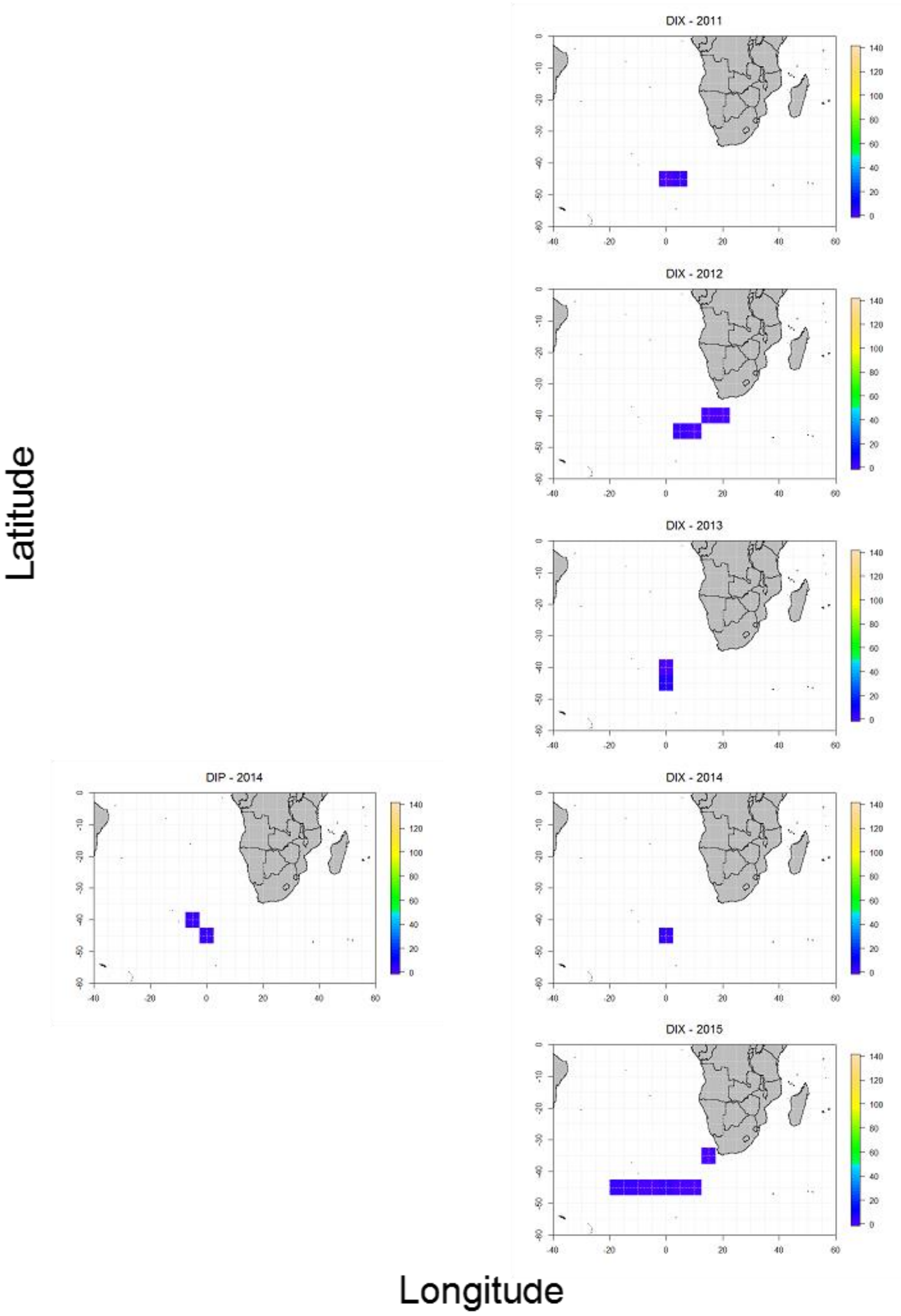
Aves: Unidentified birds, DBN: Tristan albatross.



DIC: Grey-headed albatross, DIM: Black-browed albatross.



DIP: South royal albatross, DIX: Wandering albatross.



Macronectes spp: Unidentified giant petrel, MAH: Northern giant petrel.

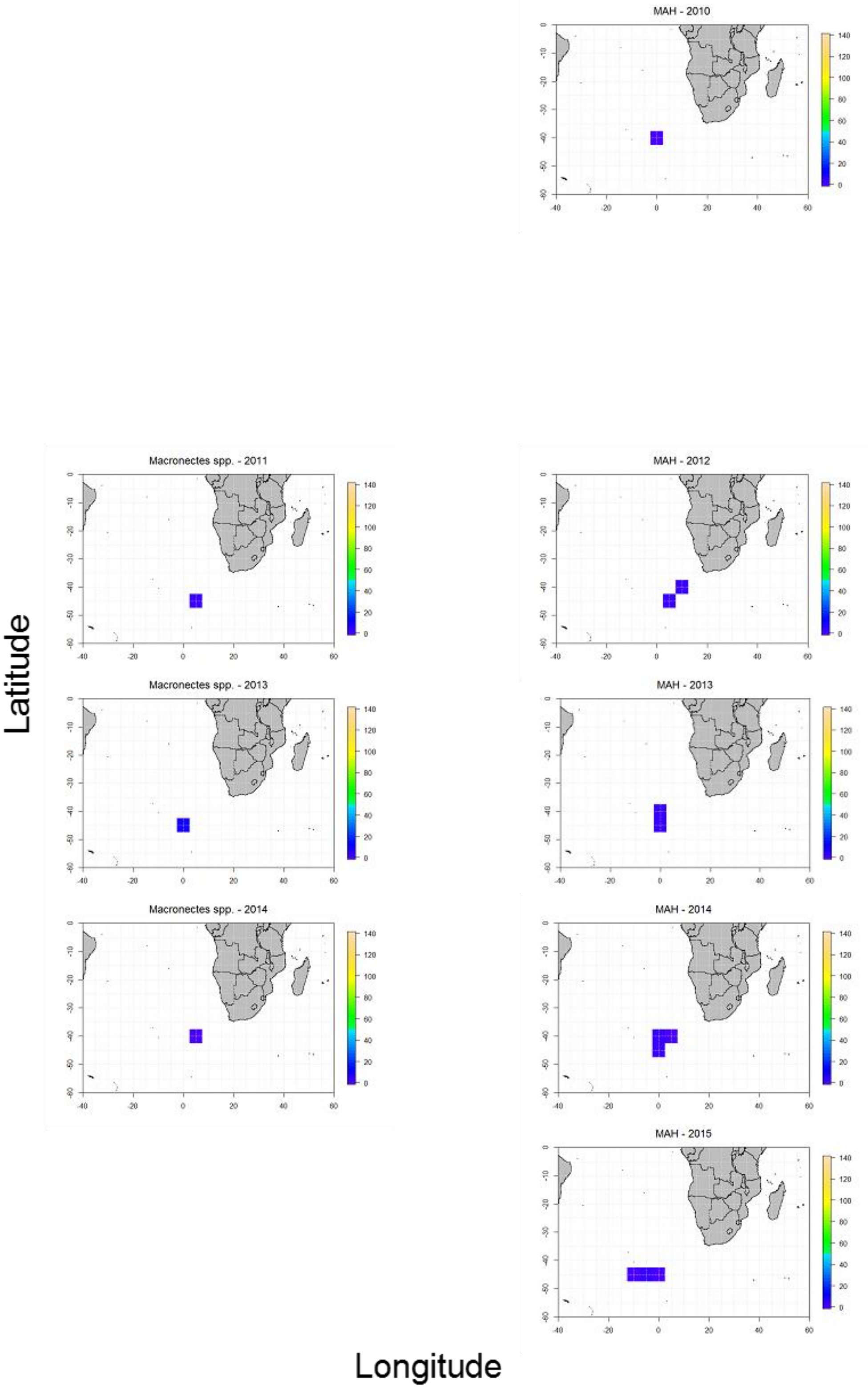
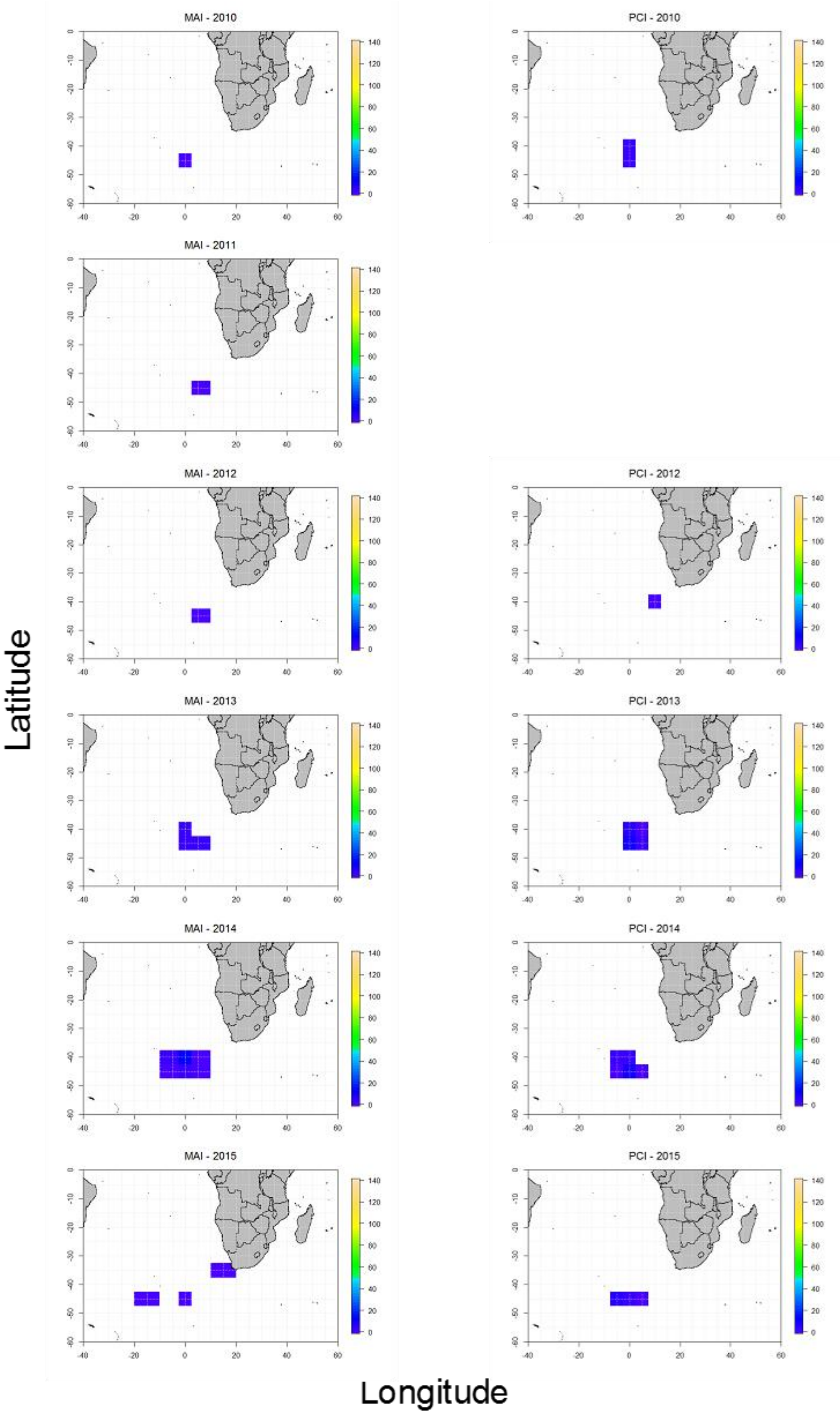
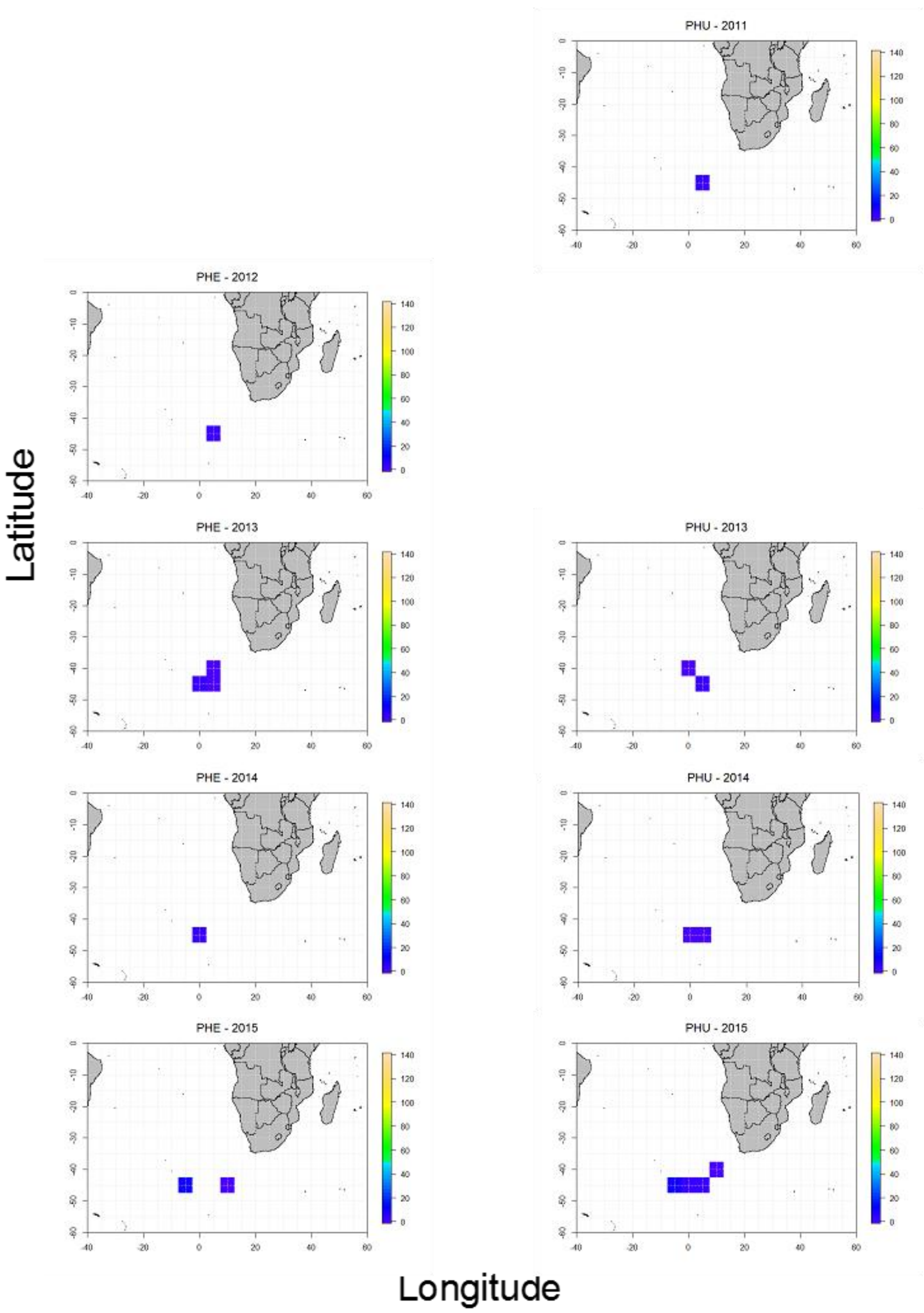


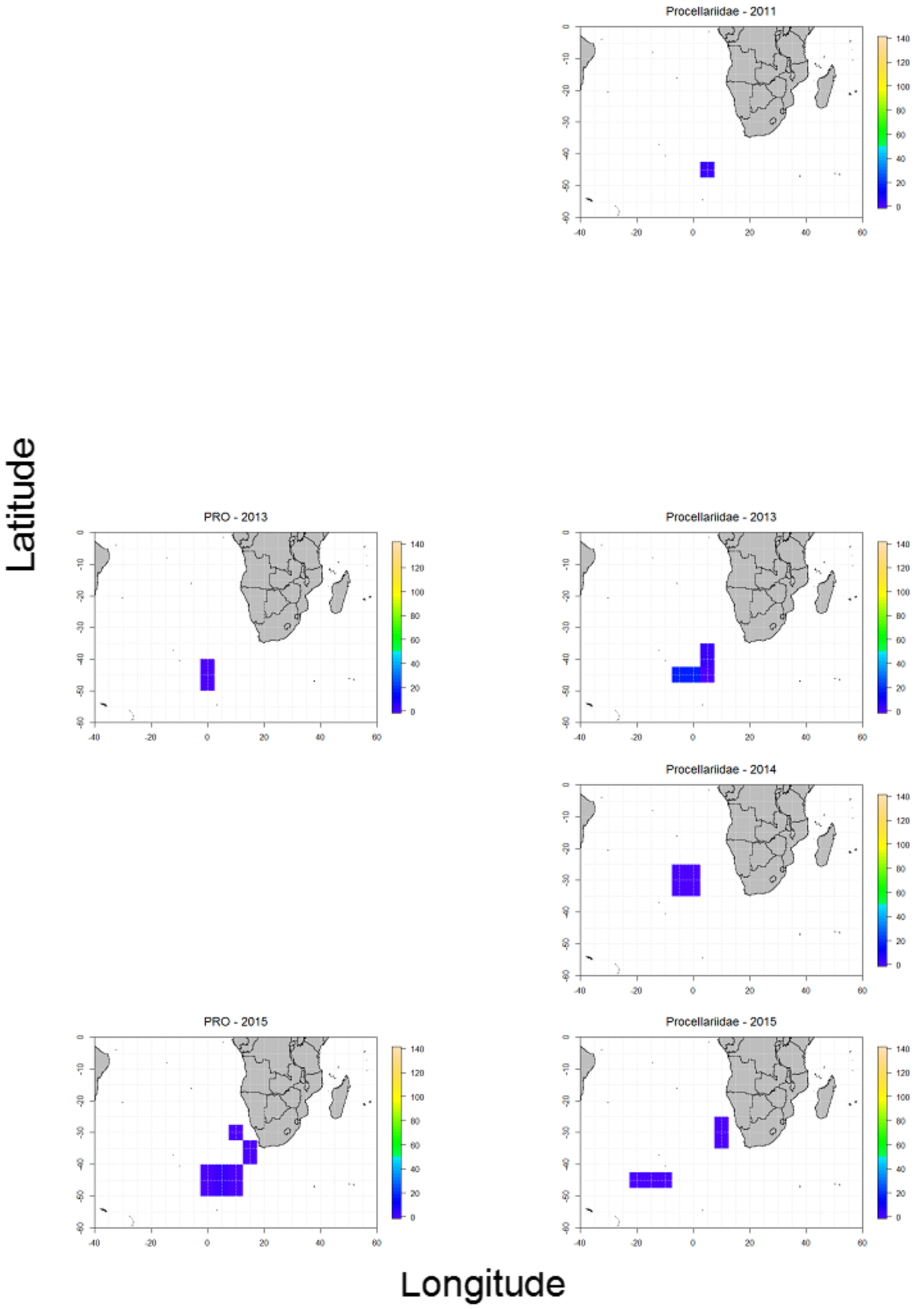
Fig . continued. MAI: Southern giant petrel, PCI: Grey petrel.



PHE: Light-mantled albatross, PHU: Sooty albatross.



PRO: White-chinned petrel, Procellariidae: Unidentified petrel.



PUG: Great shearwater, Spheniscidae: Unidentified penguin.