SCIENTIFIC COMMITTEE
ELEVENTH REGULAR SESSION

Pohnpei, Federated States of Micronesia
5-13 August 2015

The overlap of threatened seabirds with reported bycatch areas between 25° and 30° South in the Western Central Pacific Fisheries Commission Area.

WCPFC-SC11-2015/ EB-WP-09

Karen Baird[1], Cleo Small[1], Elizabeth Bell[2], Kath Walker[3], Graeme Elliot[3], David Nicholls[4], Rachael Alderman[5], Paul Scofield[6], Lorna Depp[7], Bindi Thomas[8], and Maria P. Dias[1].

[1] BirdLife International
[2] Wildlife Management International Limited
[3] Albatross Research (New Zealand),
[4] Chisholm Institute, Cranbourne Campus, Conservation & LM (Australia),
[5] Department of Primary Industries, Parks, Water and Environment, Tasmania,
[6] Canterbury Museum (New Zealand),
[7] University of Canterbury,
[8] Massey University (New Zealand)

The overlap of threatened seabirds with reported bycatch areas between 25°and 30° South in the Western Central Pacific Fisheries Commission Area.

Authors: Karen Baird[1], Cleo Small[1], Elizabeth Bell[2], Kath Walker[3], Graeme Elliot[3], David Nicholls[4], Rachael Alderman[5], Paul Scofield[6], Lorna Deppe[7], Bindi Thomas[8], Maria P. Dias[1].

[1] BirdLife International, [2] Wildlife Management International Limited, [3] Albatross Research (New Zealand), [4] Chisholm Institute, Cranbourne Campus, Conservation & LM (Australia), [5] Department of Primary Industries, Parks, Water and Environment, Tasmania, [6] Canterbury Museum (New Zealand), [7] University of Canterbury, [8] Massey University (New Zealand)

Abstract

The WCPFC seabird conservation measure (CMM 12/07) requires that seabird bycatch mitigation measures are mandatory for all longline fishing effort south of 30°S. Here we show the distribution of five species of threatened albatrosses (Antipodean, Northern Royal, Wandering, Black-browed and White-capped albatrosses) and two species of threatened petrels (Black and White-chinned petrel) in the Western and Central Pacific Fisheries Commission area. The data indicate these threatened species are at risk from bycatch in the South Pacific up to 25°S, outside the current area where mitigation measures are mandatory. This is supported by published information on bycatch and sightings of seabirds in the area between 25 and 30°S. We conclude that these two lines of evidence represent a meaningful risk to seabirds, which would be mitigated by extending the area of application of CMM 12/07 to south of 25°S

1. **Introduction**

Fifteen of the 22 albatross species are globally threatened with extinction, with the major threat to most species recognised as incidental mortality particularly in longline fisheries (Brothers 1991, Robertson & Gales 1998, Croxall *et al*. 1998, Baker *et al*. 2002, Anderson *et al*. 2011, Agreement on Albatrosses and Petrels (ACAP) 2012). Some petrel species are also threatened by fishing activities. (Weimerskirch et al. 1999, Phillips *et al*. 2006, ACAP 2012).Published data on bycatch in the area between 25°S-30°S by Japan and Taiwan have highlighted the potential risk to seabirds in this area (Inoue *et al.* 2011, Huang and Yeh 2011, Huang 2014). To understand the level of risk posed to seabirds from bycatch by longline fleets in the area 25°S -30°S we assessed seabird distribution based on seabird tracking data, which we present here.

2. **Methods**

We examined distribution maps of albatrosses and petrels based on the BirdLife International range maps (available at www.birdlife.org/datazone), complemented with data from tracking studies held in the Seabird Tracking Database (www.seabirdtracking.org). Where albatross and petrel species ranges overlapped with the geographical area between 25°S and 30°S in the WCPFC area of competence we analysed their distribution in more detail, using the tracking data held in the Seabird Tracking Database. The species considered in more detail were: Antipodean albatross *Diomedea antipodensis*, Northern Royal Albatross *Diomedea sanfordi*, Wandering Albatross *Diomede aexulans*, Black-browed Albatross *Thalassarche melanophris*, White-capped Albatross *Thalassarche steadi*, Black Petrel *Procellaria parkinsoni* and White-chinned Petrel *Procellaria aequinoctialis*.

The distribution of these species in each season were mapped using kernel density estimation, based on GPS, PTT and GLS data (previously filtered to remove unrealistic positions, using the Argos filter R package, for PTT data, and following the procedures described in Phillips *et al*. 2004, for GLS data). Birds from different populations (i.e., tracked from different colonies) and of different ages (adults and juveniles/

immatures) were mapped separately. Maps were created for each year quarter: season 1 (January-March), season 2 (April-June), season 3 (July – September) and season 4 (October-March). Only results from the relevant populations of each species (i.e. those using the WCPFC area in a given year-quarter), and for which we have tracking data available in the Seabird Tracking Database, are presented (Table 1. Appendix). We calculated the percentage of the world population breeding in each colony based on data available at the ACAP data portal (https://data.acap.aq/).

Longline bycatch data covering the area 25°S-30°S have been presented to WCPFC by Japan (Inoue *et al.* 2011) and Taiwan (Huang and Yeh 2011; Huang 2014). Japan's data were presented in four seasons, while Taiwan's 2011 data were presented in half years. The areas (5X5 grid square) where seabird bycatch was reported in these papers are shown on the albatross distribution maps for each species.

All the analyses were carried out using R software (2014).

3. Results

The seasonal distribution of the selected albatrosses and petrels is shown in Figures 1a- 9a, together with reported incidence of seabird bycatch. Bar graphs of percentage seabird distribution by 5° of latitude band are shown in Figures 1b-9b. Results are presented below by species, and each species IUCN threat category is indicated.

Huang and Yeh (2011) report observer data collected by Taiwan from 2002-2007: no data are available from the 1st and 4th year quarters, coinciding with low fishing effort in those seasons. However, effort was observed between 25°S -30°S in the 2nd and 3rd quarters, with seabird bycatch reported in four of seven 5x5 grid squares observed. Later data (2008-2013) on bycatch by Taiwan (Huang 2014) confirm bycatch occurring in the 25°S-30°S region in similar areas to previous years. Observer data reported by Inoue *et al* (2011) also report seabird bycatch in the 25°S -30°S latitudinal band (observer data are available in the Tasman Sea and bycatch in two 5X5 grid squares in season 3 (July-Sept).

Antipodean Wandering Albatross (*Diomedea antipodensis*) (Vulnerable).There are two populations of this New Zealand endemic species, with 99% of *antipodensis* breeding only on the Antipodes Islands and 95% of *D. antipodensis gibsoni* breeding on Adams Island in the Auckland Island archipelago, South of New Zealand. Fig 1a shows the Antipodes Island population (55% of the world population) distribution for adults and juveniles. Overall, 6.8% of adult and 7 % of juvenile estimated distribution is within the 25°S - 30°S band. Based on available tracking data, estimated species distribution in the 25°S -30°S latitudinal band was more than 10% for adults and nearly 15% for juveniles in the 3rd season when bycatch has been reported to occur. Bycatch and sightings from both Taiwanese and Japanese vessels across the whole of the WCPFC area did not identify bycatch of Antipodean Albatross, but Inoue *et al* 2011 used the older classification system which groups Antipodean into wandering albatrosses. Only Wandering Albatross (*Diomedea exulans*) is listed in Huang and Yeh, 2011, also suggesting that separation into the two species found in the region (Wandering and Antipodean) may not have taken place. Also both Japan and Taiwan indicate many albatrosses bycaught during the early studies are unidentified. Fig 2a shows the *gibson's* population from Auckland Island also ranging into the 25°S -30°S area during April to September, with more than 5% of adults distributed in this area (Fig 2b).

Northern Royal Albatross (*Diomedea sanfordi*) (Endangered). This species breeds mostly at the Chatham Islands in New Zealand with a very small mainland population near Dunedin. Fig 3a shows that birds

tracked from the Forty-Fours Islands at the Chathams (47% of breeding population) move north following breeding and occur in the 25°S -30°S area between October and December around 10% of the time. Although no bycatch is indicated in the 4th season there was also no observer coverage during this period.

Wandering Albatross (*Diomedea exulans*) (Vulnerable).Fig 4a shows the distribution of the Macquarie Island population which is within the WCPFC area. Just 0.1% of the world population breeds on this island and just 4 adults and 4 juveniles have been tracked. There is limited overlap with the 25°S-30°S band, although the data indicate juveniles moving further north than adults.

Black-browed Albatross (*Thalassarche melanophrys*) (Near Threatened). Fig 5a shows juvenile birds from the Macquarie Island population (0.06% of world population) overlap significantly with the area between 25°Sand 30°S in the 2nd and 3rd seasons, with 25% of their time within this band in the 3rd season (Fig 5b). This is supported by Huang and Yeh (2011) who report sightings of Black-browed Albatross as one of 4 species identified in counts of birds in the southern area (south of 20°S). However they cite lack of data prevented estimates of bycatch for this and other species. Inoue *et al.* (2011) also specifically mention Black-browed Albatross as the most by-caught species in the WCPFC area and were caught in the Tasman Sea from April to September. While Inoue *et al* don't report species caught by latitudinal band, maps of bycatch areas show this includes areas north of 30°S.

White-capped Albatross (*Thalassarche steadi*) (Near Threatened). White-capped albatross is an endemic New Zealand albatross, breeding on islands in the New Zealand subantarctic, mostly Disappointment Island (96%) in the Auckland Island group. Distribution maps in Fig 6a show distribution in the 25°-30°S area in all seasons but significantly with the 2nd and 3rd seasons, when 8% and 11% of their time was spent in this band (Fig 6b).

White-chinned Petrel (*Procellaria aequinoctialis*)(Vulnerable). White-chinned petrels breed in the NZ region (Auckland, Antipodes and Campbell Islands, subantarctic region). Figs 7a and 7b show that birds tracked from the Antipodes Islands (5-10% of world population) occur in the 25°S-30°S area, especially during the 1st and 4thseasons, when birds are breeding (from September to May).No tracking has been undertaken so far for populations on the Auckland and Campbell Islands or for juveniles. There are no available observer data in this region for the 1stand 4th quarters.

Black Petrel (*Procellaria parkinsoni*) (Vulnerable).Black Petrel is also an endemic New Zealand breeding bird, found on just two islands in the Hauraki Gulf of New Zealand (Great Barrier and Little Barrier Islands). Figs 8a and 9a show the overlap of tracked birds from both populations. Both map series show very high overlap with the 25°S-30°S area in the 1st, 2nd and 4thseasons when birds are returning to breed and are breeding in NZ. Figs 8b and 9b show the percentage time spent in the 25°S - 30°S band, with 25% of Great Barrier Island birds in that band in season 2, with additional foraging north of 25°S. In the 3rd quarter, after breeding has finished, adults and immature birds move north towards Ecuador in South America where they overwinter.

Discussion

Available tracking data indicate the albatross and petrel species vulnerable to bycatch have distributions up to (and in some cases further north than) the 25°S -30°S latitudinal band. That this distribution corresponds to bycatch risk is supported by reported seabird bycatch data. Based on available tracking data, species at risk include the Antipodean Albatross, especially juveniles in season 3, juvenile Black-

browed Albatross in season 3, White-capped Albatross in season 3 and 4 and Black Petrel in all seasons except 3. 'Wandering' type albatrosses and Black-browed Albatross have been reported caught up to 25°S in the Tasman Sea between July and September (season 3) (Inoue *et al*, 2011). For Taiwan, 124 'Wandering' albatross were caught as bycatch in the western south Pacific (from April to September) with a further 739 unidentified albatrosses caught in the south Pacific between 2002 and 2007 (Huang and Yeh, 2011).

Very few juveniles of any species have been tracked (just three Antipodean Albatross, four Wandering Albatross and two Black-browed Albatross). This paucity of data is likely to result in an underestimation of their distribution in the 25°S -30°S area, as we found the few juveniles tracked range further north than adults. Delord and Weimerskirch (2011) also found juvenile, young immature and non-breeding albatrosses and petrels showed extensive overlap with bycatch hotspots in the Indian Ocean. Juvenile and immature birds are likely to be more vulnerable to bycatch due to naiveté and because their inexperience is likely to result in difficulty finding food in their first years. Researchers in New Zealand have also found that Antipodean albatrosses may be expanding their foraging distribution over larger areas of ocean than previously most likely due to changes in oceanic conditions. This may be affecting their productivity but may also bring them more frequently into range of fishing vessels increasing their vulnerability, particularly if they are having difficulty finding food. (Walker & Elliott, 2013).

Albatrosses in the 'Wandering group' are difficult to separate as adults and even more difficult as juveniles and immatures. All birds start out all dark and whiten as they age which makes it hard to distinguish different species of unknown age. Generally it appears that observers have categorised birds as 'Wandering' type albatrosses as opposed to the Royal albatrosses which can be separated by the presence of the black cutting edge of the bill. In future, improvements in how species are assigned will enable a better understanding of the risks to individual species. Since the 2011 Inoue *et al* paper to WCPFC, Japan has undertaken an update of their species classification for seabird bycatch, including a retrospective review of past data to align with the 22 albatross species taxonomy.

Although many data gaps remain, both in tracking data sample sizes, and in seabird bycatch, the available seabird distribution and bycatch data indicate that threatened albatrosses and petrels are distributed in the 25°S -30°S latitudinal band, and that seabird bycatch occurs here.

References

Agreement on Albatrosses and Petrels2012 ACAP species assessments.www.acap.aq/en/acap-species

Anderson, O.R.J., Small, C.J., Croxall, J.P., Dunn, E.K., Sullivan, B.J.S., Yates, O., Black, A. (2011). Global seabird bycatch in longline fisheries. Endangered Species Research **14**: 91-106.

Baker, G.B., Gales, R., Hamilton, S., Wilkinson, V. (2002) Albatrosses and petrels in Australia: a review of their conservation and management. Emu **102**: 71-97

Brothers, N. (1991) Albatross mortality and associated bait loss in the Japanese longline fishery in the Southern Ocean. Biological Conservation **55**:255-268

Croxall, J.P., Stuart, H.M., Butchart, Lascelles, B., Stattersfield, A.J., Sullivan, B., Symers, A., Taylor, P. (2012). Seabird conservation status, threats and priority actions: a global assessment. Bird Conservation International **22**:1-34.

Delord, Karine&Weimerskirch Henri, 2011. New information on distribution of albatrosses and petrels breeding in the Indain Ocean and assessment of potential overlap with the IOTC fisheries. IOTC-2011-WPEB07-38

Global Seabirds Tracking Database http://seabirdtracking.org/

Inoue *et al*. 2011.Distribution of seabird bycatch at WCPFC and the neighbouring area of the Southern Hemisphere. WCPFC-SC7-2011/EB-WP-07

Huang H-W. (2011). Bycatch of high sea longline fisheries and measures taken by Taiwan: Actions and challenges. Marine Policy **35:** 712-720

Huang H-W. andYeh Y-M. (2011). Impact of Taiwanese distant water longline fisheries on the Pacific seabirds: finding hotspots on the high seas. Animal Conservation (2011)1-13

Huang 2014.Seabirds and sea turtles bycatch of Taiwanese tuna longline fleets in the Pacific Ocean. WCPFC-SC10-2014/EB-WP-06 Rev1

Phillips, R.A., Silk, J.R.D., Croxall,J.P., Afanasyev, V., Briggs, D.R.,2004. Accuracy of geolocation estimates for flying seabirds. Marine Ecology-Progress Series 266, 265-272

Robertson, G., Gales, R. (1998) Albatross Biology and Conservation. Surrey Beatty and Sons, NSW, Australia

R Core Team (2014). R: A language and environment for statistical computing. RFoundation for Statistical Computing, Vienna, Austria.URL http://www.R-project.org/.

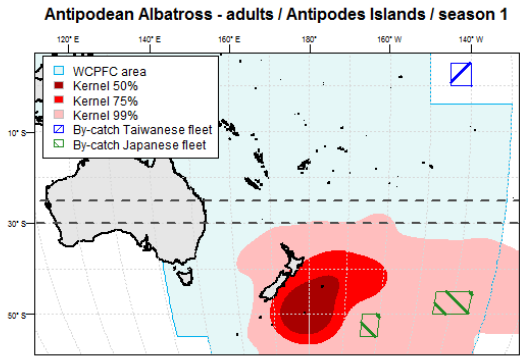
Sagar, P. 2010. Antipodes Island white-chinned petrel and grey petrel field work report, Ministry of Fisheries (New Zealand) Final research report,PRO2006-01D. 2009-10 15 September 2010

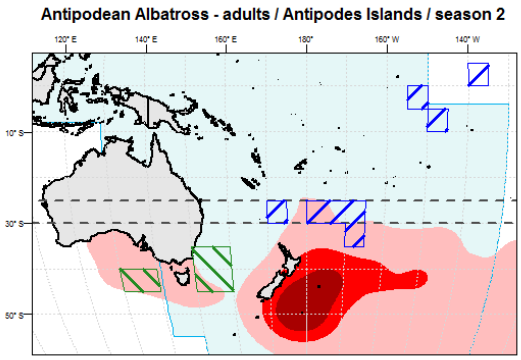
Walker, K. and Elliot, G. 2013. Antipodean Wandering Albatross Research. Unpublished research report, Department of Conservation, New Zealand.

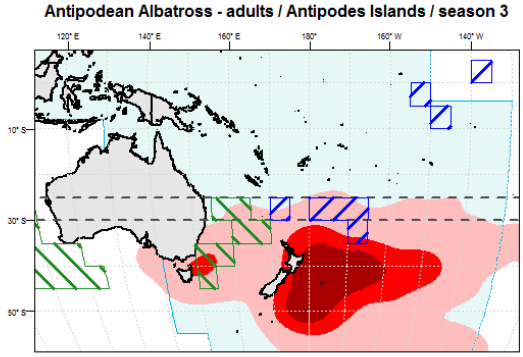
Table 1: Summary of the tracking data used to produce the maps shown in figures 1-9.

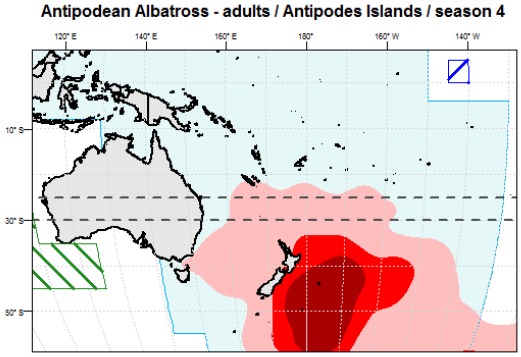
Species	Population	Number of tracks	Number of locations	Data-owners	Link
Antipodean albatross	Adams Island	65 adults	10196	David Nicholls, Kath Walker	http://seabirdtracking.org/mapper/?dataset_id=469 http://seabirdtracking.org/mapper/?dataset_id=471
	Antipodes Island	94 adults 3 juveniles	10272 1451	David Nicholls, Kath Walker	http://seabirdtracking.org/mapper/?dataset_id=470 http://seabirdtracking.org/mapper/?dataset_id=472
Northern Royal Albatross	The Forty Fours	5 adults	2151	Leigh Torres/NIWA, Lorna Deppe, Paul Scofield	http://seabirdtracking.org/mapper/?dataset_id=648
Wandering Albatross	Macquarie Island	4 adults 4 juveniles	4015 2558	Rachael Alderman, Rosemary Gales	http://seabirdtracking.org/mapper/?dataset_id=412
Black-browed Albatross	Macquarie Island	7 adults 2 juveniles	1940 1008	Rachael Alderman	http://seabirdtracking.org/mapper/?dataset_id=408
White-capped Albatross	Disappointment Island	171 adults	32100	David Thompson, Leigh Torres/NIWA, Paul Sagar	http://seabirdtracking.org/mapper/?dataset_id=640 http://seabirdtracking.org/mapper/?dataset_id=666
White-chinned Petrel	Antipodes Island	63 adults	8961	David Thompson, Leigh Torres/NIWA, Paul Sagar	http://seabirdtracking.org/mapper/?dataset_id=627 http://seabirdtracking.org/mapper/?dataset_id=635
Black Petrel	Great Barrier Island	104 adults	54545	Elizabeth Bell, Todd Landers	http://seabirdtracking.org/mapper/?dataset_id=658 http://seabirdtracking.org/mapper/?dataset_id=949 http://seabirdtracking.org/mapper/?dataset_id=951
	Little Barrier Island	13 adults	485	Elizabeth Bell	http://seabirdtracking.org/mapper/?dataset_id=659

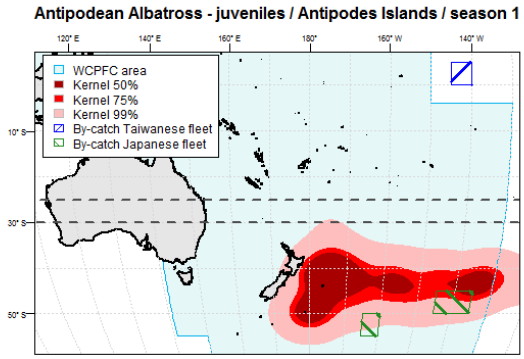
Figure 1a) Antipodean Albatross from Antipodes Islands, New Zealand (ca.55% of the world population; ACAP 2014) Blue 5X5 squares indicate bycatch reported in Huang and Yeh 2011; Green 5X5 squares indicate bycatch reported in Inoue *et al* 2011

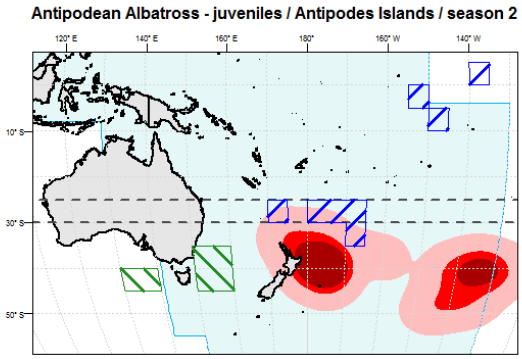












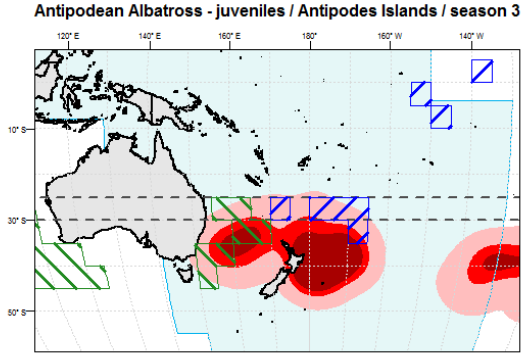
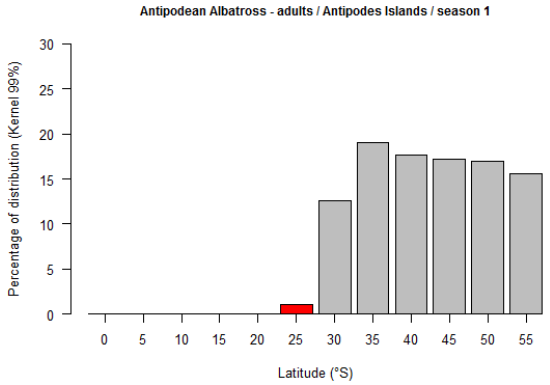
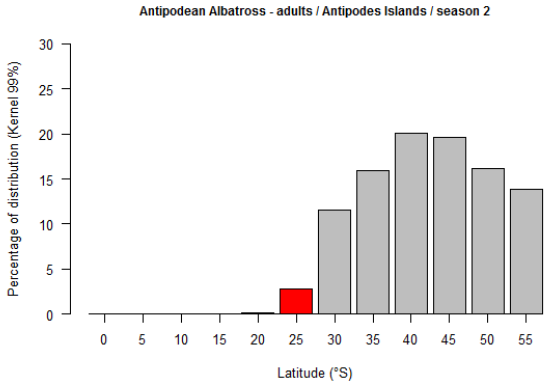
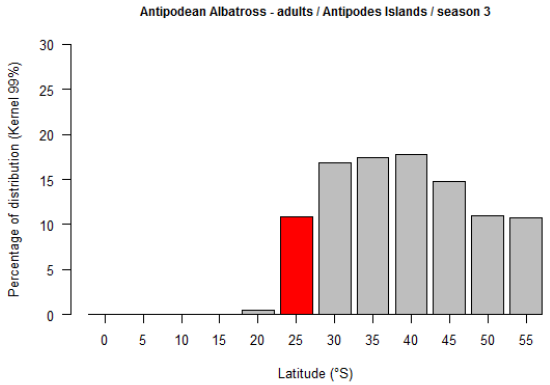
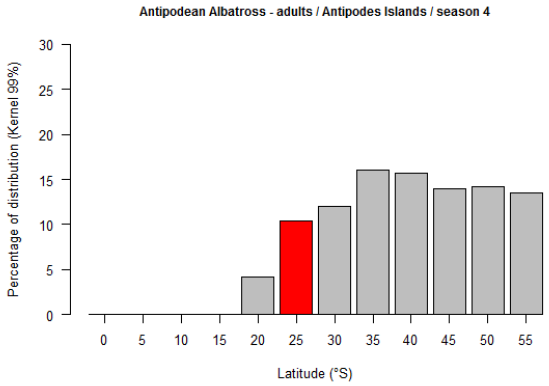


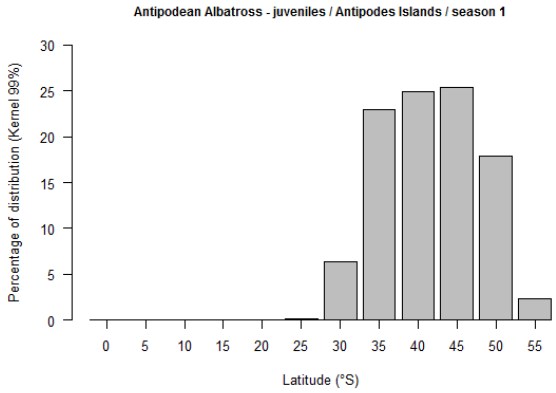
Figure 1b) Antipodean Albatross from Antipodes Islands - percentage distribution across latitudinal bands

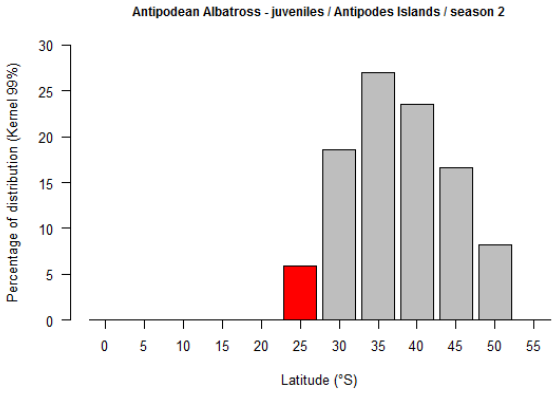












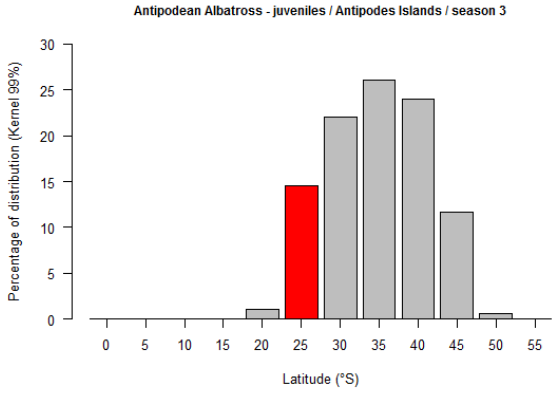


Figure 2a) Antipodean Albatross from Adams Island, New Zealand (ca.40% of the world population; ACAP 2014) Blue 5X5 squares indicate bycatch reported in Huang and Yeh 2011; Green 5X5 squares indicate bycatch reported in Inoue *et al* 2011

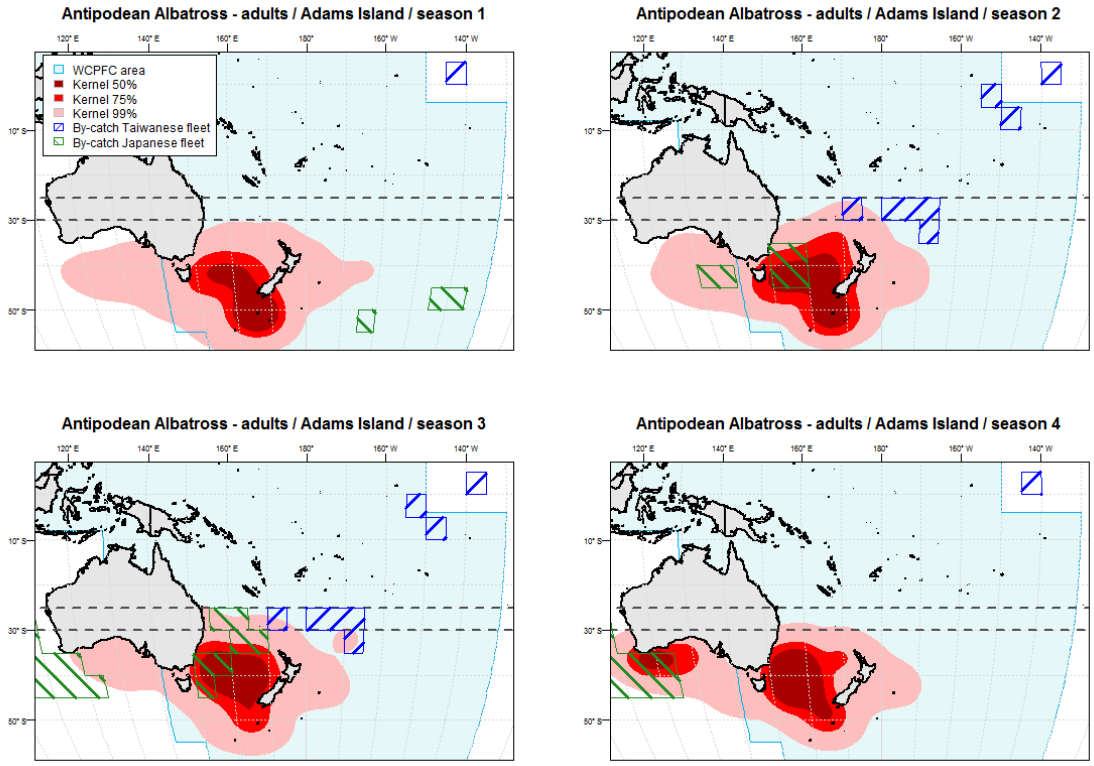


Figure 2b) Antipodean Albatross from Adams Island - percentage distribution across latitudinal bands

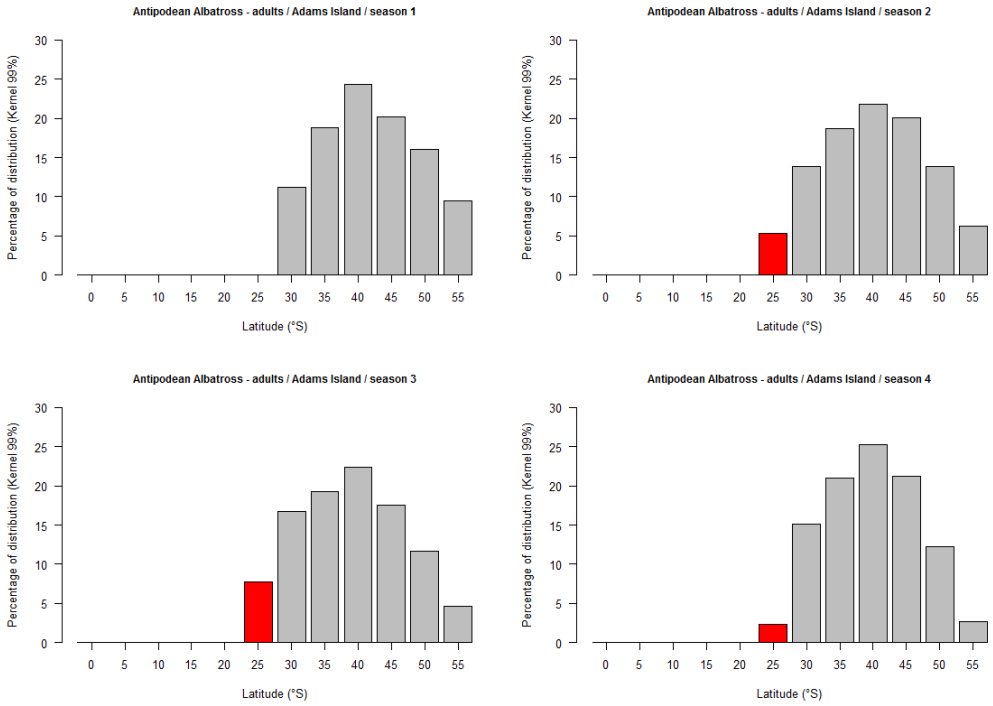


Figure 3a) Northern Royal Albatross from The Forty-fours, Chatham Islands, New Zealand (ca. 47% of the world population; ACAP 2014) Blue 5X5 squares indicate bycatch reported in Huang and Yeh 2011; Green 5X5 squares indicate bycatch reported in Inoue *et al* 2011

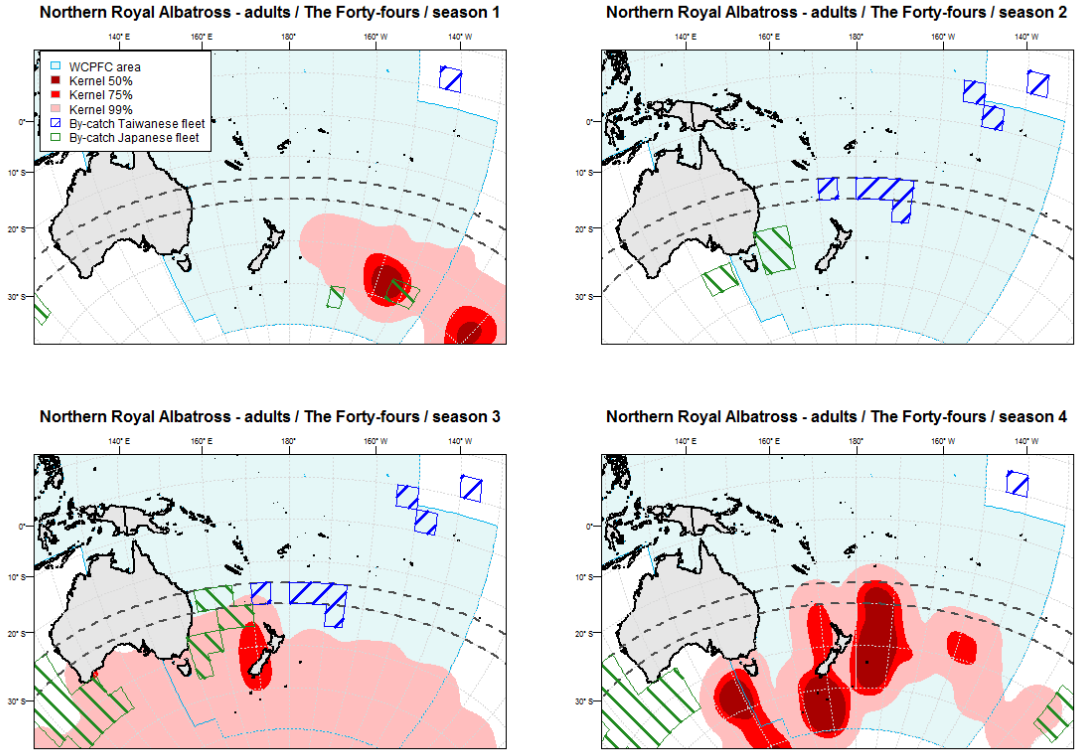


Figure 3b) Northern Royal Albatross from The Forty-fours, Chatham Islands - percentage distribution across latitudinal bands

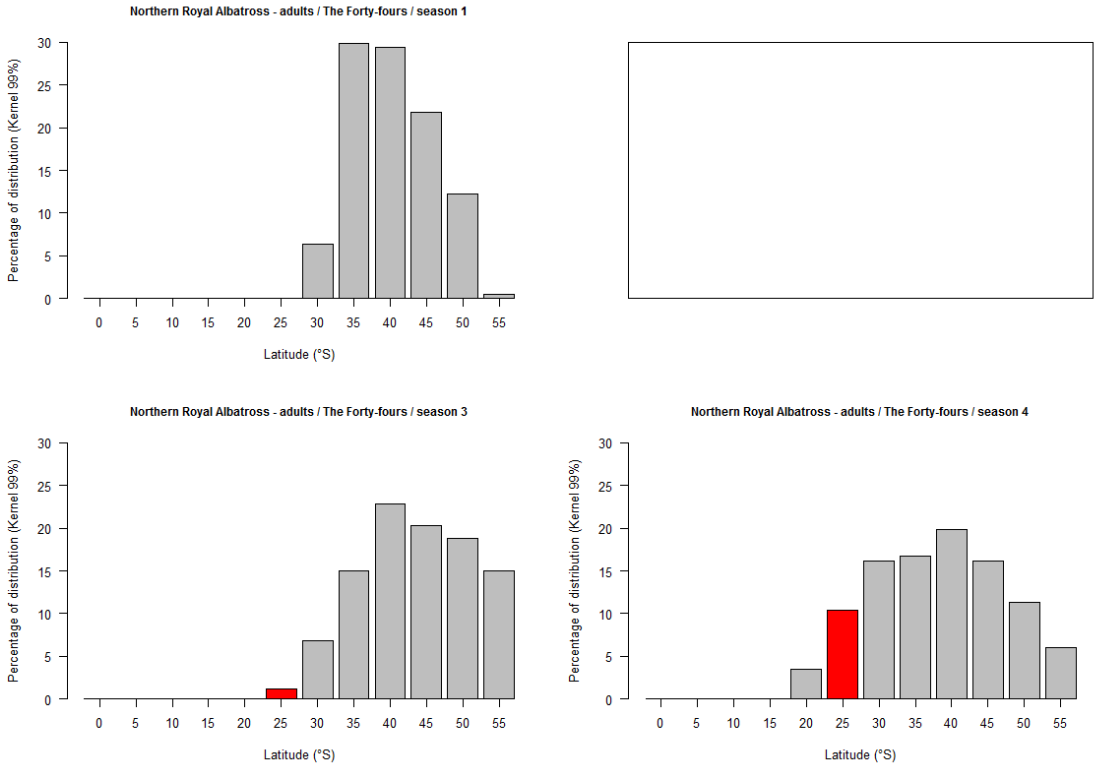
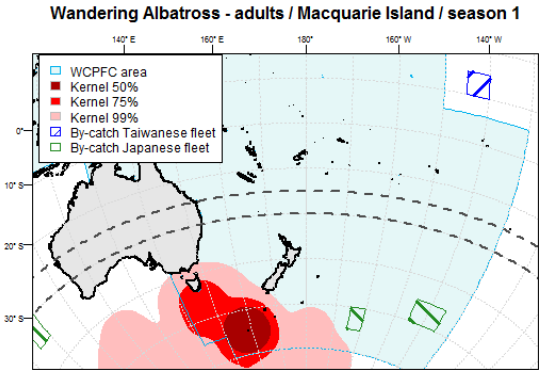
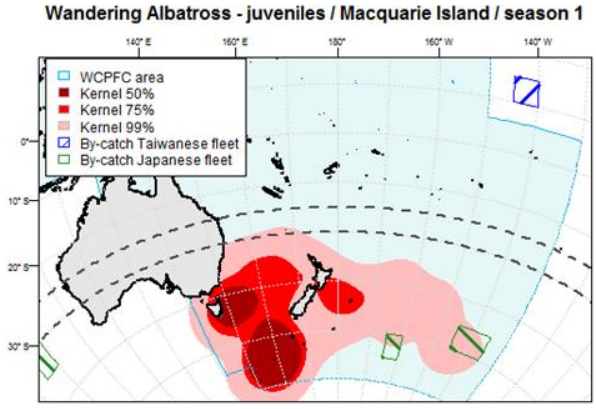
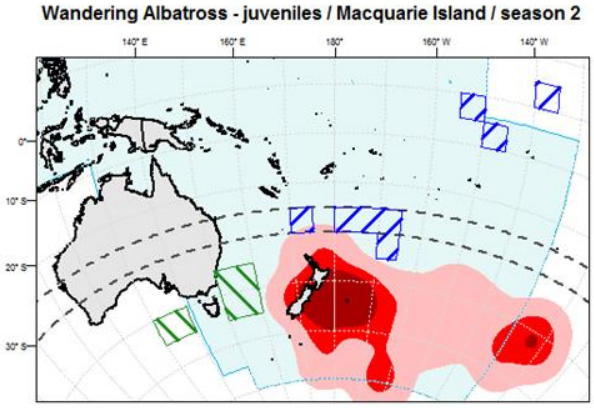
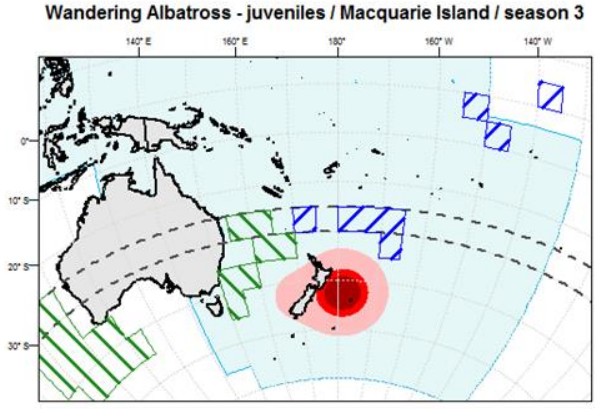


Figure 4a) Wandering Albatross from Macquarie Island, Australia (ca.0.1% of the world population; ACAP 2014). Blue 5X5 squares indicate bycatch reported in Huang and Yeh 2011; Green 5X5 squares indicate bycatch reported in Inoue *et al* 2011









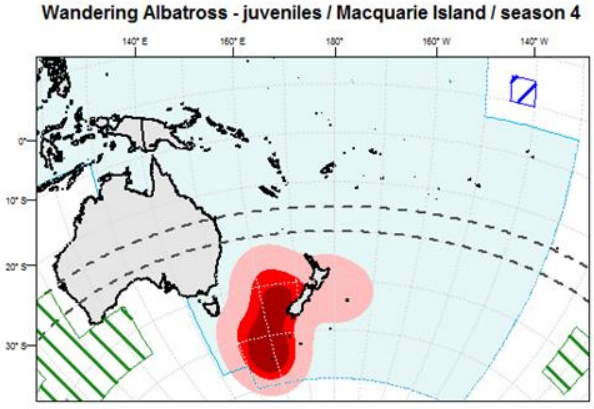
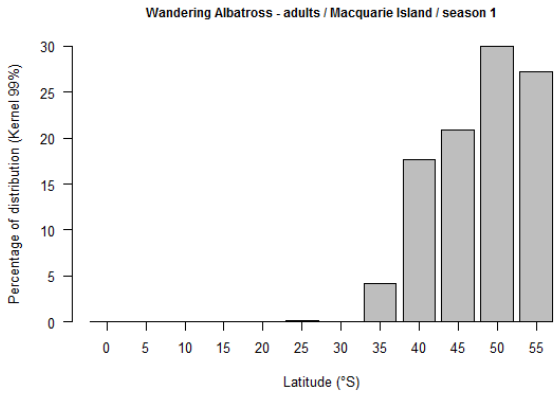
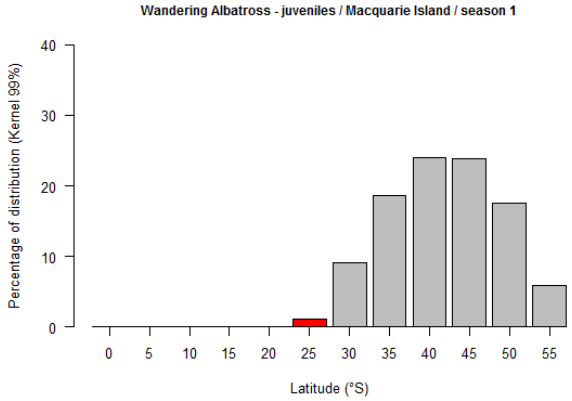
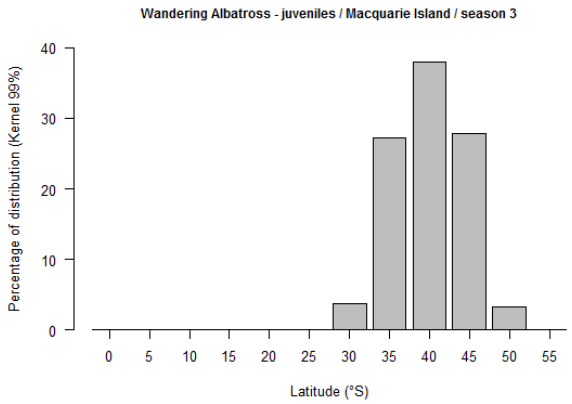


Figure 4b) Wandering Albatross from Macquarie Island - percentage distribution across latitudinal bands







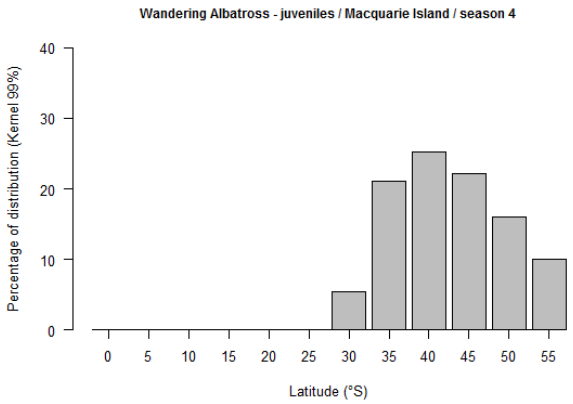


Figure 5a) Black-browed Albatross from Macquarie Island, Australia (ca.0.006% of the world population; ACAP 2014). Blue 5X5 squares indicate bycatch reported in Huang and Yeh 2011; Green 5X5 squares indicate bycatch reported in Inoue *et al* 2011

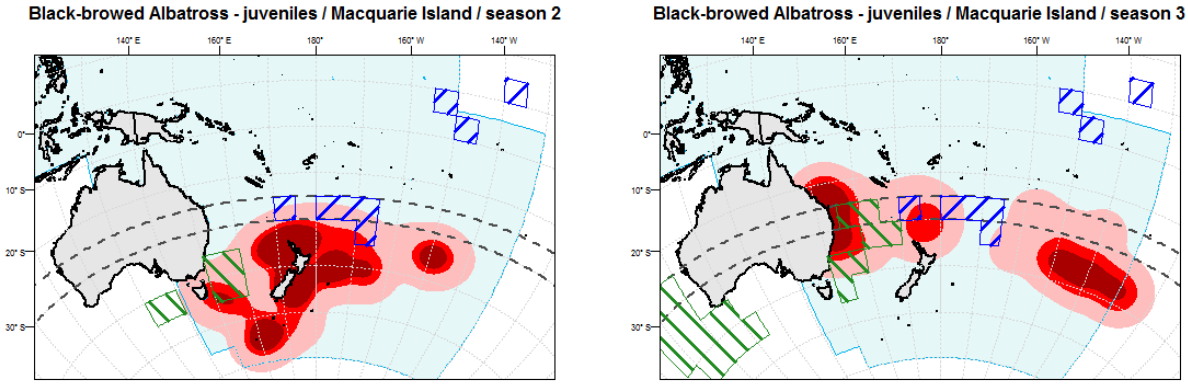


Figure 5b) Black-browed Albatross from Macquarie Island - percentage distribution across latitudinal bands

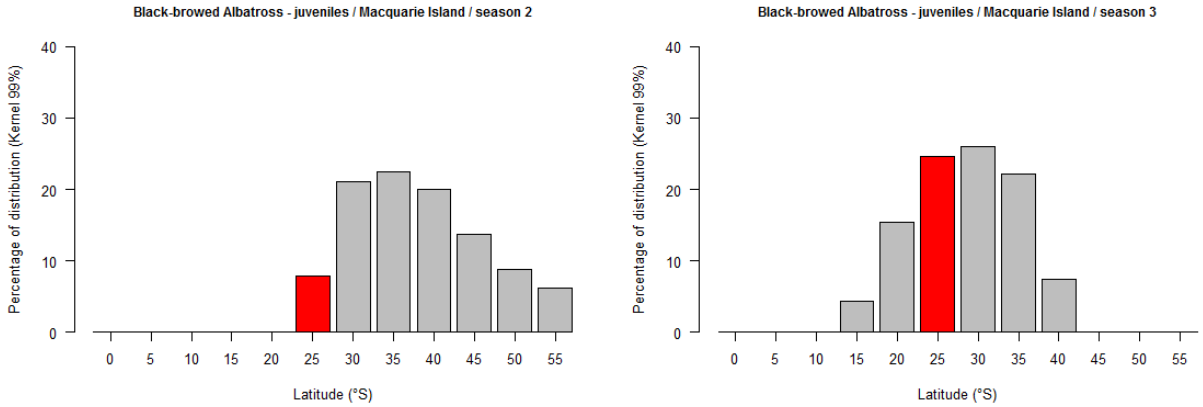


Figure 6a) White capped Albatross from Disappointment Island, New Zealand (ca.96% of the world population; ACAP 2014) Blue 5X5 squares indicate bycatch reported in Huang and Yeh 2011; Green 5X5 squares indicate bycatch reported in Inoue *et al* 2011

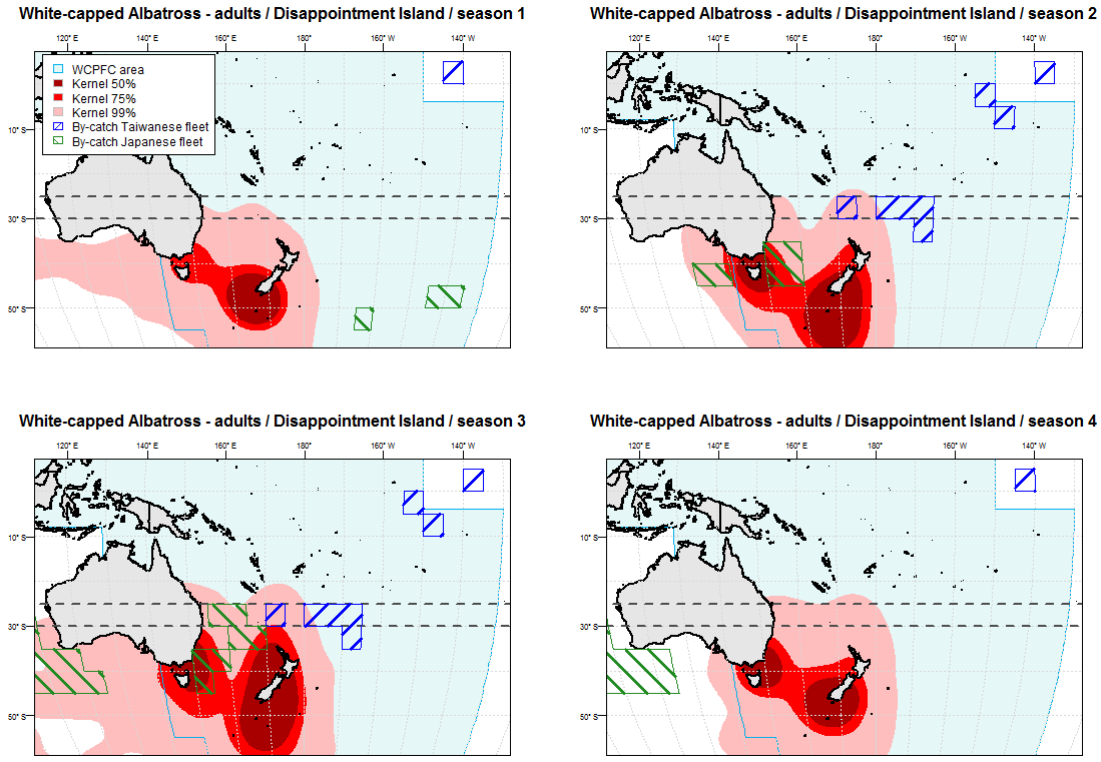


Figure 6b) White capped Albatross from Disappointment Island - percentage distribution across latitudinal bands

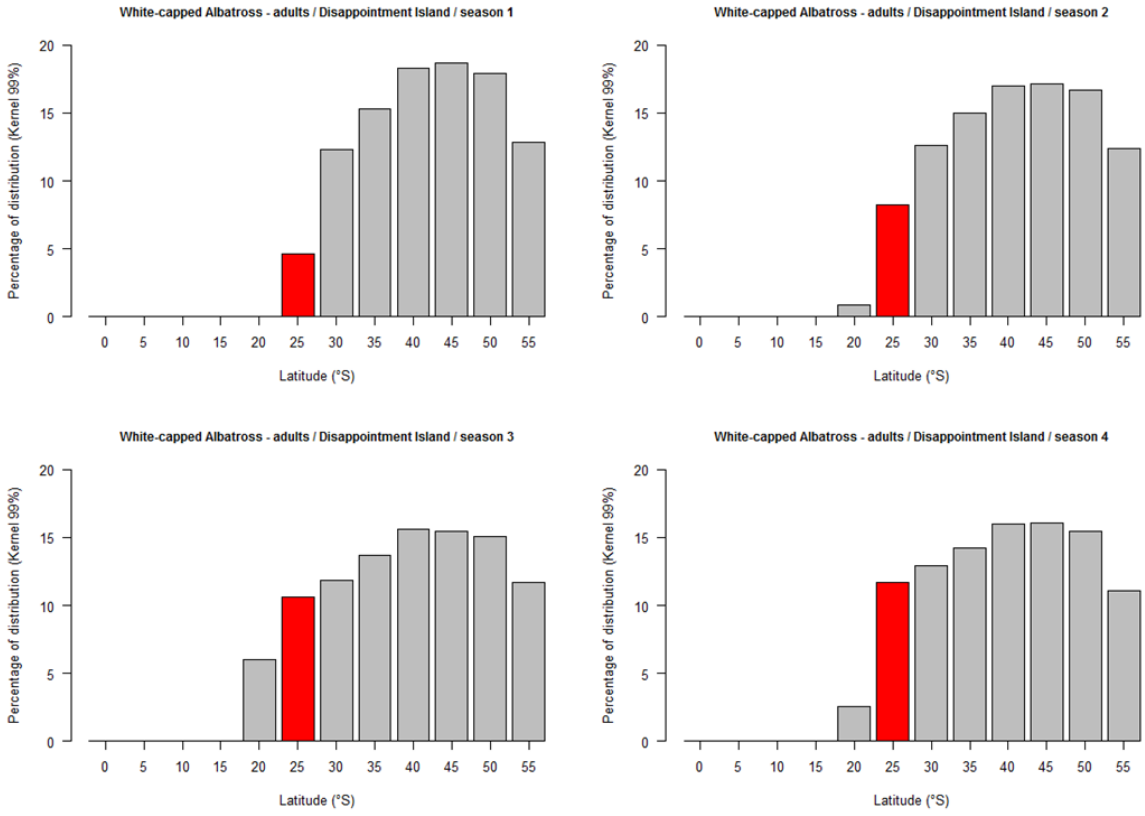


Figure 7a) White chinned Petrel from Antipodes Islands, New Zealand (5-10% of the world population; ACAP 2014) Blue 5X5 squares indicate bycatch reported in Huang and Yeh 2011; Green 5X5 squares indicate bycatch reported in Inoue *et al* 2011

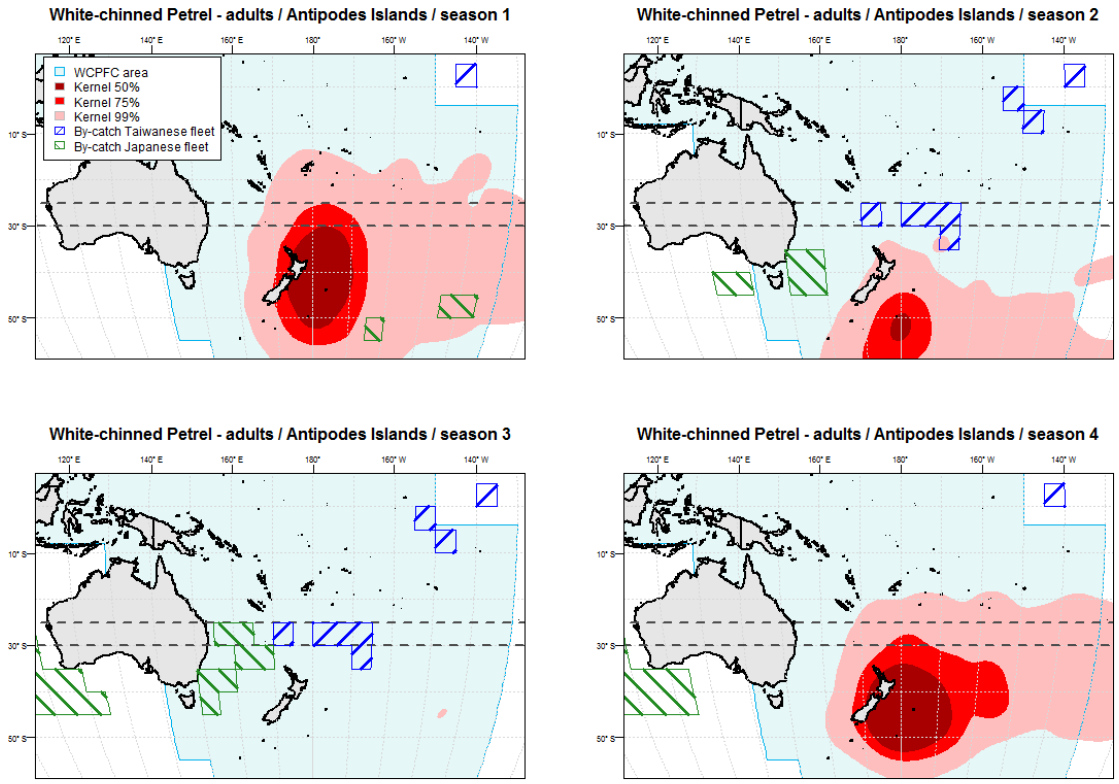


Figure 7b) White chinned Petrel from Antipodes Islands - percentage distribution across latitudinal bands

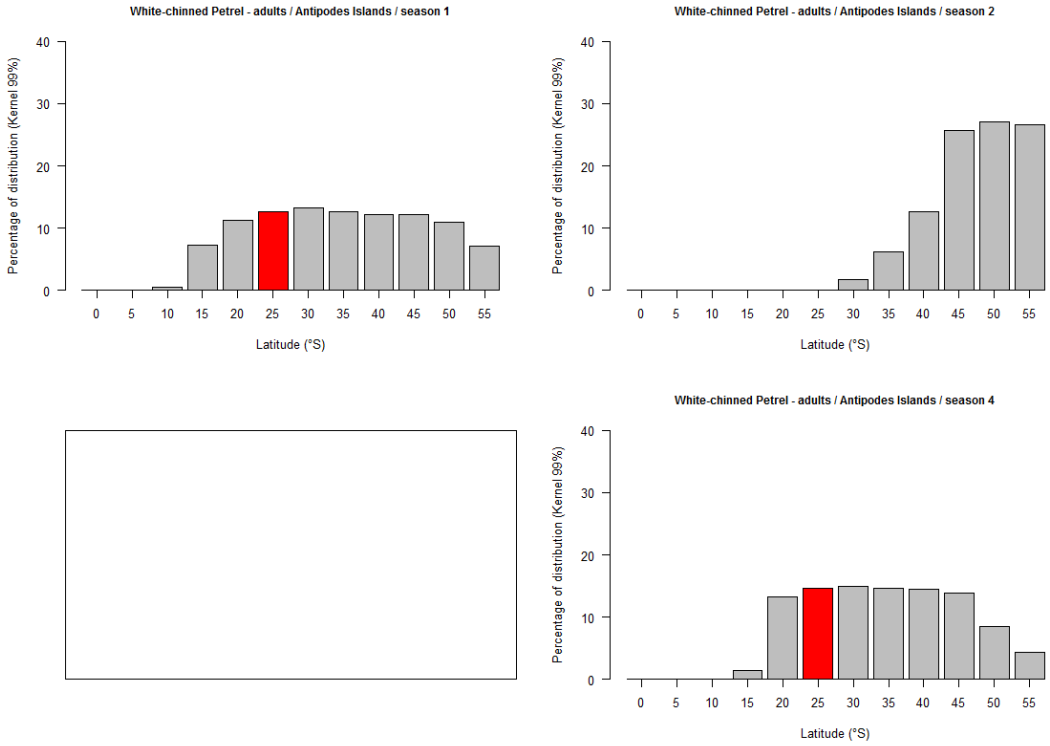


Figure 8a) Black Petrel from Great Barrier Island New Zealand (94% of the world population; ACAP 2014) Blue 5X5 squares indicate bycatch reported in Huang and Yeh 2011; Green 5X5 squares indicate bycatch reported in Inoue *et al* 2011

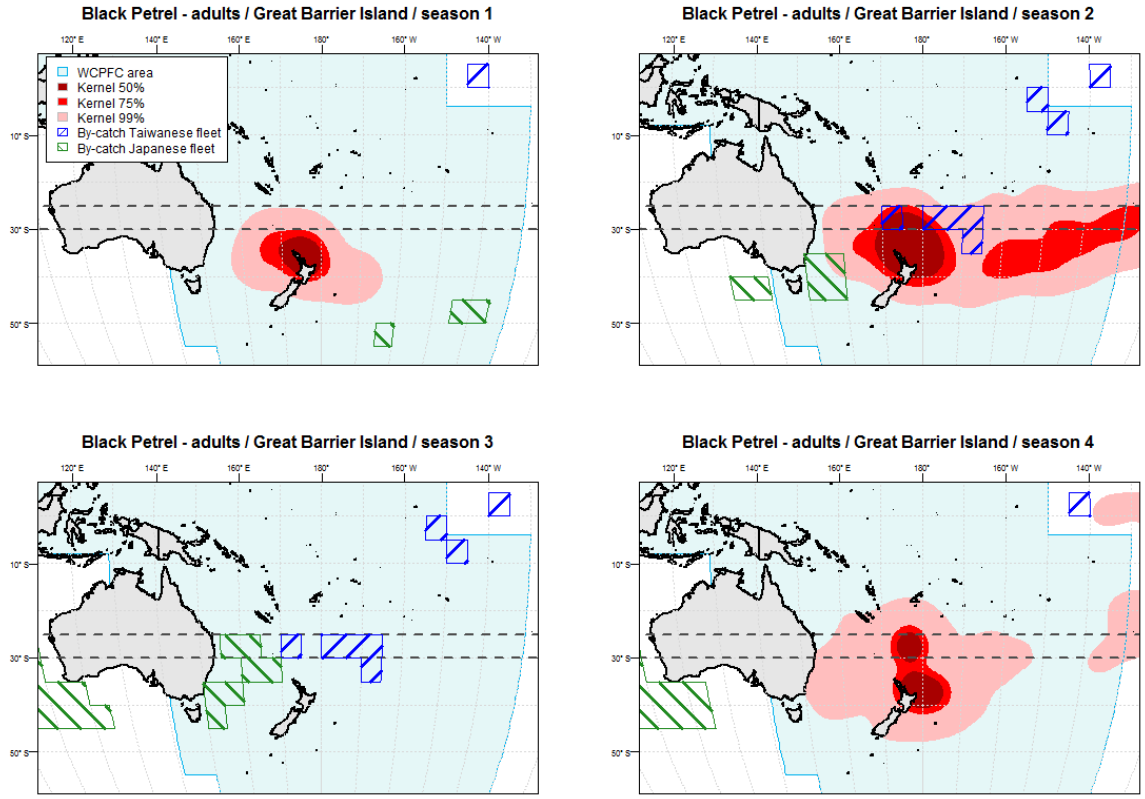


Figure 8b) Black Petrel from Great Barrier Island - percentage distribution across latitudinal bands

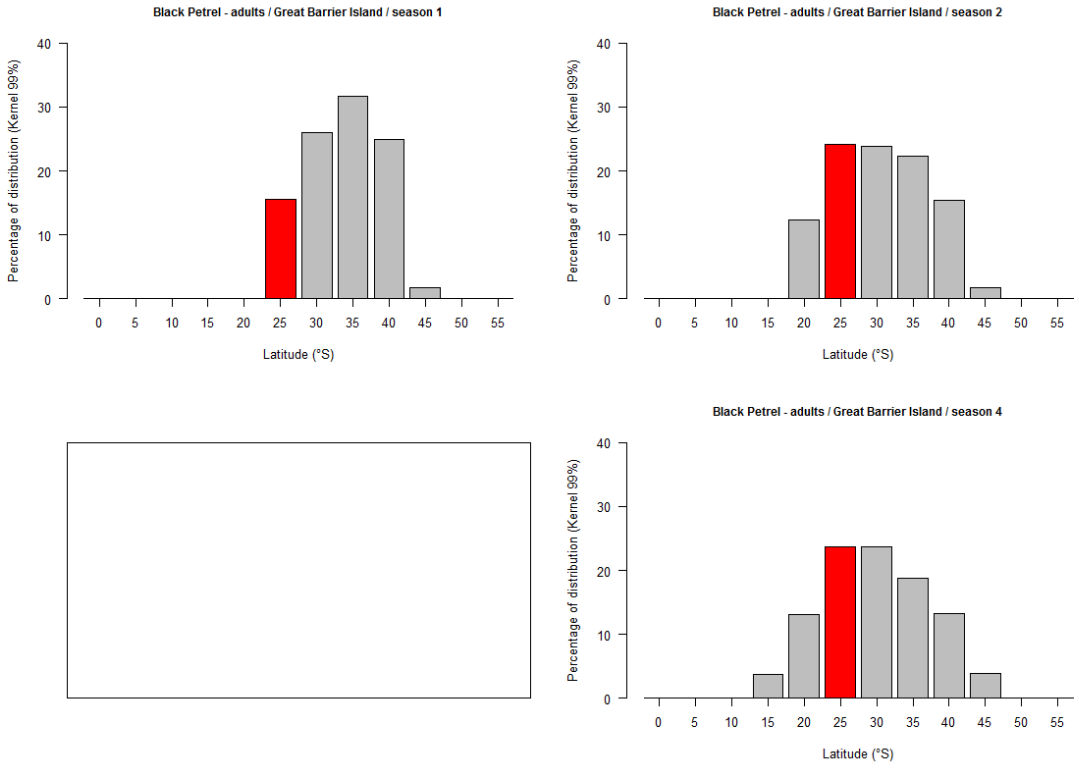


Figure 9a) Black Petrel from Little Barrier Island New Zealand (6% of the world population; ACAP 2014) Blue 5X5 squares indicate bycatch reported in Huang and Yeh 2011; Green 5X5 squares indicate bycatch reported in Inoue *et al* 2011

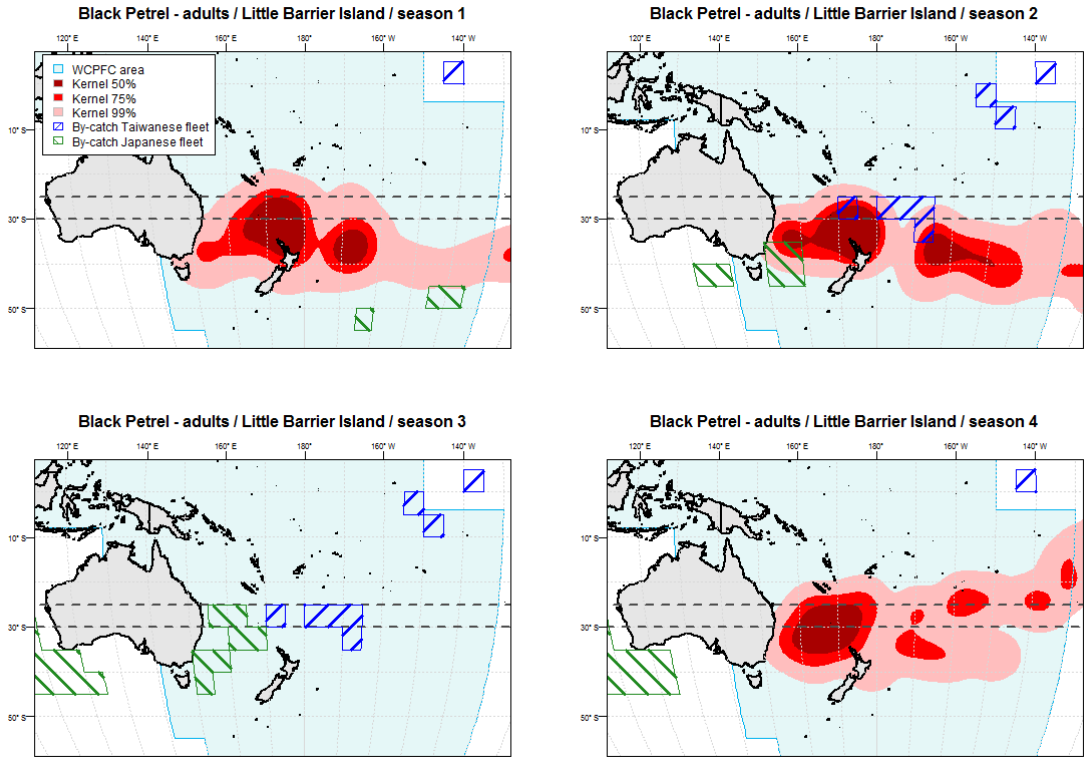


Figure 8b) Black Petrel from Great Barrier Island - percentage distribution across latitudinal bands