ANALYSIS OF ALBATROSS AND PETREL DISTRIBUTION WITHIN THE CCAMLR CONVENTION AREA: RESULTS FROM THE GLOBAL *PROCELLARIIFORM* TRACKING DATABASE

BirdLife International
(prepared by C. Small✉ and F. Taylor)
Wellbrook Court, Girton Road
Cambridge CB3 0NA
United Kingdom
Correspondence address:
BirdLife Global Seabird Programme
c/o Royal Society for the Protection of Birds
The Lodge, Sandy
Bedfordshire SG19 2DL
United Kingdom
Email – cleo.small@rspb.org.uk

Abstract

CCAMLR has implemented successful measures to reduce the incidental mortality of seabirds in most of the fisheries within its jurisdiction, and has done so through area-specific risk assessments linked to mandatory use of measures to reduce or eliminate incidental mortality, as well as through measures aimed at reducing illegal, unreported and unregulated (IUU) fishing. This paper presents an analysis of the distribution of albatrosses and petrels in the CCAMLR Convention Area to inform the CCAMLR risk-assessment process. Albatross and petrel distribution is analysed in terms of its division into FAO areas, subareas, divisions and subdivisions, based on remote-tracking data contributed to the Global *Procellariiform* Tracking Database by multiple data holders. The results highlight the importance of the Convention Area, particularly for breeding populations of wandering, grey-headed, light-mantled, black-browed and sooty albatross, and populations of northern and southern giant petrel, white-chinned petrel and short-tailed shearwater. Overall, the subareas with the highest proportion of albatross and petrel breeding distribution were Subareas 48.3 and 58.6, adjacent to the southwest Atlantic Ocean and southwest Indian Ocean, but albatross and petrel breeding ranges extend across the majority of the Convention Area. Subareas with the lowest proportion of breeding distribution were Subareas 88.2 and 88.3. The distribution data also emphasise the importance for breeding albatrosses and petrels of regions north of the CCAMLR boundaries, particularly including areas managed by CCSBT, ICCAT, IOTC and WCPFC. Priority gaps in current tracking data are identified, especially relating to studies of non-breeding distribution. These data will be essential for comprehensive assessment of risks of incidental mortality for albatrosses and petrels foraging in the Convention Area.

Résumé

La CCAMLR a mis en œuvre avec succès des mesures visant à réduire la mortalité accidentelle d'oiseaux de mer dans la plupart des pêcheries relevant de sa juridiction. Elle y est parvenue en associant l'évaluation des risques par secteur à l'application obligatoire de mesures tendant à atténuer ou éliminer la mortalité accidentelle et en mettant en place des mesures visant à enrayer la pêche illicite, non déclarée et non réglementée (INN). Ce document présente une analyse de la répartition des albatros et des pétrels dans la zone de la Convention CCAMLR destinée à alimenter le processus d'évaluation des risques mis en œuvre par la CCAMLR. Cette analyse, qui est fonction de la division en zones, sous-zones, divisions et subdivisions de la FAO, repose sur les données de télédétection que nombre de détenteurs de données ont fournies à la base de données globale de suivi des *Procellariiformes*. Les résultats soulignent l'importance de la zone de la Convention, notamment pour les populations reproductrices de grands albatros et d'albatros à tête grise, à dos clair, à sourcils noirs ou fuligineux à dos sombre et les populations de pétrels géants antarctiques ou subantarctiques, de pétrels à menton blanc et de puffins à queue courte. Dans l'ensemble, la plus grande part de la répartition des reproducteurs d'albatros et de pétrels concerne les sous-zones 48.3 et 58.6 adjacentes aux secteurs sud-ouest de l'océan Atlantique et de l'océan Indien, mais l'aire de reproduction des albatros et des pétrels s'étend pratiquement à l'ensemble de la zone de la Convention. Les sous-zones 88.2 et 88.3 sont celles où cette proportion est la plus faible. Les données de répartition mettent également en valeur l'importance, pour les albatros et les pétrels reproducteurs, des régions

au nord des limites de la CCAMLR, notamment dans les secteurs gérés par la CCSBT, la CICTA, la CTOI et la WCPFC. Les données manquantes dans les données actuelles de suivi qu'il convient de se procurer en priorité sont identifiées, plus particulièrement celles liées à l'étude de la répartition des non-reproducteurs. Ces données seront essentielles pour une évaluation complète des risques de mortalité accidentelle encourus par les albatros et les pétrels qui recherchent leur nourriture dans la zone de la Convention.

Резюме

АНТКОМ ввел действенные меры по сокращению побочной смертности морских птиц в ходе большинства промыслов, находящихся под его юрисдикцией, и сделал это путем оценок риска по районам вместе с обязательным использованием мер по сокращению или устранению побочной смертности, а также при помощи мер, направленных на сокращение незаконного, незарегистрированного и нерегулируемого (ННН) промысла. В данном документе анализируется распространение альбатросов и буревестников в зоне действия Конвенции АНТКОМ с целью предоставить информацию для проведения АНТКОМом оценок риска. Распространение альбатросов и буревестников анализируется в плане его разделения на районы, подрайоны, участки и подучастки ФАО на основе данных дистанционного наблюдения, представленных различными держателями данных во всемирную базу данных наблюдения за *Procellariiform*. Результаты свидетельствуют о важном значении зоны действия Конвенции, особенно для размножающихся популяций странствующих, сероголовых, светлоспинных, чернобровых и дымчатых альбатросов, а также популяций северных и южных гигантских буревестников, белогорлых и тонкоклювых буревестников. В целом, районами с наиболее высокой долей распространения размножающихся альбатросов и буревестников являются подрайоны 48.3 и 58.6, примыкающие к юго-западной части Атлантического и Индийского океанов, однако, ареал размножения альбатросов и буревестников простирается на бóльшую часть зоны действия Конвенции. Районами с самой низкой долей распространения размножающихся птиц являются подрайоны 88.2 и 88.3. Данные о распространении также указывают на важное значение для размножающихся альбатросов и буревестников районов к северу от границ АНТКОМа, в частности, районов, управляемых CCSBT, ИККАТ, IOTC и WCPFC. Выявлены пробелы в имеющихся данных наблюдения, требующих первоочередного внимания, особенно в том, что касается изучения распространения неразмножающихся птиц. Эти данные необходимы для всесторонней оценки риска побочной смертности альбатросов и буревестников, добывающих корм в зоне действия Конвенции.

Resumen

La CCRVMA ha implementado medidas efectivas para reducir la mortalidad incidental de aves marinas en la mayoría de las pesquerías que se llevan a cabo bajo su jurisdicción, basándose en evaluaciones del riesgo para cada área y en la obligación de cumplir con medidas dirigidas a la prevención o eliminación de la mortalidad incidental y de la pesca ilegal, no declarada y no reglamentada (INDNR). Este estudio analiza la distribución de albatros y petreles en el Área de la Convención de la CCRVMA para contribuir al proceso de evaluación del riesgo llevado a cabo por esta organización. Se examinó la distribución de albatros y petreles en relación con las áreas, subáreas, divisiones y subdivisiones de la FAO, a partir de los datos de seguimiento por satélite presentados por muchos contribuyentes a la Base Global de Datos de Seguimiento de las Aves *Procellariiformes*. Los resultados subrayan la importancia del Área de la Convención, particularmente para las poblaciones reproductoras del albatros errante, el albatros de cabeza gris, el albatros de manto claro, el albatros de ceja negra y el albatros oscuro; y las poblaciones del petrel gigante subantártico, el petrel gigante antártico, el petrel de mentón blanco y el petrel australiano. En general, las subáreas con la mayor proporción de poblaciones reproductoras de albatros y petreles fueron las Subáreas 48.3 y 58.6, adyacentes al área suroeste del Océano Atlántico y del Océano Índico; aunque las áreas donde se reproducen los albatros y petreles abarcan la mayor parte del Área de la Convención. Las subáreas con la menor proporción de poblaciones reproductoras fueron las Subáreas 88.2 y 88.3. Los datos sobre la distribución de poblaciones reproductoras también subrayan la importancia de las áreas al norte del área de la CCRVMA para estas poblaciones de albatros y petreles, en particular, las áreas bajo la jurisdicción de CCSBT, ICCAT, IOTC y WCPFC. Se identificaron las deficiencias principales de los datos actuales de seguimiento, en particular la información sobre la distribución de

las poblaciones de aves no reproductoras. Estos datos serán imprescindibles para realizar una evaluación exhaustiva del riesgo de mortalidad incidental para los albatros y petreles que se alimentan en el Área de la Convención.

Keywords: seabirds, albatross, petrel, distribution, satellite tracking, CCAMLR

Introduction

The status and trends in albatross breeding populations are well documented, with 19 of 21 species now globally threatened and the remainder near-threatened (IUCN, 2004; BirdLife International, 2004a). Many petrel species are also under global threat of extinction. Although albatross and petrel species face a number of threats at their breeding sites, the principal threat to many species is from interaction with fisheries (Robertson and Gales, 1998; Croxall et al., 1998; Baker et al., 2002), notably the many thousands of birds killed annually by longline fishing (Brothers, 1991; Cherel et al., 1996; Schiavini et al., 1998; Nel et al., 2002; Favero et al., 2003; Delord et al., 2005).

Solutions to this increased mortality require accurate knowledge of the distributions of albatrosses and petrels throughout their annual and life cycles. Such data are also invaluable for understanding many aspects of the ecology and demography of these species and their role in the functioning of marine systems – including their potential susceptibility to changes in these.

In terms of studies aimed at revealing their at-sea distribution, albatrosses and petrels are not only the object of at-sea observation data (e.g. White et al., 2001; Woehler et al., 1999), but are also among the most studied of all marine species in terms of remote-tracking data (e.g. Weimerskirch et al., 1993; Nicholls et al., 1995; Freeman et al., 1997; Prince et al., 1998; Weimerskirch et al., 1999; Huin, 2002; González-Solís et al., 2000a; Hyrenbach et al., 2002; Nicholls et al., 2002; Croxall and Wood, 2002; Phillips et al., 2004a). Recognising the substantial potential of these remote-tracking data for conservation applications, BirdLife International convened an evaluation workshop in South Africa in 2003, which resulted in the establishment of the Global *Procellariiform* Tracking Database through contribution of tracking data by multiple data holders. The results of an analysis of this database have been published in *Tracking Ocean Wanderers* (BirdLife International, 2004b). The contributors of the data used in the analyses for this paper are listed in the Acknowledgements.

At the 2004 meeting of CCAMLR's ad hoc Working Group on Incidental Mortality Associated with Fishing (WG-IMAF), CCAMLR requested that BirdLife International use the database to determine the proportion of time that southern hemisphere albatross and petrel species spend in each part of the CCAMLR Convention Area. This paper is the product of such an analysis, with the benefit of new data that have been added to the database since the report 'Tracking Ocean Wanderers' was published.

Methods

Over 90% of existing albatross and petrel remote-tracking data have been submitted to the Global *Procellariiform* Tracking Database, representing 15 of the 17 southern hemisphere species of albatross, both species of giant petrel, and white-chinned and Westland petrel (Table 1). Tracking data for short-tailed shearwater are now also incorporated in the database and are presented in this paper. Species names used in the text are listed in Appendix 1.

The satellite-tracking (PTT) data were processed using standardised methods agreed among the data holders. Datapoints were first validated using a filter based on that used by McConnell et al. (1992), which calculated the bird's velocity between each pair of uplinks. If the velocity was over the maximum velocity vMax (vMax set at 100 $km.hr^{-1}$ for all species), and an alternative latitude and longitude was provided, the filter substituted the alternative point. In an iterative process, the filter then removed the point with the highest velocity over vMax, although a point was not removed if it had location class 1, 2, or 3 because these locations have an accuracy of up to 1 km (ARGOS, 1989, 1996). The velocities for the four points adjacent to the removed point were then recalculated and the process repeated, until no low quality point had a velocity above vMax (BirdLife International, 2004b).

In order to convert the PTT tracking data into density distributions, the assumption was made that birds travelled at constant speed and in a straight line between each pair of uplinks. The path of the bird was then resampled at hourly intervals. If the interval between two uplinks was more than 24 hours, no resampling was conducted between these points. Bird tracks were grouped into datasets that represented unique combinations of species/colony/breeding status/breeding stage/sex, as far as data availability allowed. Kernels were

derived from these datasets using the kernel function in ArcGIS 8.2, with a smoothing (*h*) parameter of 1° and a grid size of 0.1°. The most important step when deriving kernels is the selection of the smoothing parameter (Nicholls et al., 2005). A smoothing factor of 1° was selected on the basis that this was likely to be the smallest practical unit for management on the high seas. As datapoints were not separated into 'commuting' or 'foraging' points, it is recognised that not all areas used by the albatrosses and petrels will be areas of foraging. However, these areas still represent areas where there is potential interaction with fisheries.

Data holders submitted Geolocator (GLS) data to the database in a processed form, since the variety of geolocators available made it unrealistic to develop a standardised validation routine for GLS data. GLS data did not require resampling since the locations are available from tracked birds at approximately 12-hour intervals. Kernel density-distribution maps were generated as above, but with a smoothing parameter *h* of 2°, which was the nominal resolution of the GLS data, and a cell size of 0.5°.

Remote-tracking data exist for the estimation of distribution during the breeding season for all 20 albatross, petrel and shearwater species listed in Table 1. However, the database contains fewer non-breeding data (data for only eight species). In addition, many of these non-breeding data are tracks of failed breeders and of post-breeding migration, and many gaps remain, particularly for the distribution of juveniles and the distribution of adults during the non-breeding period. For this reason, this paper restricts itself predominantly to the assessment of the distribution of breeding birds.

Even with breeding distribution data, data are not available for all colonies of all species (Table 1), and in some cases sample sizes are small. Assessment of the effect of sample size on kernel estimation indicates that the reliability of the estimated kernel distributions increases asymptotically with sample size, and the rate at which the asymptote is reached varies between species (BirdLife International, 2004b). Care needs to be taken when interpreting kernel distributions where data is missing from some colonies (Table 1, and indicated on maps), and where sample sizes are small. Ideally, analysis would be based on at least 10–15 tracks for each breeding stage, and preferably each sex, before results would be considered to approach reliability, though the effect of sample size varies between species (BirdLife International, 2004b). Shearwater tracking data are from two colonies, together representing <1% of the population of this species, and for this reason short-tailed shearwater data are not used in the calculations of combined albatross and petrel distribution across CCAMLR areas, but are presented separately. Distribution of albatrosses and petrels has also been identified as varying between years, though analysis suggests that while differences do exist, they are not as substantial as other factors, such as breeding stage (Weimerskirch et al., 1993; Prince et al., 1998; Weimerskirch, 2004; Phillips et al., 2004a).

The foraging ranges and distributions of albatrosses vary depending on stage of the breeding season, sex and colony. For each species, overall breeding distribution was calculated by weighting each dataset by the number of individuals at sea for that particular combination of colony/breeding status/breeding stage/sex. Density distributions for each species were standardised to allow addition across species to create multi-species maps. Population sizes of albatross species vary greatly: there are over 500 000 annual breeding pairs of black-browed albatross, whereas Amsterdam albatross and short-tailed shearwater number less than 1 000 annual breeding pairs (BirdLife International, 2004a). For this reason, the multi-species maps were calculated with all species weighted equally, to avoid domination of the maps by the few species with large populations. The density distributions are represented on maps by the 50, 75 and 95% utilisation distributions. A utilisation distribution is a probability contour that indicates areas within which birds spend 50, 75 and 95% of their time. For further details on methods for data validation and derivation of density distributions, see *Tracking Ocean Wanderers* (BirdLife International, 2004b).

Distribution within the CCAMLR Convention Area was assessed by overlaying the albatross and petrel distributions with a map of the area, supplied by the CCAMLR Secretariat. An attempt was also made to analyse albatross and petrel distribution separately for the CCAMLR open and closed fishing periods that apply to Subarea 48.3 (open 1 May–31 August, closed 1 September–30 April). Assessment of bird distribution during these periods was made across the whole of the Convention Area, although the fishing seasons apply to a restricted area only.

Results

Breeding distributions

The breeding distributions of albatrosses and petrels within the CCAMLR Convention Area, in relation to FAO areas, subareas, divisions

and subdivisions, are summarised in Table 2. Table 3 presents the data for each species in relation to breeding location.

Of the 15 albatross species considered in this paper, the breeding distributions of eight species overlap with the Convention Area, as do the distributions of both giant petrels, white-chinned petrels and short-tailed shearwaters. Overall, the CCAMLR subareas with the highest proportion of albatross and petrel distribution were Subarea 48.3 in the southwest Atlantic Ocean and Subarea 58.6 in the southwest Indian Ocean (Table 2), but albatross and petrel ranges extend across the majority of the Convention Area (Figure 1). The combined breeding distribution of the 19 albatross and petrel species also indicates the importance of oceanic areas to the north of the CCAMLR boundaries (Figure 1).

Wandering albatrosses have been tracked from all their breeding sites, with the exception of Macquarie Island where the population is extremely small, and it can be seen that the breeding distributions for wandering albatross from all sites have a high degree of overlap with the Convention Area and adjacent areas of the South Atlantic and south Indian Ocean (Figure 2, Table 3). Other albatross populations which have breeding distributions with a high degree of overlap with the Convention Area are those of the grey-headed albatross (especially populations from South Georgia, also Prince Edward Islands and Chile) (Figure 3); black-browed albatross from the Kerguelen Islands and South Georgia (Figure 4); light-mantled albatross from South Georgia and Macquarie Island (i.e. both sites for which there are tracking data) (Figure 5), and sooty albatross from the Crozet Islands (Figure 6). The Campbell albatross also has some overlap with the Convention Area, amounting to around one fifth of its at-sea distribution during the breeding season (Figure 7).

The Convention Area is also important for petrel species, including the breeding distributions of northern and southern giant petrels from South Georgia (Figures 8 and 9), as well as those of white-chinned petrels from South Georgia and Crozet Islands (Figure 10). The distribution of short-tailed shearwaters from Montague Island and French Island (Figure 11) represent only a small proportion of the global short-tailed shearwater population, but indicates the extensive foraging of this species in Antarctic waters, particularly in Subarea 88.1 and Division 58.4.1. Figures 2 to 9 also indicate the sites for each species for which there are no breeding distribution tracking data.

The breeding distribution of Indian yellow-nosed albatrosses from Amsterdam Island has a low degree of overlap with the Convention Area. However, as indicated in Figure 11 and Table 1, tracking data are not yet available for this species from the Crozet Islands or the Prince Edward Islands.

Species for which the breeding distribution has very little (<1%) or no overlap with the Convention Area include Amsterdam, Antipodean, Buller's, Chatham, northern royal, southern royal and Tristan albatrosses and Westland petrel. Subareas 88.2 and 88.3, whose northern boundaries are 60ºS and which contain no breeding sites, contain a low proportion of albatross and petrel breeding distribution, and have little overlap with available non-breeding data on northern royal, grey-headed and wandering albatrosses.

Non-breeding distributions

The northern royal albatross was the only species for which sufficient data exists in the database to calculate a reliable non-breeding density distribution. In total, only 0.2% of the non-breeding distribution of northern royal albatrosses overlapped with the Convention Area. Broken down into populations, 0.3% of the distribution of non-breeding birds tracked from the Chatham Islands was in Subarea 48.1, while 0.1% of the distribution of non-breeding birds from Taiaroa Head was in Subarea 48.3.

Non-breeding data exist for other species, including Buller's, Chatham, grey-headed and black-browed albatrosses and white-chinned petrels. Distribution maps and discussion of these data are presented in Section 3.3 in *Tracking Ocean Wanderers* (BirdLife International, 2004b). Initial analysis of non-breeding distribution data for grey-headed albatross in particular indicate that their non-breeding distribution overlaps partially with the Convention Area (Figure 12). However, for these species, data collection and analysis is still ongoing and, for this reason, their proportionate distribution across the Convention Area has not yet been analysed. Nevertheless, the volume of data currently being collected indicates that this will be possible in the near future.

Albatross and petrel distribution during the CCAMLR open and closed fishing seasons

Albatross and petrel distribution was also analysed within the Convention Area in relation

to distribution during the open and closed fishing seasons (these apply mainly to fishing within Subarea 48.3 around South Georgia).

For the majority of species, however, available tracking data correspond only to the closed period (Table 4), meaning that results from such an analysis duplicate those provided in the section above on breeding distribution. However there were sufficient data available to analyse the distribution of northern royal and wandering albatrosses by open and closed fishing season. For the northern royal albatross, the overlap was very low, as indicated in the section above. For the wandering albatross, results indicate a broad breeding distribution across the Convention Area during both the open and closed periods (Table 5). Distribution patterns are similar for both periods, although wandering albatrosses from South Georgia spend a higher proportion of their time in Subarea 48.3 during the closed season (52%), compared to the open season (32%), as expected in relation to foraging distribution close to breeding sites during early stages of the breeding season.

Discussion

The analysis presented in this paper represents a synthesis of a vast body of research that has been conducted by scientists world-wide, who have undertaken detailed analyses of albatross and petrel remote-tracking data in the southern hemisphere, including assessment of variation between breeding stages (e.g. Weimerskirch et al., 1993; Prince et al., 1998; Huin, 2002; Cuthbert et al., 2004) and sexes (e.g. Weimerskirch et al., 1997; González-Solís et al., 2000a, 2000b; Stahl and Sagar, 2000; Phillips et al., 2004a), interannual variation (e.g. Catry et al., 2004; Weimerskirch, 2004), relationships to oceanographic factors (e.g. Prince et al., 1998; Wood et al., 2000; Xavier et al., 2003; Phillips et al., 2006), and overlap with fisheries (e.g. Cherel et al., 1996; Brothers et al., 1998; Prince et al., 1998; Weimerskirch, 1998; Freeman et al., 2001; Robertson et al., 2003). Collaboration between these scientists in creating the Global *Procellariiform* Tracking Database has made possible the multi-species analysis of the global distribution of albatrosses and petrels, such as the analysis of distribution within the Convention Area presented in this paper.

Limitations of the analysis

The Global *Procellariiform* Tracking Database includes over 90% of existing tracking data for albatross and petrel species. However, key data gaps remain for some species and sites, which influence overall estimates of albatross and petrel distribution in the Convention Area (Table 1). Data gaps that are particularly relevant in relation to improving knowledge of albatross and petrel distribution within the Convention Area are likely to be data for sooty albatrosses from the Crozet Islands; for grey-headed and light-mantled sooty albatrosses from the Crozet and Kerguelen Islands; and for Indian yellow-nosed albatross from the Crozet and Prince Edward Islands, given that their breeding sites are located within the Convention Area itself. In addition, key data gaps remain for northern and southern giant petrels and the white-chinned petrel, as indicated in Table 1, particularly for sites located within the Convention Area, such as the Prince Edward Islands, Kerguelen Islands, Crozet Islands, Heard and McDonald Islands and South Orkney (see also SC-CAMLR, 2005). As well as gaps in breeding distribution, data on non-breeding distributions are lacking for the majority of species. A full understanding of non-breeding distribution requires data from a number of life-cycle stages (e.g. post-fledging chicks, juveniles, failed breeders, post-breeding migration, inter-breeding period), all of which may have different distributions, with differing degrees of overlap with different fisheries. Small sample sizes will also affect the estimation of kernel density distributions for some species (BirdLife International, 2004b), and must be borne in mind when interpreting the hotspots identified in this analysis.

Seabird at-sea survey data are also an extensive resource of seabird distribution data within the Convention Area and can be used to fill knowledge gaps where remote-tracking data are lacking. For example, the distribution of the short-tailed shearwater in sub-Antarctic and Antarctic waters during the breeding season and post-breeding dispersal (Figure 10), which is based on a small sample size, is supported by at-sea records collected over a 19-year period from 1981 to 1999 (Woehler et al., 1999). In addition, remote-tracking data are currently lacking for the white-chinned petrel and northern and southern giant petrels within CCAMLR areas adjacent to the southern Indian Ocean, but at-sea data confirm that they utilise these waters (Woehler et al., 1990, 1999). In contrast to remote-tracking data, at-sea data lack information on the origin and status (breeder, migrant, non-breeder) of the birds observed. However, there is a real need to investigate the feasibility of combining remote-tracking and at-sea datasets, and this is one of the long-term objectives of the Global *Procellariiform* Tracking Database (BirdLife International, 2004b).

Importance of the CCAMLR Convention Area

The results highlight the importance of the Convention Area, particularly for wandering and grey-headed albatross, and for populations of light-mantled, black-browed and sooty albatrosses, northern and southern giant petrels and the white-chinned petrel. The available tracking data for the short-tailed shearwater are from colonies representing a small proportion of the total population, but the available data emphasise the importance of Antarctic waters for breeding short-tailed shearwaters during the breeding season (Klomp and Schultz, 2000).

Differences between species in the degree of overlap between their breeding distribution and the Convention Area reflect breeding site location, variation in foraging strategies and habitat preferences, which lead to a level of spatial segregation at sea. For example, black-browed albatrosses from Patagonia and the Indian Ocean tend to forage in areas of continental shelf and shelf break (Weimerskirch et al., 1997; Robertson et al., 2000; Huin, 2002), as does the closely related Campbell albatross (Waugh et al., 1999), and the different populations also exhibit largely mutually exclusive foraging ranges during the breeding season (Phillips et al., 2004b). In this analysis, the distribution of black-browed albatross breeding at sites within the Convention Area (South Georgia, Kerguelen Islands) overlapped substantially with the Convention Area, whereas the distributions of black-browed albatrosses breeding at sites outside the Convention Area (Falkland/Malvinas Islands, Chile and Macquarie Island) showed a low degree of overlap.

In comparison, wandering albatrosses have wide-ranging oceanic foraging habits and the foraging area covered by breeding populations is large (e.g. Prince et al., 1992; Nel et al., 2002; Nicholls et al., 2002) although, like other albatrosses, during part of the chick-rearing period they may spend considerable time in shelf waters close to their breeding grounds (Weimerskirch et al., 1993; Croxall and Prince, 1996). With widely dispersed breeding populations in the Atlantic and Indian Oceans, the overall breeding and wintering range of the wandering albatross covers a large proportion of the southern oceans (e.g. Prince et al., 1992; Weimerskirch et al., 1993; Nel et al., 2002; Nicholls et al., 2002), including areas both within and north of the Convention Area. The grey-headed albatross is also a wide-ranging highly pelagic species (Prince et al., 1998; Nel et al., 2001; Phillips et al., 2004a), whose breeding distributions have a high degree of overlap with the Convention Area.

The analysis has also indicated high overlap between the distributions of sooty and light-mantled albatross and the Convention Area, though many tracking data gaps remain for both species. For the light-mantled albatross, data are missing for six of the eight colonies, representing 63% of the breeding population. However, the light-mantled albatross is known to forage in high latitude sub-Antarctic and Antarctic waters (e.g. Tickell and Woods, 1972; Weimerskirch and Robertson, 1994), including Antarctic shelf areas distant from their breeding sites (Phillips et al., 2005). At-sea observations from the southern Indian Ocean corroborate the finding in this analysis of high overlap with the Convention Area, identifying high densities of light-mantled sooty albatross within the Convention Area south of the Crozet and Kerguelen Islands and the Prince Edward Islands (for which there are no tracking data), particularly between November and March (Woehler et al., 1990).

In contrast, for the sooty albatross, the high degree of overlap with the Convention Area identified from tracking data from the Crozet Islands population may not be replicated at the other breeding sites: sooty albatrosses are predominantly distributed in sub-tropical waters (Tickell, 2000), and remote-tracking data are currently lacking from the key breeding sites outside the Convention Area.

The results also emphasise the importance for albatrosses and petrels of the areas surrounding the Convention Area. These areas include fisheries that are managed by the Commission for the Conservation of Southern Bluefin Tuna (CCSBT), the International Commission for the Conservation of Atlantic Tunas (ICCAT), the Indian Ocean Tuna Commission (IOTC) and the Western and Central Pacific Fisheries Commission (WCPFC). While CCAMLR has established a comprehensive system of seabird by-catch mitigation measures and has effectively reduced seabird by-catch in its regulated fisheries, systems for by-catch data collection and seabird by-catch mitigation are much less advanced, or in many cases completely lacking, in other regional fisheries management organisations (RFMOs) (Small, 2005).

Conclusion

The results highlight the importance of the CCAMLR Convention Area, but also the importance for breeding albatrosses and petrels of oceanic areas north of the CCAMLR boundaries in regions managed by other RFMOs. The initiation of new tracking studies to fill remaining gaps, particularly in non-breeding distribution, is important for the knowledge of the distribution of albatrosses

and petrels within the Convention Area, and for the knowledge of potential susceptibility to fishery mortality in surrounding regions. Integration of the remote-tracking database with other datasets may be a challenging process, but is an issue which requires further exploration.

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Table 1: Remote-tracking data on southern hemisphere species of albatross and petrel held in the Global *Procellariiform* Tracking Database. * – new data added since the publication of *Tracking Ocean Wanderers*. Colony sizes from Arata et al., 2003; BirdLife International, 2004a; Cuthbert et al., 2004; Gales, 1998; Huin and Reid, 2005a, 2005b; Lawton et al., 2003; Patterson et al., in press; Poncet et al., 2006; Robertson et al., 2003; Tickell, 2000.

Species	Site	Annual no. breeding pairs	% global population	PTT datasets submitted to the Global *Procellariiform* Tracking Database (blank indicates no data)
Albatrosses				
Amsterdam	Amsterdam Island	17	100	Breeding
Antipodean	Antipodes Island	5 148	100	Failed migratory and non-breeding, resident
	Campbell Island	6	0	
Antipodean (Gibson's)	Auckland Islands	7 319	100	Breeding and non-breeding
Atlantic yellow-nosed	Gough Island	7 500	23	
	Tristan da Cunha Island	25 750	77	
Black-browed	Antipodes Island	115	0	
	Campbell Island	16	0	
	Chile	122 870	20	Breeding
	Falkland/Malvinas Islands	399 416	66	Breeding, failed migratory (single track), plus non-breeding geolocator data
	Heard and McDonald Islands	729	0	
	Crozet Islands	880	0	
	Kerguelen Islands	4 270	1	Breeding
	Macquarie Island	182	0	Breeding
	Snares Islands	1	0	
	South Georgia*	74 296	12	Breeding, failed migratory (single track), plus non-breeding geolocator data
Buller's	Chatham Island	18 150	58	
	Three Kings	20	0	
	Snares Islands	8 465	27	Breeding, failed and non-breeding resident and migratory, also juveniles
	Solander Islands	4 800	15	Breeding, failed migratory
Campbell	Campbell Island*	26 000	100	Breeding
Chatham	Chatham Island	4 000	100	Breeding, failed and non-breeding resident and migratory, also juveniles
Grey-headed	Campbell Island	6 400	7	Breeding
	Chile	16 408	18	Breeding, failed migratory (single track)
	Crozet Islands	5 940	6	
	Kerguelen Islands	7 905	9	
	Macquarie Island	84	0	Breeding
	Prince Edward Islands	7 717	8	Breeding
	South Georgia*	47 674	52	Breeding, failed migratory (single track), plus non-breeding geolocator data
Indian yellow-nosed	Amsterdam Island	25 000	70	Breeding
	St. Paul Island	12	0	
	Crozet Islands	4 430	12	
	Kerguelen Islands	50	0	
	Prince Edward Islands	6 000	17	

(continued)

Table 1 (continued)

Species	Site	Annual No. breeding pairs	% Global population	PTT datasets submitted to the Global *Procellariiform* Tracking Database (blank indicates no data)
Albatrosses (continued)				
Light-mantled	Antipodes Island	169	1	
	Auckland Islands	5 000	23	
	Campbell Island	1 600	7	
	Heard and McDonald Islands	350	2	
	Crozet Islands	2 421	11	
	Kerguelen Islands	4 000	18	
	Macquarie Island	2 000	9	Breeding
	Prince Edward Islands	241	1	
	South Georgia*	6 250	28	Breeding
Northern royal	Chatham Island	2 060	99	Breeding, failed migratory, non-breeding
	Taiaroa Head	18	1	Breeding, failed and non-breeding resident and migratory, also juveniles
Salvin's	Bounty Island	76 352	99	
	Crozet Islands	4	0	
	Snares Islands	587	1	
Shy	Antipodes Island	18	0	
	Auckland Islands	72 233	85	
	Chatham Island	1	0	
	Tasmania	12 250	14	Breeding, failed migratory, also juveniles
Sooty	Gough Island	5 000	38	
	Amsterdam Island	350	3	
	St. Paul Island	20	0	
	Crozet Islands	2 248	17	Breeding
	Kerguelen Islands	4	0	
	Prince Edward Islands	2 755	21	
	Tristan da Cunha Island	2 747	21	
Southern royal	Auckland Islands	72	1	
	Campbell Island	7 800	99	Breeding
Tristan	Gough Island	2400	100	Breeding
	Tristan da Cunha Island	3	0	
Wandering	Crozet Islands	2 062	28	Breeding, non-breeding migratory (single track)
	Kerguelen Islands	1 094	15	Breeding
	Macquarie Island	10	0	
	Prince Edward Islands	2 707	36	Breeding, failed migratory, non-breeding
	South Georgia	1 553	21	Breeding, failed migratory
	Unknown			Non-breeding, migratory

(continued)

Table 1 (continued)

Species	Site	Annual No. breeding pairs	% Global population	PTT datasets submitted to the Global *Procellariiform* Tracking Database (blank indicates no data)
Petrels				
Northern giant	Antipodes Island	300	3	
	Auckland Islands	100	1	
	Campbell Island	240	2	
	Chatham Island	2 150	19	
	Crozet Islands	1 060	9	
	Kerguelen Islands	1 400	12	
	Macquarie Island	1 110	10	
	Prince Edward Islands	540	5	
	South Georgia	4 310	38	Breeding
Southern giant	Antarctic Continent	290	0.5	
	Antarctic Peninsula	6 500	14	
	Argentina*	1 350	3	Breeding
	Chile	290	0.5	
	Falkland/Malvinas Islands	19 810	42	
	Gough Island	50	0	
	Heard and McDonald Islands	4 400	9	
	Crozet Islands	1 060	2	
	Kerguelen Islands	4	0	
	Macquarie Island	2 300	5	
	Prince Edward Is	1 790	4	
	South Georgia	4 650	10	Breeding
	South Orkney Islands	3 400	7	
	South Sandwich Islands	1 550	3	
White-chinned	Antipodes Island	50 000	?	
	Auckland Islands	50 000	?	
	Campbell Island	?	?	
	Crozet Islands	50 000	?	Breeding
	Kerguelen Islands	200 000	?	
	Falkland/Malvinas Islands	55	0	
	Macquarie Island	?	?	
	Prince Edward Islands	?	?	
	South Georgia*	2 000 000	?	Breeding
Westland	Punakaiki*	2 000	100	Breeding
Short-tailed	Montague Island*	>12 500	0	Breeding, failed
shearwater	French Island*	3 100	0	Post-breeding

Table 2: At-sea breeding distribution of 18 southern hemisphere albatross and petrel species within the CCAMLR Convention Area (% time). Data are based on available tracking data: tracking data are not available for all colonies of every species (see Table 1). The combined total does not include short-tailed shearwater (see text for explanation).

CCAMLR area	Amsterdam albatross	Antipodean albatross	Black-browed albatross	Buller's albatross	Campbell albatross	Chatham albatross	Grey-headed albatross	Indian yellow-nosed albatross	Light-mantled albatross	Northern royal albatross	Southern royal albatross	Shy albatross	Sooty albatross	Tristan albatross	Wandering albatross	Southern giant petrel	Northern giant petrel	White-chinned petrel	Westland petrel	Short-tailed shearwater	Total
48			14.7				48.8		65.4				0.7		11.3	65.1	65.1	63.2			18.6
48.1			1.0				5.8		12.5						0.1	0.9					1.1
48.2			1.5				3.2		18.2						0.1	13.5	2.0	18.7			3.2
48.3			11.5				36.1		29.0						10.3	23.4	51.4	44.5			11.5
48.4			0.4				1.3		5.3							15.5	10.9				1.9
48.5									0.3												
48.6			0.3				2.3		0.1				0.7		0.9	11.8	0.9				0.9
58	0.1		0.7				3.6	0.3	3.4				66.0		49.2			1.7		61.7	7.0
58.4							1.5		3.4				9.9		1.1			0.9		61.7	0.9
58.4.1									3.4				4.2							57.3	0.4
58.4.2													0.2		0.1			0.3		3.7	
58.4.3																				0.6	
58.4.3a																					
58.4.3b																				0.6	
58.4.4							1.5						5.6		0.9			0.6		0.1	0.5
58.4.4a							1.5						4.4		0.4			0.2			0.4
58.4.4b													1.2		0.4			0.4		0.1	0.1
58.5	0.1		0.7					0.1							14.2						0.8
58.5.1	0.1		0.6					0.1							13.9						0.8
58.5.2			0.1												0.3						
58.6							0.5	0.2					56.0		22.6			0.8			4.5
58.7							1.6						0.1		11.3						0.7
88			0.6		22.0		5.8		7.4											17.2	2.0
88.1					16.8		1.1		7.4											17.2	1.4
88.2					5.2																0.3
88.3			0.6				4.6														0.3
Inside CCAMLR	0.1	0.0	15.9	0.0	22.0	0.0	58.1	0.3	76.1	0.0	0.0	0.0	66.7	0.0	60.5	65.1	65.1	64.9	0.0	79.0	27.5
Outside CCAMLR	99.9	100.0	84.1	100.0	78.0	100.0	41.9	99.7	23.9	100.0	100.0	100.0	33.3	100.0	39.5	34.9	34.9	35.1	100.0	21.0	72.5

Table 3: At-sea distribution of species within the CCAMLR Convention Area, in relation to breeding location (% time). A – Amsterdam Island ; B – Auckland Islands; C – Chile; D – Falkland/Malvinas Islands; E – Kerguelen Islands; F – Macquarie Island; G – South Georgia; H – Solander Islands; I – Snares Islands; J – Campbell Island; K – Chatham Island; L – Prince Edward Islands; M – Taiaroa Head; N – Tasmania; O – Crozet Islands; P – Gough Island; Q – Argentina; R – Punakaiki; S – French and Montague Islands.

CCAMLR area	Amsterdam albatross	Antipodean (Gibson's)	Black-browed albatross	Black-browed albatross	Black-browed albatross	Black-browed albatross	Black-browed albatross	Buller's albatross	Buller's albatross	Campbell albatross	Chatham albatross	Grey-headed albatross	Grey-headed albatross	Grey-headed albatross	Grey-headed albatross	Grey-headed albatross	Indian yellow-nosed albatross
	A	B	C	D	E	F	G	H	I	J	K	J	C	F	L	G	A
48			3.8				84.8						21.8		7.3	66.3	
48.1			3.8				1.2						21.5			3.0	
48.2							9.0						0.1			4.8	
48.3							7						0.3			54.0	
48.4							2.5									1.9	
48.5							0.2										
48.6							1.9								7.3	2.5	
58	0.1				95.2										42.6		0.3
58.4															18.1		
58.4.1																	
58.4.2																	
58.4.3																	
58.4.3a																	
58.4.3b																	
58.4.4															18.1		
58.4.4a															18.1		
58.4.4b																	
58.5	0.1				95.2												0.1
58.5.1	0.1				87.9												0.1
58.5.2					7.3												
58.6															5.5		0.2
58.7															19.0		
88			2.8			2.0				22.0		16.4	23.0	4.5		0.8	
88.1						2.0				16.8		16.4		4.5			
88.2										5.2							
88.3			2.8										23.0				
Inside CCAMLR	0.1	0.0	6.6	0.0	95.2	2.0	84.8	0.0	0.0	22.0	0.0	16.4	44.8	4.5	49.9	67.1	0.3
Outside CCAMLR	99.9	100.0	93.4	100.0	4.8	98.0	15.2	100.0	100.0	78.0	100.0	83.6	55.2	95.5	50.1	32.9	99.7

(continued)

Table 3 (continued)

CCAMLR area	Light-mantled albatross	Light-mantled albatross	Northern royal albatross	Northern royal albatross	Shy albatross	Southern Royal albatross	Sooty albatross	Tristan albatross	Wandering albatross	Wandering albatross	Wandering albatross	Wandering albatross	Southern giant petrel	Southern giant petrel	Northern giant petrel	White-chinned petrel	White-chinned petrel	Westland petrel	Short-tailed shearwater
	F	G	K	M	N	J	O	P	O	E	L	G	Q	G	G	O	G	R	S
48		86.3					0.7		2.0		1.2	41.0		83.8	65.1	0.3	64.8		
48.1		16.5										0.3		1.2					
48.2		24.1										0.2		17.4	2.0		19.1		
48.3		38.3										40.5		29.9	51.4		45.6		
48.4		6.9												2	10.9				
48.5		0.4																	
48.6		0.1					0.7		2.0		1.2			15.3	0.9	0.3			
58	13.9						66.0		66.3	84.7	58.1					69.3			61.7
58.4	13.9						9.9		3.5		0.4					35.5			61.7
58.4.1	13.9						4.2												57.3
58.4.2							0.2		0.5							10.6			3.7
58.4.3									0.2							0.1			0.6
58.4.3a									0.2							0.1			
58.4.3b																			0.6
58.4.4							5.6		2.8		0.4					24.9			0.1
58.4.4a							4.4		1.2		0.3					10.1			
58.4.4b							1.2		1.6		0.1					14.8			0.1
58.5									7.8	84.7	1.0					0.7			
58.5.1									7.2	84.7	0.6					0.7			
58.5.2									0.6		0.3								
58.6							56.0		53.7		24.7					31.3			
58.7							0.1		1.2		32.0					1.8			
88	30.3											0.2							17.2
88.1	30.3																		17.2
88.2																			
88.3												0.2							
Inside CCAMLR	44.2	86.3	0.0	0.0	0.0	0.0	66.7	0.0	68.2	84.7	59.2	41.2	0.0	83.8	65.1	69.6	64.8	0.0	79.0
Outside CCAMLR	55.8	13.7	100.0	100.0	100.0	100.0	33.3	100.0	31.8	15.3	40.8	58.8	100.0	16.2	34.9	30.4	35.2	100.0	21.0

Table 4: Tracking periods of PTT data held in the Global *Procellariiform* Tracking Database, for the species of albatross and petrel whose distributions overlap with the CCAMLR Convention Area, indicating overlap with CCAMLR open (1 May–31 August) and closed (1 September–30 April) fishing seasons.

Species		Tracking period		Breeding season		Overlap with CCAMLR fishing season
		Start	End	Start	End	
Albatrosses						
Amsterdam		25 Feb	14 Apr	Feb	Feb	closed
Black-browed		12 Oct	17 May	Sep	Apr	closed (except for 1 track)
Campbell		3 Feb	25 Feb	Sep	May	closed
Grey-headed		2 Nov	1 May	Oct	May	closed
Indian yellow-nosed		1 Oct	25 Feb	Sep	Apr	closed
Light-mantled		9 Dec	21 Apr	Oct	Jun	closed
Northern royal	breeding	4 Nov	9 Jul	Nov	Sep	closed/open
	non-breeding	19 Feb	27 Nov			closed/open
Sooty		3 Oct	23 Jan	Oct	May	closed
Wandering		1 Jan	31 Dec	Dec	Feb	closed/open
Petrels						
Northern giant		29 Oct	1 Dec	Oct	Apr	closed
Southern giant		8 Nov	10 Mar	Nov	May	closed
White-chinned		26 Nov	27 Feb	Sept	May	closed
Short-tailed shearwater		18 Feb	23 Apr	Sept	May	closed

Table 5: Wandering albatross distribution within the CCAMLR Convention Area, by CCAMLR fishing season (open 1 May–31 August, closed 1 September–30 April).

CCAMLR area	Crozet Islands		Kerguelen Islands		Prince Edward Islands		South Georgia		Total	
	Open	Closed	Open	Closed	Open	Closed	Open	Closed	Open	Closed
48		1.3				1.9	32.3	53.1	8.2	14.5
48.1							0.2	0.4		0.1
48.2								0.6		0.1
48.3							32.0	52.2	8.2	13.3
48.4										
48.5										
48.6		1.3				1.9				1.0
58	66.4	77.4	10	84.6	57.5	58.5			51.1	52.2
58.4	0.1	4.3				0.7				1.3
58.4.1										
58.4.2		0.3								0.1
58.4.3		0.1								
58.4.3a		0.1								
58.4.3b										
58.4.4	0.1	3.8				0.7				1.2
58.4.4a		1.4				0.6				0.6
58.4.4b	0.1	2.4				0.1				0.7
58.5	5.9	4.8	10	84.6		1.6			15.5	13.6
58.5.1	5.5	4.5	10	84.6		1.1			15.3	13.3
58.5.2	0.4	0.4				0.5			0.1	0.3
58.6	60.4	67.5			12.8	32.6			20.3	28.9
58.7		0.8			44.7	23.6			15.4	8.3
88								0.3		0.1
88.1										
88.2										
88.3								0.3		0.1
Inside CCAMLR	66.4	78.6	100.0	84.6	57.5	60.5	32.3	53.4	59.3	66.8
Outside CCAMLR	33.6	21.4	0.0	15.4	42.5	39.5	67.7	46.6	40.7	33.2

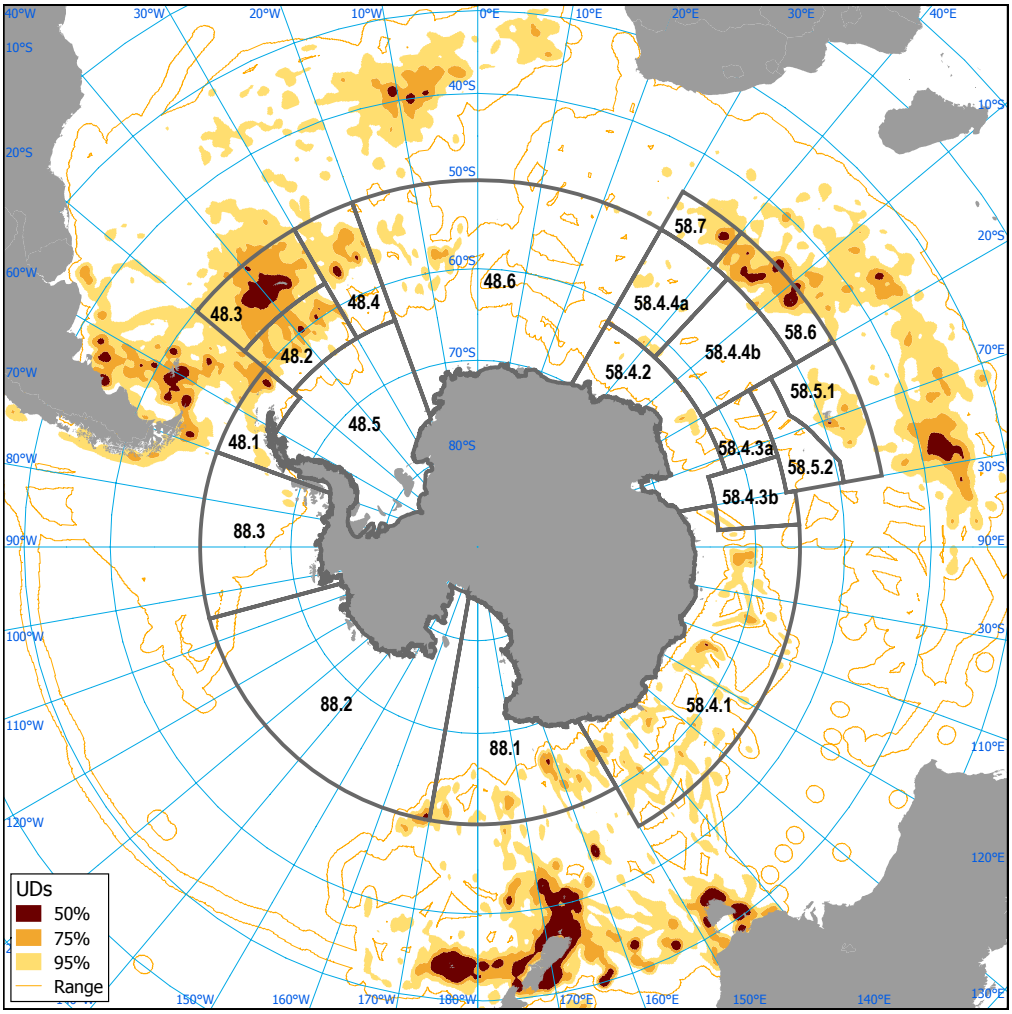

Figure 1: Combined utilisation distribution for the breeding distribution of 19 southern-hemisphere albatross, giant petrel, petrel and shearwater species represented in the BirdLife International Global *Procellariiform* Tracking Database. Each species has been given equal weighting.

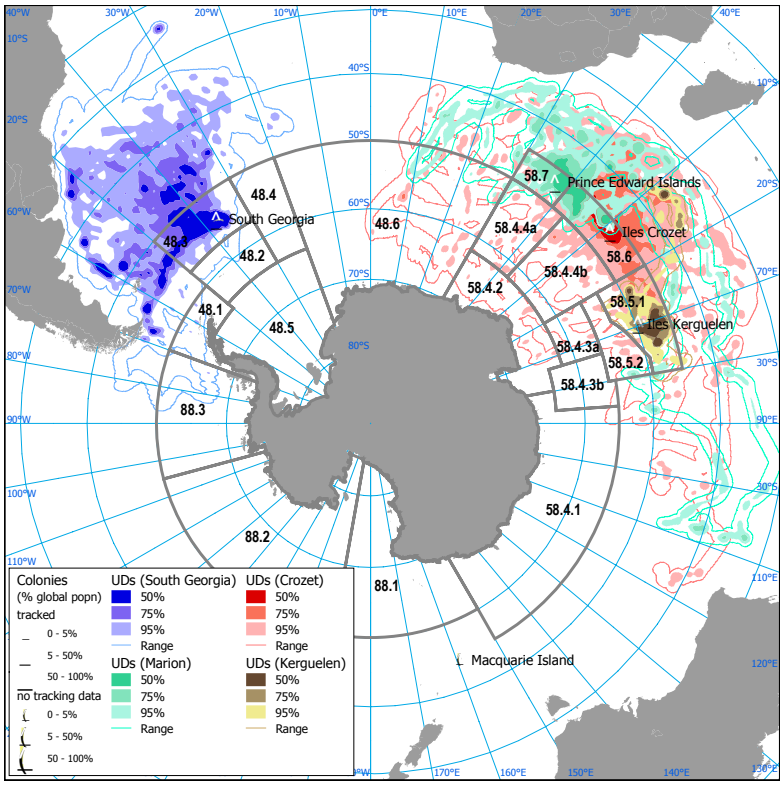

Figure 2: Utilisation distribution for breeding wandering albatrosses tracked from four different populations and their overlap with the CCAMLR Convention Area.

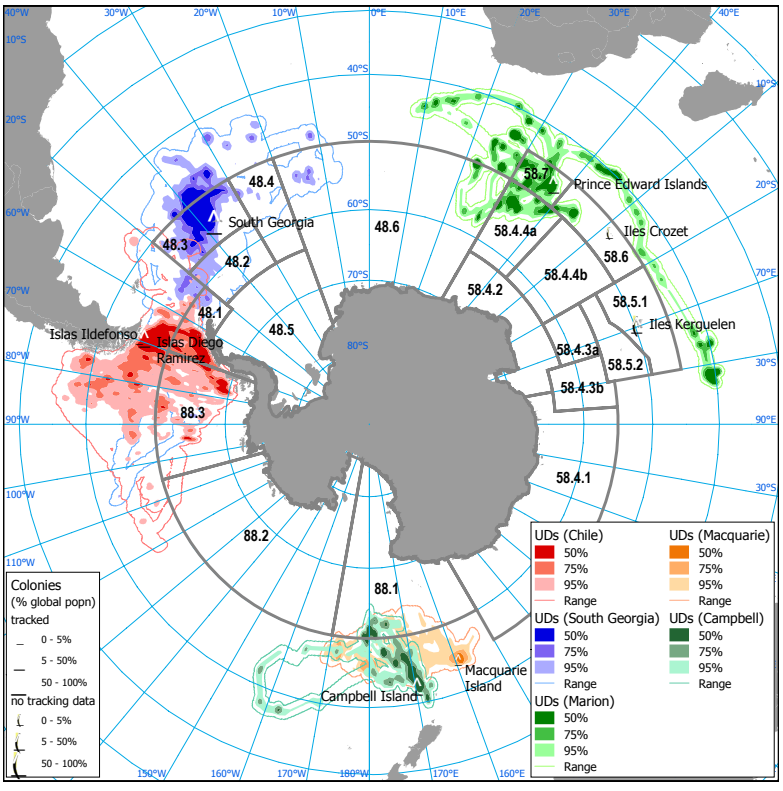

Figure 3: Utilisation distribution for breeding grey-headed albatrosses tracked from five different populations and their overlap with the CCAMLR Convention Area.

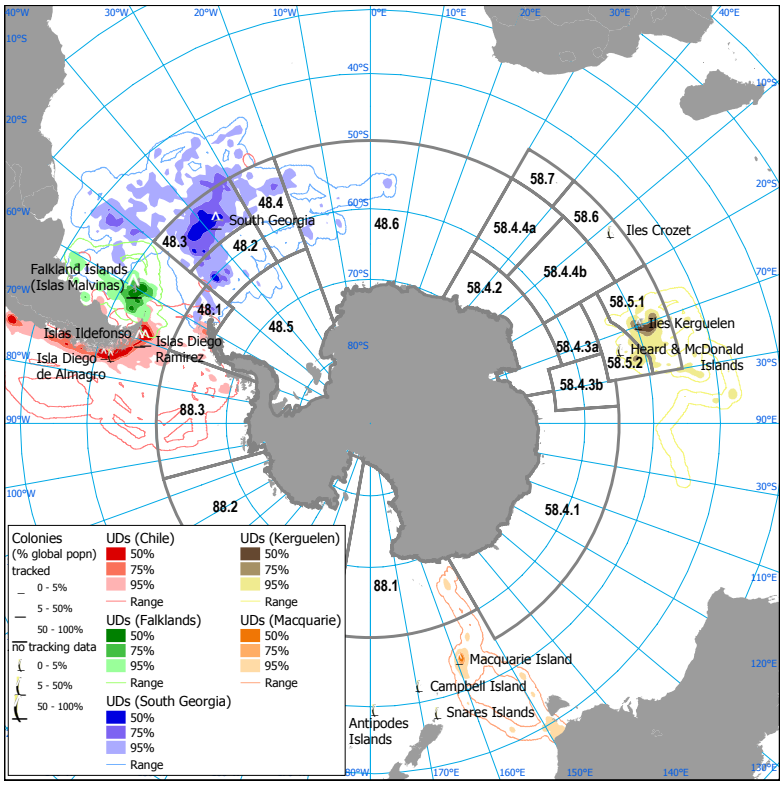

Figure 4: Utilisation distribution for breeding black-browed albatrosses tracked from five different populations and their overlap with the CCAMLR Convention Area.

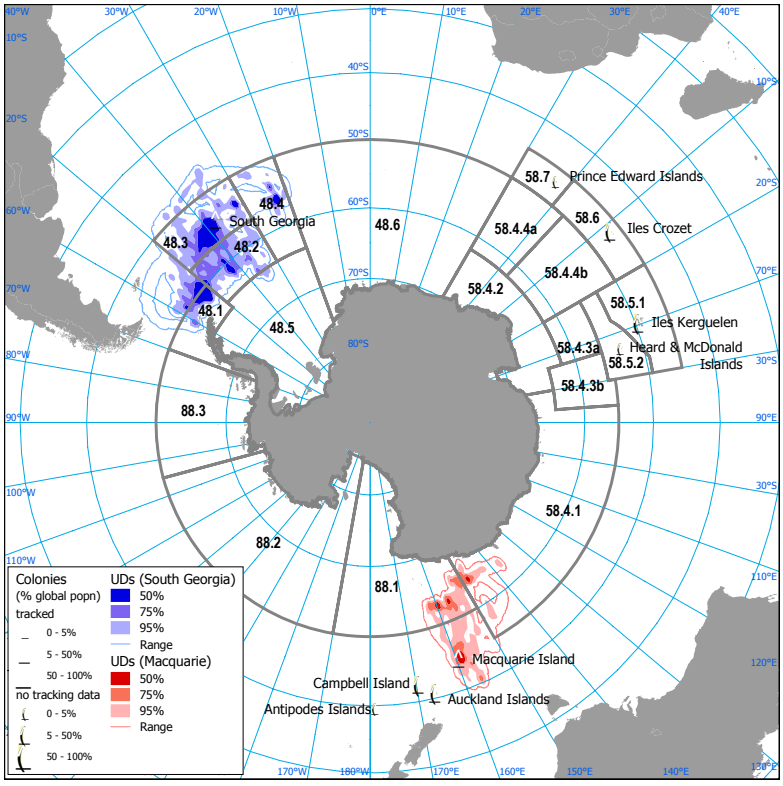

Figure 5: Utilisation distribution for breeding light-mantled albatrosses tracked from two different populations and their overlap with the CCAMLR Convention Area.

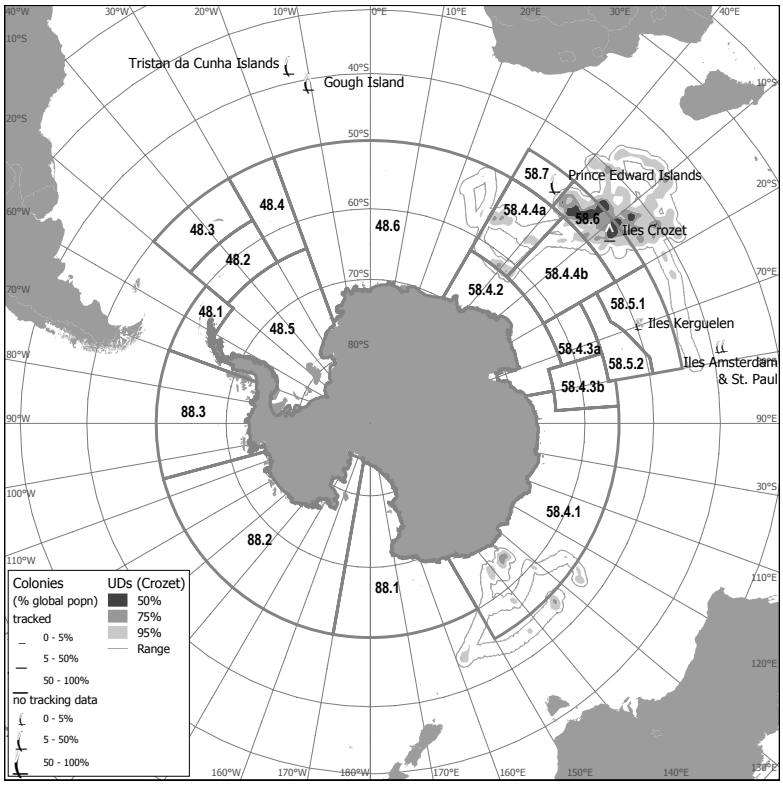

Figure 6: Utilisation distribution for breeding sooty albatrosses tracked from a single population and their overlap with the CCAMLR Convention Area.

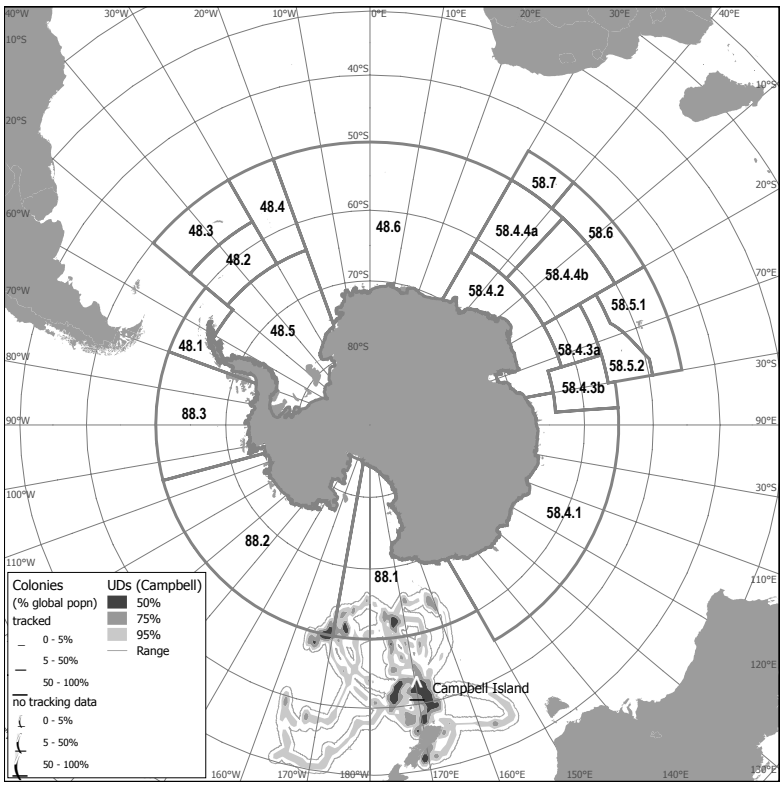

Figure 7: Utilisation distribution for breeding Campbell albatrosses tracked from the only population and their overlap with the CCAMLR Convention Area.

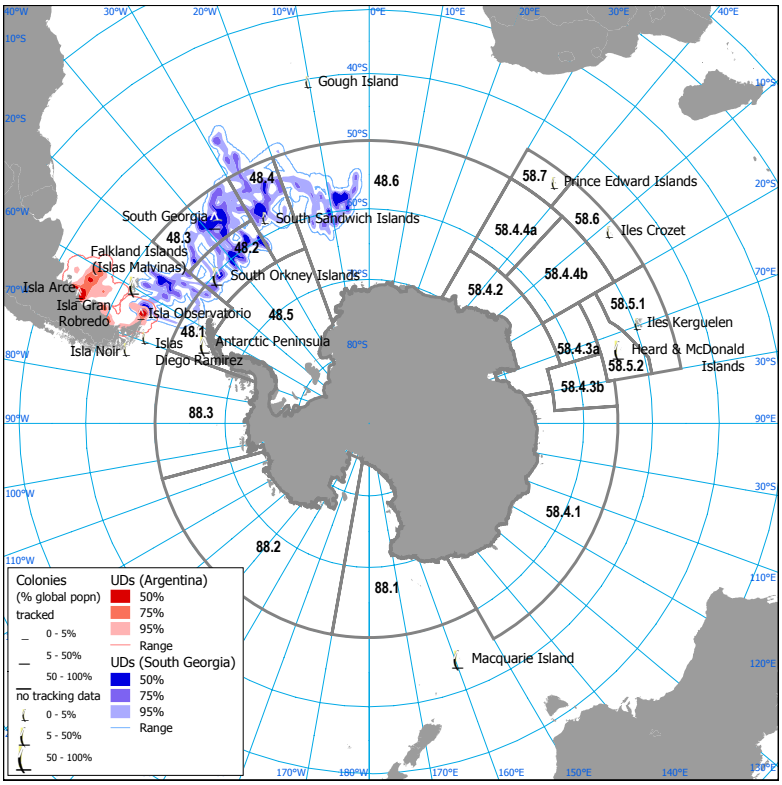

Figure 8: Utilisation distribution for breeding southern giant petrels tracked from two different populations and their overlap with the CCAMLR Convention Area.

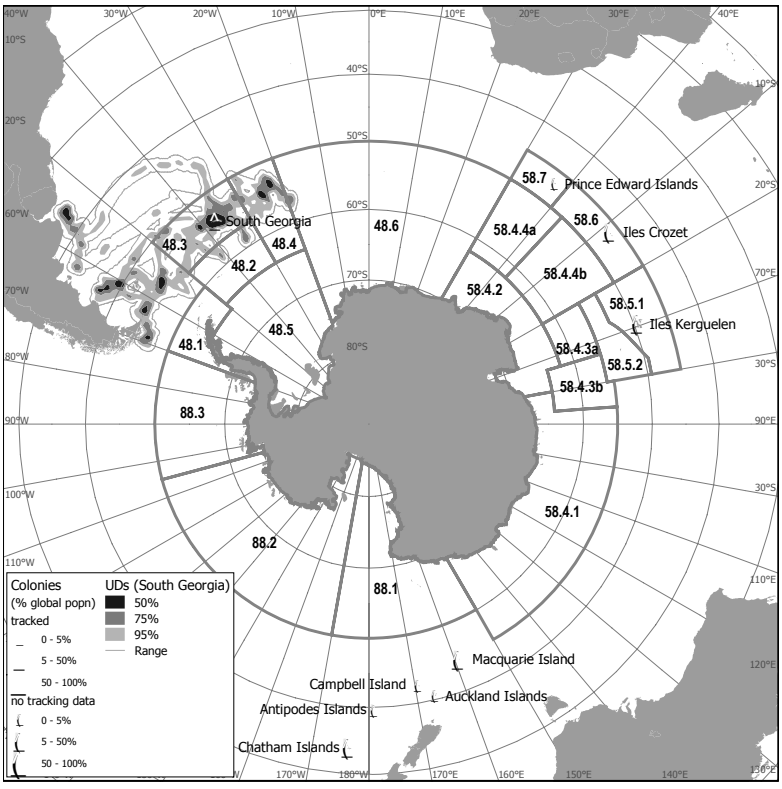

Figure 9: Utilisation distribution for breeding northern giant petrels tracked from a single population and their overlap with the CCAMLR Convention Area.

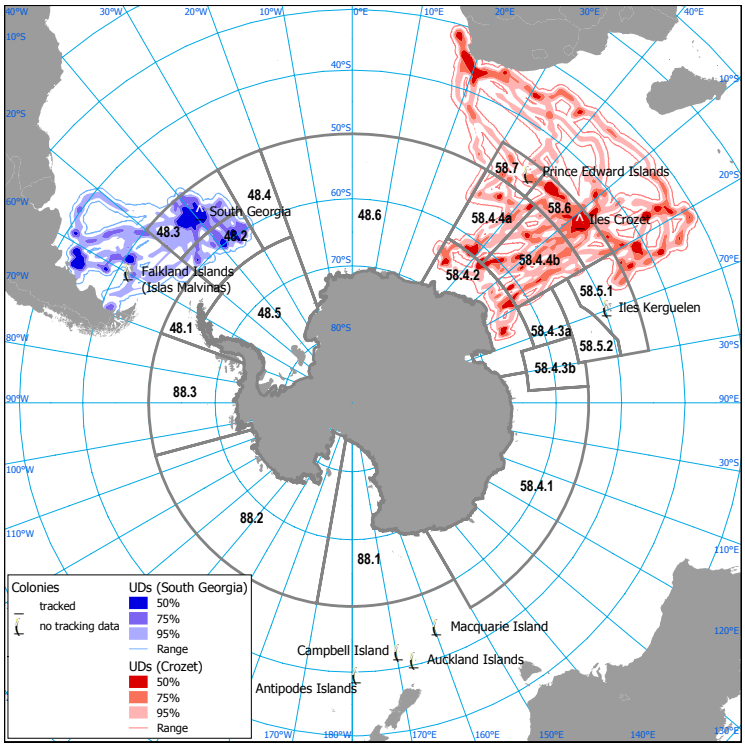

Figure 10: Utilisation distribution for breeding white-chinned petrels tracked from two different populations and their overlap with the CCAMLR Convention Area.

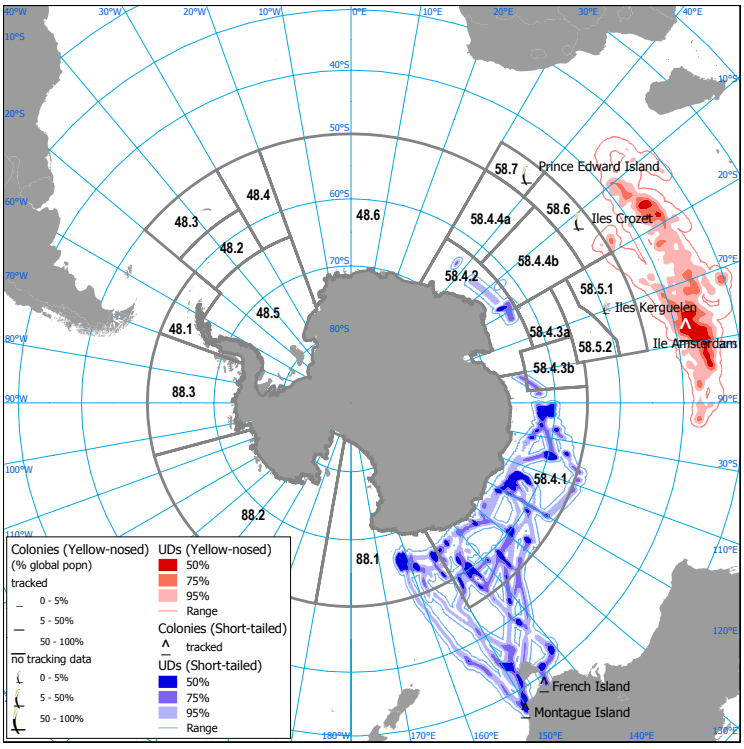

Figure 11: Utilisation distribution for breeding Indian yellow-nosed albatrosses, and for short-tailed shearwaters tracked from Montague and French Islands, Australia, and their overlap with the CCAMLR Convention Area. The latter is a composite of two tracks from breeding birds, a track from a failed breeder, and a post-breeding track. The tracks for short-tailed shearwaters are from two of more than 160 colonies, representing <1% of the total global population.

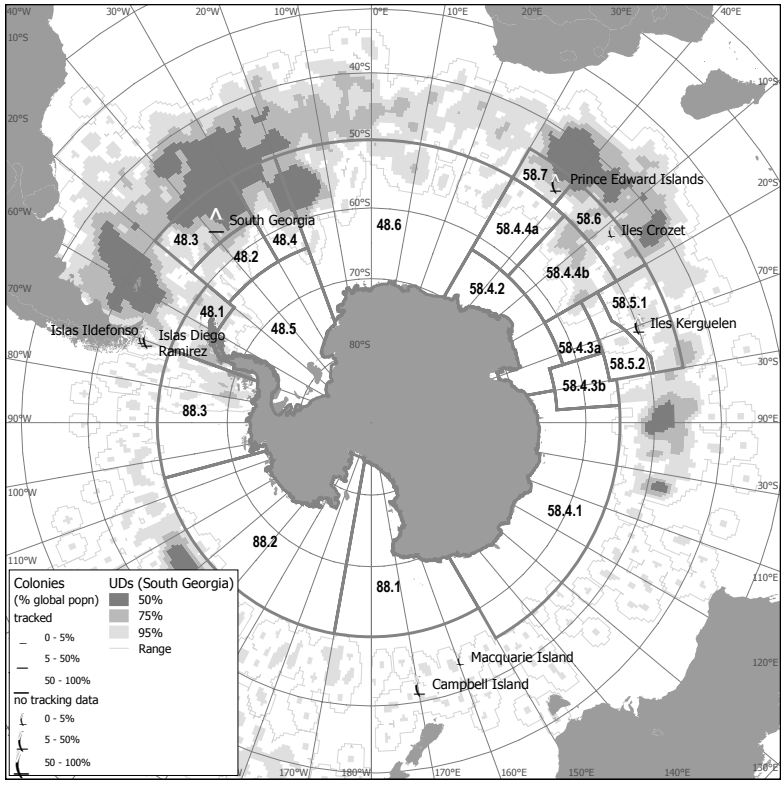

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Tableau 2: Répartition en mer des reproducteurs de 18 espèces d'albatros et de pétrels de l'hémisphère sud dans la zone de la Convention (% en temps). Les données sont fondées sur les données de suivi disponibles : des données de suivi ne sont pas disponibles pour toutes les colonies de chaque espèce (voir tableau 1). Le puffin à queue courte n'est pas pris en compte dans le total combiné (voir texte pour explications).

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Tableau 4: Périodes de suivi des données de PTT détenues dans la base de données globale de suivi des *Procellariiformes* de BirdLife International, pour les espèces d'albatros et de pétrels dont la répartition chevauche la zone de la Convention CCAMLR; le chevauchement est précisé en fonction des saisons de pêche ouvertes (1er mai–31 août) et fermées (1er septembre–30 avril).

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Рис. 12: Ареалы, используемые наблюдавшимися сероголовыми альбатросами (размножаются раз в два года) с о-ва Берд, Южная Георгия, в течение 18 месяцев между попытками размножения.

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Tabla 1: Datos de teledetección para las especies de albatros y petreles del hemisferio sur guardados en la Base Global de Datos de Seguimiento de las Aves *Procellariiformes*. * – nuevos datos agregados desde la publicación de *Tracking Ocean Wanderers*. Tamaños de las colonias obtenidos de Arata et al., 2003; BirdLife International 2004a; Cuthbert et al., 2004; Gales, 1998; Huin y Reid, 2005a, 2005b; Lawton et al., 2003; Patterson et al., en imprenta; Poncet et al., 2006; Robertson et al., 2003; Tickell, 2000.

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Figura 11: Distribución de las áreas utilizadas por el albatros de pico amarillo y el petrel australiano durante la época de reproducción, derivada de los datos de seguimiento de las Islas Montague y French, Australia; y su superposición con el Área de la Convención de la CCRVMA. La última es una combinación del seguimiento de dos aves reproductoras, de una que no se reprodujo, y de un ave después de la reproducción. El seguimiento del petrel australiano se realizó en dos de más de 160 colonias, que representan <1% del total de la población mundial.

Figura 12: Mapas de las áreas utilizadas por el albatros de cabeza gris (ave que se reproduce cada dos años) derivados de los datos de seguimiento en Isla Bird, Georgia del Sur, durante los 18 meses transcurridos entre los intentos de reproducción.

APPENDIX 1

KEY TO SPECIES NAMES USED IN THE TEXT

Common	Scientific	Status[1]
Amsterdam albatross	*Diomedea amsterdamensis*	Critically Endangered
Antipodean albatross[2]	*Diomedea antipodensis*	Vulnerable
Black-browed albatross	*Thalassarche melanophrys*	Endangered
Buller's albatross	*Thalassarche bulleri*	Vulnerable
Campbell albatross	*Thalassarche impavida*	Vulnerable
Chatham albatross	*Thalassarche eremita*	Critically Endangered
Grey-headed albatross	*Thalassarche chrysostoma*	Vulnerable
Light-mantled albatross	*Phoebetria palpebrata*	Near Threatened
Northern Royal albatross	*Diomedea sanfordi*	Endangered
Southern Royal albatross	*Diomedea epomophora*	Vulnerable
Salvin's albatross	*Thalassarche salvini*	Vulnerable
Shy albatross	*Thalassarche cauta*	Near Threatened
Sooty albatross	*Phoebetria fusca*	Endangered
Tristan albatross	*Diomedea dabbenena*	Endangered
Wandering albatross	*Diomedea exulans*	Vulnerable
Atlantic yellow-nosed albatross	*Thalassarche chlororhynchos*	Endangered
Indian yellow-nosed albatross	*Thalassarche carteri*	Endangered
Northern giant petrel	*Macronectes halli*	Near Threatened
Southern giant petrel	*Macronectes giganteus*	Vulnerable
Westland petrel	*Procellaria westlandica*	Vulnerable
White-chinned petrel	*Procellaria aequinoctialis*	Vulnerable
Short-tailed shearwater	*Puffinus tenuirostris*	Least Concern

[1] Source IUCN (2004), BirdLife International (2004a)
[2] Including Gibson's albatross (*D. (antipodensis) gibsoni*)