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TOWARDS A SEABIRD MORTALITY RISK ASSESSMENT: DISTRIBUTION OF SEABIRDS IN THE WCPFC CONVENTION AREA AND POTENTIAL OVERLAP WITH FISHERIES

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Towards a seabird mortality risk assessment: distribution of seabirds in the WCPFC Convention Area and potential overlap with fisheries

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Abstract

This paper reviews the distribution of seabird species with the WCPFC Area. From a review of the distributions of 99 species of albatross and petrel, 16 species of albatross and 60 species of petrel occur within the area of the WCPFC, and are potentially vulnerable to fisheries bycatch. These include species with IUCN classification of Critically Endangered (n = 1), Endangered (n = 7), Vulnerable (n =26) and Near Threatened (n = 7). The remaining 30 species are classified by the IUCN as Least Concern. This paper, having identified key risks, is intended to assist with the development of advice on mitigation of seabird mortality in fisheries in the WCPFC Convention Area. Recommendations on future approaches to mitigating risk are made.

Introduction

The WCPFC Ecosystem and Bycatch Specialists Working Group will consider seabird mitigation requirements following WCPFC Resolution-2005-01 which entered into force in February 2006. This paper is intended to provide back-ground information for the development of a seabird mortality risk assessment, providing details of the distribution of seabirds in the WCPFC Convention Area and potential overlap with fisheries. This information should assist in the discussion of in which WCPFC areas risk to seabirds from fishing exists, and consequently where mitigation is required.

Detailed information about the overlap of fisheries with albatross and petrel species has been prepared using satellite telemetry studies. This information shows that the distribution of some species, during certain life-stages and phases of the breeding cycle, overlaps with fisheries (BirdLife International 2004, Birdlife International, unpublished). However, a review of this information, does not allow evaluation of the overlap with fisheries for those species which are more difficult to study, such as burrowing petrels, or for species for which the non-breeding range is poorly known from satellite-telemetry studies.

Burrowing petrels tend to be difficult to study compared to the large, surface-nesting and diurnal albatross species, due to their nocturnal nature, small body mass relative to location-tracking devices and the inaccessibility of breeding areas. For this reason, there is relatively little information about their individual behaviours. However, a large body of literature exists that summarises the seasonal distribution of these species and their migration patterns through the year (see reviews by Harrison 1983, Marchant and Higgins 1990, Taylor 2000, Brooke 2004).

In addition to foraging distributions and migration ranges, it is important to consider the vulnerability of seabirds to capture that is inherent in their species-specific feeding styles.

Feeding behaviours vary between groups of birds, with petrels and albatrosses tending to be vulnerable to capture in different aspects of a fishing operation. Petrels tend to dive deeper, and are more active feeders at night or in different aspects of the fishery operation than albatrosses. In longline fisheries, the more proficient diving species among the petrels are more vulnerable to being hooked during setting because they dive deeper and can access baits during a far longer period and further from the stern of the vessel than albatrosses. In trawl fisheries, species specific behaviours lead to a result that petrels are more vulnerable to net captures, while albatrosses are more vulnerable to warp-strikes.

In terms of spatial separation and vulnerability to fisheries capture, albatrosses are generally confined to latitudes south of 30° S in the Pacific Ocean, with one or two exceptions (Table 2). Many species of petrel however undertake extensive migrations across tropical areas and travel from one hemisphere to the other in the Pacific basin. Mitigation solutions therefore need to be tailored to the suite of species that are vulnerable to capture for a particular fishery area.

The distributions of albatrosses and petrels that are considered vulnerable to capture in WCPFC fisheries are described here in summary form to assist the WCPFC in considering appropriate mitigation practices to implement in its fisheries. In particular, the occurrence of petrels and albatrosses in different latitudinal bands may require different mitigation measure to be deployed in these areas.

Methods

The distributions of species from the albatross (Diomedeidae, 21 species) and petrel (Procellaridae 78 species) families were reviewed and those that use waters within the WCPFC Convention area are described.

Species distributions are described in broad terms setting out the global occurrence of the species at sea. The main locations that a species is found are described, but not extremes of ranges described for small numbers of individuals. The distributions result from a combination of at-sea sightings, band recoveries and satellite telemetry following Brooke (2004) who drew on general reviews of bird distribution (e.g. Marchant and Higgins 1990, BirdLife International 2000, Taylor 2000) as well as individual-species studies.

Results were compared to those produced by Robertson *et al.* (2003), who examined the overlap of fisheries with species ranges for species breeding in the New Zealand region. No major discrepancies between these two sources were found. Baker et al (2002) reviewed the threats to species occurring in the Australian Fisheries Zone, and detailed the species discussed in the literature caught in fisheries. This includes most genuses in the Diomedeidae and Procellaridae families. The example set by Baker et al. (2002) is followed and the distributions of the large-bodied species in the Procellaridae family are included in the analysis (petrels, prions and shearwaters, but not diving petrels or storm petrels).

In the analysis completed for this paper, Brooke's (2004) bird distributions were assigned to the following 8 Areas in relation to the WCPFC area (Table 1 and Figure 1):

Table 1. Ocean areas and their descriptors in relation to seabird distribution and overlap with the WCPFC area.

Area	*Descriptor*
1	South Pacific - south of 20° S in the sector from the east of New Zealand to the South American coast
2	Tasman Sea - between New Zealand and Australia, and north to 20°S
3	Tropical South Pacific - North of 20°S to the equator
4	Atlantic Ocean - East of Cape Horn to Cape of Good Hope
5	Indian Ocean - Cape of Good Hope to Western Australia
6	Southern Australia – Western Australia to the eastern extremity of Tasmania (147°E)
7	North Pacific - North of the equator to 20°N
8	Far North Pacific - Above 20°N in the Pacific

Results

The review found that 16 species of albatross and 60 species of petrel potentially overlapped with the area of the WCPFC and were potentially vulnerable to fisheries bycatch (Table 2). These included species with IUCN classification of Critically Endangered (6), Endangered (7), Vulnerable (26) and Near Threatened (7) for both albatrosses and petrels. The remainder were classified by the IUCN as Least Concern (www.iucnredlist.org).

The threat classification and regions used by the bird species are set out in Table 2. Where described, the extremes of the latitudinal ranges of species are indicated (Brooke 2004). Species divided into those uniquely using the Southern Hemisphere at lower latitudes (Areas 1-3, 4-6), those that occurred uniquely in the Northern Hemisphere (Areas 7-8) and those that traversed the tropical regions and may have wide latitudinal ranges within the Pacific Region and elsewhere. Species that migrated through or were found breeding in tropical waters (here defined as between 20°S and 20°N) numbered 43 (42 petrel species and one albatross species).

Discussion

The analysis of seabird at-sea distributions presented here indicates that the WCPFC fisheries will need to consider mitigation options for a range of species types (both albatrosses and petrels), and adapt these measures to the latitudes in which the different species groups are encountered.

Albatrosses mainly breed and migrate to areas in latitudes greater than 20° in both the southern and northern Pacific regions in the area of overlap with the WCPFC Convention Area. These species are vulnerable to capture during daytime, though some species are particularly active around twilight periods (Waugh and Weimerskirch 2003).

Petrels present additional difficulties for those seeking to mitigate captures in fishing operations for several reasons. Petrel dive depths vary between 6 and 58 m whereas albatross maximum dive depths are limited to less than 5 m (mean maximum depths from capillary tube maximum depth gauges, summarised in Brooke 2004). Petrel species feed actively during the

night as well as the day. A great number of petrel species traverse the WCPFC Convention area, including tropical regions.

Species with Critical to Near Threatened threat classifications exist for both Procellaridae and Diomedeidae families and occur across the WCPFC Convention area. Effective mitigation that is adapted to the albatross or petrel community encountered in different areas is therefore needed to mitigate any effect of WCPFC fishing on these species' populations.

This study has shown that for petrel and albatross species information exists at a coarse level that describes the ranges of species and their potential overlap with fisheries zones.

It is recommended that:

- Ongoing revisions of the risk assessment should be undertaken with new data and at finer scales where data become available.
- Mitigation measures are developed and adapted according to the community of seabirds in specific fishery areas, taking into account their specific behaviours and distributions.
- Mitigation of seabird mortalities in tropical as well as temperate and sub-Antarctic regions is warranted, given the ranges and latitudinal migration or distribution patterns of albatross and petrel species.
- Data on seabird mortality is collected on a fine scale to allow a more detailed assessment of risk within the WCPFC Convention Area, to assess the efficacy of any mitigation deployed.

Acknowledgements

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Table 2. Albatross and petrel species from the families Diomedidae and Procellariidae that have at-sea ranges apparently overlap with the area of the WCPFC Convention, following Brooke (2004). Use by species of Tropical Pacific region is indicated "yes" if species enter or traverse between 20°S and 20°N during some time in their annual cycle. * Two species for which at sea ranges may not be overlapping with WCPFC Convention Area as they are shown in the eastern, North Pacific and the western extent of their ranges with respect to the WCPFC area is not explicit.

Species	Scientific name	IUCN status	Zone Frequented (Figure 1)	Use of Tropical Pacific Region	Northern or Southern most described latitude
Antipodean Albatross	*Diomedea antipodensis*	Vulnerable	1, 2, 6		30°-55°S
Southern Royal Albatross	*Diomedea epomophora*	Vulnerable	1, 2, 4, 5, 6		
Wandering Albatross	*Diomedea exulans*	Vulnerable	1, 2, 3, 4, 5, 6		30°S
Northern Royal Albatross	*Diomedea sanfordi*	Endangered	1, 2, 4, 5, 6		35°S
Laysan Albatross	*Phoebastria immutabilis*	Vulnerable	8		Nothern pacific mainly between 30° - 55° N
Black-footed Albatross	*Phoebastria nigripes*	Vulnerable	8		Northern pacific north of Hawaiian Islands, mostly north of 30°N
Sooty Albatross	*Phoebetria fusca*	Endangered	4, 5, 6		Mainly south of 30°S
Light-mantled Sooty Albatross	*Phoebetria palpebrata*	Near Threatened	1, 2, 4, 5, 6		Mainly south of 40°S
Buller's Albatross	*Thalassarche bulleri*	Vulnerable	1, 2, 3	Yes	Mainly south of 30°S but distribution shown around Galapagos.
Indian Yellow-nosed Albatross	*Thalassarche carteri*	Endangered	1, 2, 5, 6		North to 35° in the Indian Ocean, but does occur north of 35° of New Zealand
Shy Albatross	*Thalassarche cauta* *Thalassarche steadi*	Near Threatened	1, 2, 3, 4, 5, 6		
Grey-headed Albatross	*Thalassarche chrysostoma*	Vulnerable	1, 2, 4, 5, 6		Mainly south of 39°S
Chatham Albatross	*Thalassarche eremita*	Critical	1, 2, 3		
Campbell Albatross	*Thalassarche impavida*	Vulnerable	1, 2		
Black-browed Albatross	*Thalassarche melanophrys*	Vulnerable	1, 2, 3, 4, 5, 6,	Yes	Southern Pacific north to around 15° S.
Salvin's Albatross	*Thalassarche salvini*	Vulnerable	1, 2, 3, 4, 5, 6		Mainly in latitudes 35-50°S, but north to 6° off Peru.
Bulwer's Petrel	*Bulweria bulwerii*	Least Concern	3, 4, 5, 7, 8	Yes	Tropical distribution around Pacific, Indian, and Atlantic Oceans
Streaked Shearwater	*Calonectris leucomelas*	Least Concern	7, 8	Yes	Western North Pacific and Western South Pacific north of Australia
Cape Pigeon	*Daption capense*	Least Concern	1, 2, 3, 4, 5, 6	Yes	North of 25°S into the Humboldt current in winter
Southern Fulmar	*Fulmarus glacialoides*	Least Concern	1, 2, 3, 4, 5, 6	Yes	North to Ecuador in the Eastern Pacific (around 4°N)
Blue Petrel	*Halobaena caerulea*	Least Concern	1, 2, 3, 4, 5, 6	Yes	Mainly south of 35°S except in the Humboldt current area where it is found north of 20°S
Southern Giant Petrel	*Macronestes giganteus*	Vulnerable	1, 1, 4, 5, 6		South of 20°S
Northern Giant Petrel	*Macronestes halli*	Near Threatened	1, 2, 4, 5, 6		South of 30°S

Species	Scientific name	IUCN status	Zone Frequented (Figure 1)	Use of Tropical Pacific Region	Northern or Southern most described latitude
Thin-billed Prion	*Pachyptila belcheri*	Least Concern	1, 2, 3, 4, 5, 6	Yes	South of 15°S in winter
Fulmar Prion	*Pachyptila crassirostris*	Least Concern	1, 5		Mainly within NZEEZ (south of 35°S) and at Heard Is.
Antarctic Prion	*Pachyptila desolata*	Least Concern	1, 2, 3, 4, 5, 6	Yes	South of 12°S in winter
Salvin's Prion	*Pachyptila salvinia*	Least Concern	1, 2, 5, 6		South of around 35°S
Fairy Prion	*Pachyptila turtur*	Least Concern	1, 2, 4, 5, 6		
Broad-billed Prion	*Pachyptila vittata*	Least Concern	1, 2, 4		South of 35°S in the Pacific
Snow Petrel*	*Pagodroma nivea*	Least Concern	1, 4, 5, 6		South of 50-55°S
Short-tailed Albatross	*Phoebastria albatrus*	Vulnerable	8		Northern pacific north of Hawaiian Islands (20°N)
White-chinned Petrel	*Procellaria aequinoctialis*	Vulnerable	1, 2, 3, 4, 5, 6	Yes	Ranges south of 30°S except in the Humboldt and Benguela current areas
Grey Petrel	*Procellaria cinerea*	Near Threatened	1, 2, 3, 4, 5, 6	Yes	Mainly south of 32°S except around South America where it reaches north of 20°S
Parkinson's Petrel	*Procellaria parkinsoni*	Vulnerable	1, 2, 3	Yes	Crosses the equator during migration into central american waters
Westland Petrel	*Procellaria westlandica*	Vulnerable	1, 2		
Beck's Petrel	*Pseudobulweria becki*	Critical	3	Yes	Solomon Islands
MacGillivray's Petrel	*Pseudobulweria macgillivrayi*	Critical	3	Yes	Tropical Pacific around Fiji
Tahiti Petrel	*Pseudobulweria rostrata*	Near Threatened	3, 7	Yes	Tropical Pacific distribution
Little Shearwater	*Puffinus assimilis*	Least Concern	1, 2, 4, 5, 6		
Buller's Shearwater	*Puffinus bulleri*	Vulnerable	1, 2, 3, 7, 8	Yes	Migrates across tropical waters after breeding in Northern New Zealand waters
Flesh-footed Shearwater	*Puffinus carneipes*	Least Concern	1, 2, 5, 6, 7, 8	Yes	Migrates across tropical waters after breeding
Pink-footed Shearwater*	*Puffinus creatopus*	Vulnerable	1, 3, 7, 8	Yes	Eastern Pacific may occur in WCPFC in extreme west of range
Fluttering Shearwater	*Puffinus gavia*	Least Concern	1, 2, 6		Mainly south of 35°S except around eastern Australia where they are found further north
Sooty Shearwater	*Puffinus griseus*	Least Concern	1, 2, 3, 4, 5, 6, 7, 8	Yes	Migrates across tropical waters
Heinroth's Shearwater	*Puffinus heinrothi*	Vulnerable	7	Yes	Solomon Islands and Bismarck Sea
Hutton's Shearwater	*Puffinus huttoni*	Endangered	1, 2, 6		Mainly south of 35°S except around eastern Australia where they are found further north
Audubon's Shearwater	*Puffinus lherminieri*	Least Concern	3, 4, 5, 7, 8	Yes	Tropical regions of Western and Eastern Pacific, Indian and Atlantic Oceans
Christmas Shearwater	*Puffinus nativitatis*	Least Concern	3, 7	Yes	Tropical and sub-tropical central Pacific
Newell's Shearwater	*Puffinus newelli*	Vulnerable	7	Yes	Hawaiian islands and east

Species	Scientific name	IUCN status	Zone Frequented (Figure 1)	Use of Tropical Pacific Region	Northern or Southern most described latitude
Wedged-tailed Shearwater	*Puffinus pacificus*	Least Concern	2, 3, 5, 7, 8	Yes	South of 9°N and south to northern New Zealand waters (North of 35°S) in the Pacific
Short-tailed Shearwater	*Puffinus tenuirostris*	Least Concern	2, 6, 7, 8	Yes	Migrates across tropical waters
Antarctic Petrel	*Thalassoica antarctica*	Least Concern	1, 4, 5, 6		North to 48°S
Phoenix Petrel	*Pterodroma alba*	Vulnerable	3, 7	Yes	Mostly south of 24°N and north of 30°S
Henderson Petrel	*Pterodroma atrata*	Endangered	3	Yes	Central tropical Pacific
Chatham Island Petrel	*Pterodroma axillaris*	Critical	1		Unknown
Collared Petrel	*Pterodroma brevipes*	Least Concern	3	Yes	Central and Eastern Tropical Pacific
White-necked Petrel	*Pterodroma cervicalis*	Vulnerable	1, 2, 3, 7, 8	Yes	Migrates from Tasman Sea and Kermadec breeding sites to Northern Pacific
Cook's Petrel	*Pterodroma cookii*	Endangered	1, 2, 3, 7, 8	Yes	Migrates to Central and Eastern North Pacific (20°-40°N) and 10°S off Peru from New Zealand breeding sites
Juan Fernandez Petrel	*Pterodroma externa*	Vulnerable	1, 3, 7	Yes	Mostly north of 50°S and south of 20°N
Herald Petrel	*Pterodroma heraldica*	Least Concern	3, 7, 8	Yes	Mostly south of 39°N and north of 27°S
Bonin Petrel	*Pterodroma hypoleuca*	Least Concern	7, 8	Yes	Mainly 10° - 40° N to the West of Hawaii
Mottled Petrel	*Pterodroma inexpectata*	Near Threatened	1, 2, 3, 5, 6, 7, 8	Yes	Migrates from sub-antarctic latitudes to Eastern North Pacific
White-headed Petrel	*Pterodroma lessonii*	Least Concern	1, 2, 4, 5, 6		South of 30°S
Gould's Petrel	*Pterodroma leucoptera*	Vulnerable	2, 3, 6	Yes	Tropical Pacific and Tasman Sea south to 47°S
Stejneger's Petrel	*Pterodroma longirostris*	Vulnerable	1, 3, 7, 8	Yes	Migrates from South America to North Pacific
Great-winged Petrel	*Pterodroma macoptera*	Least Concern	1, 2, 4 , 5, 6		South of 25°S
Magenta Petrel	*Pterodroma magentae*	Critical	1		
Soft-plumaged Petrel	*Pterodroma mollis*	Least Concern	1, 2, 4, 5, 6		South of 30°S, but ranges further north in the Atlantic Ocean
Kermadec Petrel	*Pterodroma neglecta*	Least Concern	1, 2, 3, 7, 8	Yes	Tropical Pacific between 40°N and 35°S
Black-winged Petrel	*Pterodroma nigripennis*	Least Concern	1, 2, 3, 7, 8	Yes	Migrates from Western and Central Pacific breeding sites to Northern Pacific
Galapagos Petrel	*Pterodroma phaeopygia*	Critical	7	Yes	Eastern tropical Pacific
Pycroft's Petrel	*Pterodroma pycrofti*	Endangered	1, 3, 7, 8	Yes	Migrates from Northern New Zealand to Central northern Pacific
Hawaiian Petrel	*Pterodroma sandwichensis*	Vulnerable	7	Yes	Central tropical Pacific
Providence Petrel	*Pterodroma solandri*	Vulnerable	2, 3, 7, 8	Yes	Migrates through western tropical Pacific north to 56°N
Murphy's Petrel	*Pterodroma ultima*	Near Threatened	3, 7, 8	Yes	Central South Pacific migrating north to eastern pacific
Kerguelen Petrel	*Lugensa brevirostris*	Least Concern	1, 2, 4, 5, 6		South of 33°S

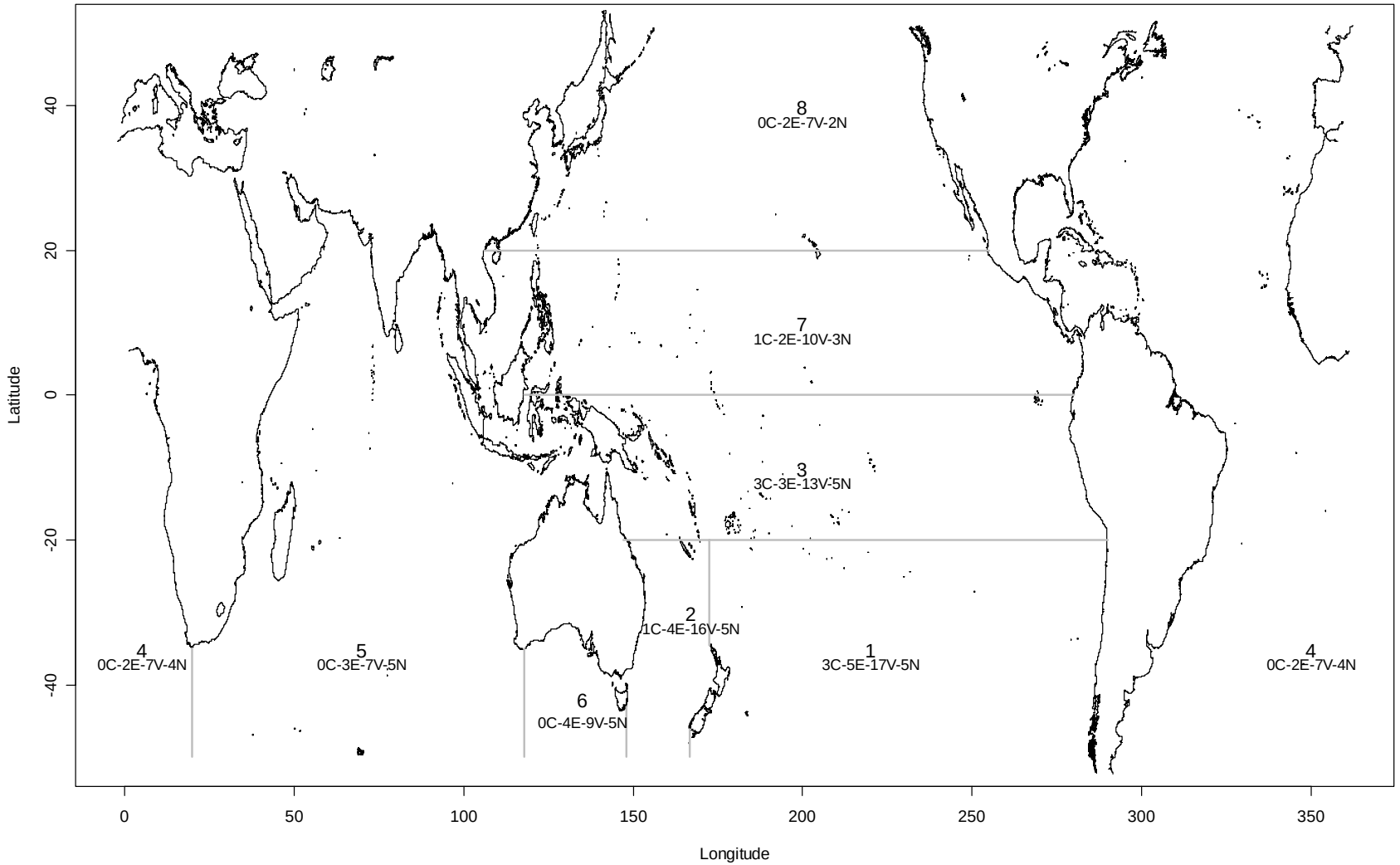

Figure 1: Eight areas in relation to the descriptions of seabird distribution shown in Tables 1 and 2, figures related to the number of Critical (C), Endangered (E), Vulnerable (V) and Near Threatened (N) species (IUCN threat classification) using each area.