

Globally threatened seabirds at risk from longline fishing: international conservation responsibilities



Deon C. Nel & Frances E. Taylor

*BirdLife International Seabird Conservation Programme, BirdLife South Africa, PO Box
1586, Stellenbosch 7599, South Africa; email: dnel@savethealbatross.org.za*

This paper was presented by BirdLife to the meeting of the UN Food and Agriculture
Organisation Committee on Fisheries, held in Rome in 2003

February 2003

Globally threatened seabirds at risk from longline fishing: international conservation responsibilities

Deon C. Nel & Frances E. Taylor

BirdLife International Seabird Conservation Programme, BirdLife South Africa, PO Box 1586, Stellenbosch 7599, South Africa; email: dnel@savethealbatross.org.za

1. Introduction

Longline fishing is a major threat to 22 species of seabirds that are currently listed as globally 'threatened' according to IUCN criteria (BirdLife International 2000). These species are listed in Table 1. This includes 17 species of Albatrosses, one Giant Petrel, and four Petrels (all of the genus *Procellaria*). Most species (19) occur in the Southern Hemisphere, mostly south of 30°S. Two threatened species occur in the North Pacific Ocean, and one species is confined to the tropical Pacific Ocean.

Most of these species are very wide ranging and consequently interact with many different fisheries both close to, and at long distances from, their breeding colonies. These fisheries are regulated and managed by several countries, Regional Fisheries Management Organisations (RFMOs) and Intergovernmental Organisations.

This paper describes the foraging ranges of these threatened species in relation to national Economic Exclusive Zones (EEZs) as well the geographical areas of competence of prominent RFMOs. Confirmed bycatch of threatened seabird species, by national fleets both within national EEZs and on the high seas, is also described.

2. Methods

2.1 Foraging distributions

The foraging distributions of threatened birds were derived from *Threatened Birds of the World* (BirdLife International 2000), CJR Robertson (pers. comm.) and Marchant & Higgins (1990). A composite map of all these foraging distributions is shown in Figure 1. Geographical areas of competence of RFMOs were taken from the FAO website (www.fao.org). National EEZs were taken as 200 nautical miles from the coastline of a country. Foraging overlap with EEZs only refers to national mainland EEZs and does not include the EEZs around breeding islands of threatened Albatross species. These are rather referred to as breeding areas, as foraging within the close surrounds of a breeding island is mostly dominated by the resident breeding populations.

2.2 Fisheries bycatch data

All fisheries in which the mortality of threatened seabirds had been recorded were listed. In a few cases, data from a closely related fishery were used to make an inference of what we could expect for these fisheries. It is recognised that the data presented here represent a considerable underestimate of the total impacts to these species as there are many more fisheries in which these species are probably killed, but for which no data are available. Sources of the data are listed in Table 2.

Estimates of total seabird bycatch are also given for fisheries where such information was available. In cases where it was deemed acceptable, extrapolations were made from total hooks set and bycatch rates. In cases where a range of estimates were given (i.e. a minimum and a maximum) the mid point of the range is presented.

Data for Royal Albatross sp., Yellow-nosed Albatross sp. and Giant Petrel sp., three pairs of sibling species where identification is often very difficult for fisheries observers, data are presented both separately and combined.

3. Results

3.1 Breeding territories

The 22 globally threatened seabirds for which longline fishing is a major threat, breed on territories under the sovereignty of ten different states (Table 1). New Zealand is the most important breeding territory (12 species), followed by the French Southern Territories and the UK Overseas Territories (both 8 species), South Africa (6) and Australia (5).

3.2 Foraging areas

3.2.1 National EEZs (Range States)

New Zealand is the most important range state, with 16 globally threatened species at risk from longline fishing, occurring within its EEZ. This was followed by Australia (14), Chile (12), South Africa (11), Uruguay (9), Argentina and Peru (8 species). Other important range states include Brazil (7) and Namibia (6).

3.2.2 RFMOs¹

Eighteen (18) globally threatened seabird species at risk from longline fishing forage within the geographical area covered by the CCSBT, making it the most important RFMO for the conservation of threatened seabirds at risk from longlining. This was followed by the FFA and the South American CPPS, with 15 and 13 species using these areas respectively. CCAMLR, IOTC and IATTC areas overlapped with the distributional ranges of 11 threatened species. Ten threatened species foraged within the geographical

¹ Please see Appendix 1 for the full names of RFMOs.

areas of ICCAT. The WIOTO and the SWIOFC also overlapped with 10 species, however these RFMOs fell within the IOTC area.

3.3 Known fisheries mortalities

The 22 globally threatened seabirds at risk from longline fishing have been recorded as incidental mortality in 28 legal fisheries from 14 different nations. Black-browed Albatrosses and White-chinned Petrels are the most ubiquitously caught species, experiencing considerable mortality rates in a minimum of 21 different fisheries. Black-browed Albatrosses are killed by fisheries conducted by 11 countries, while White-chinned Petrels are killed in fisheries of 10 countries. These two species make up the majority of the seabird bycatch in many of these fisheries. The third most widely caught species is the Wandering Albatross, which has been recorded in 12 fisheries conducted by 8 fishing nations. However, this species has a population size far smaller than the first two species and is consequently at a very high risk from such widespread mortality. Other threatened species that are killed widely are the two Giant Petrel species (12 fisheries by 8 nations), Grey-headed Albatross (8 fisheries; 5 Nations) and the Yellow-nosed Albatrosses (8 fisheries; 5 nations).

In addition, ten (10) threatened species are also most probably killed in large numbers by Illegal, Unregulated and Unreported (IUU) fisheries for Patagonian Toothfish in the Southern Ocean. Most of this IUU fishing activity occurs within the EEZs surrounding the overseas territories of Australia, France, South Africa, and the United Kingdom.

4. Discussion

Conservation of breeding and foraging habitats

This analysis shows that the 22 globally threatened seabird species for which longline fishing is a major threat, breed and forage within geographical areas under the governance of at least 25 countries; Angola, Argentina, Australia, Brazil, Canada, Chile, China, Colombia, Ecuador, France, Japan, Mozambique, Madagascar, Mexico, Namibia, New Zealand, Panama, Peru, Russia, South Africa, South Korea, Taiwan, Uruguay, UK and the USA. Longline fishing occurs within the EEZs of all of these countries. Many countries also have longline fishing fleets that operate outside of their own EEZs (either within the EEZs of other countries or on the high seas) but within the foraging ranges of the species concerned. These countries include: China, Japan, Taiwan, South Korea and Spain.

Furthermore, these 22 species spend large amounts of their time foraging in areas on the high seas, outside of areas under national jurisdiction. Fishing activity within these areas is monitored and regulated by 12 major Regional Fisheries Management Organisations; CCAMLR, CCSBT, IOTC, SWIOTC, WIOTO, ICCAT, SEAFO, FFA, CPPS, IATTC, WPRFMC, IPHC.

Known bycatch in longline fisheries

To date significant mortality of these threatened species has been recorded in the longline fleets under the regulation of 14 countries; Argentina, Australia, Brazil, Canada, Chile, France, Japan, New Zealand, Peru, South Africa, Taiwan, United Kingdom, Uruguay and the USA. It is recognised that this list is not complete, due to the lack of information from many other longline fleets operating within the foraging ranges of these species. Most importantly it is recognised that no information is available from the large distant water longline fleets of China, South Korea and Spain. These fleets all operate within the foraging ranges of these threatened species and are potentially responsible for considerable mortality.

5. Conclusions

National responsibilities

- The conservation of threatened species at risk from longlining requires the coordinated conservation efforts of at least 26 countries; Angola, Argentina, Australia, Brazil, Canada, Chile, China, Colombia, Ecuador, France, Japan, Mozambique, Madagascar, Mexico, Namibia, New Zealand, Panama, Peru, Russia, South Africa, South Korea, Spain, Taiwan, Uruguay, UK and the USA.
- Of these 26 countries, it appears that 12 have acknowledged the need to develop a NPOA-Seabirds, are in the process of developing one, or have already done so. These are: Australia, Brazil, Canada, China, Japan, Namibia, New Zealand, South Africa, Uruguay, USA and one of the UK overseas territories (Falklands/Malvinas). Outside of the FAO, Taiwan has volunteered to produce an NPOA.
- BirdLife urges the remaining 14 countries to acknowledge the need to develop a NPOA-Seabirds and start to do so as a matter of urgency. These countries are: Angola, Argentina, Chile, Colombia, Ecuador, France, Mozambique, Madagascar, Mexico, Panama, Peru, Russia, South Korea and Spain.
- Of these countries BirdLife considers the following countries to be of highest priority²: Argentina, Chile, France, Mexico, Peru, South Korea and Spain.

Regional Fisheries Management Organisation responsibilities:

- The globally threatened seabird species at risk from longline fishing forage within the geographical areas of competence of 12 RFMOs.
- Of these BirdLife considers the following to be the most important³: CCAMLR, CCSBT, IOTC, ICCAT, I-ATTC, WPRFMC and the IPhC.

² Due to the high observed or potential impacts to seabirds within the waters of these countries or by fishing fleets under its jurisdiction.

³ Due to the high observed or potential impacts to seabirds within the areas of competence of these RFMOs or by fishing fleets under its management

- BirdLife commends CCAMLR on the exemplary role it has played thus far in reducing seabird bycatch to an operational minimum in many longline operations under its management.
- BirdLife urges other RFMOs to follow this lead and to firstly assess the level and nature of seabird bycatch within longline fisheries reporting to them by means of scientific observer programmes, and secondly, to attempt reduce seabird bycatch to an operational minimum by means of implementing the most appropriate mitigation measures and operational changes.
- BirdLife welcomes the resolution on incidental mortality of seabirds recently passed by the ICCAT.
- BirdLife encourages all RFMOs to implement the FAO's International Plan of Action (IPOA) or to develop their own tailored Plans of Action (similar to NPOAs) for combating the bycatch of seabirds within the specific longline fisheries under their regulation.
- Furthermore BirdLife proposes that the FAO-COFI requests all member countries and RFMOs to report annually on the bycatch of seabirds in fisheries within their areas of jurisdiction/competence and that these data be collated in a central database in order to better assess and monitor the real impacts of fisheries on threatened seabird species.

6. Acknowledgements

John Croxall, Euan Dunn, Geoff Tuck, Rebecca Lewison, Kim Rivera, Michael Szabo and Barry Weeber improved this paper with constructive comments on an earlier draft.

6. References

- Arata J., Moreno C. 2002. Progress report of Chilean research on albatross ecology and conservation. CCAMLR-WG-FSA-02/18
- Baird, S.J. In Press. Estimation of the incidental capture of seabird and marine mammal species in commercial fisheries in New Zealand waters, 1999–00. New Zealand Fisheries Assessment Report.
- BirdLife International 2000. *Threatened Birds of the World*. Lynx Edicions and BirdLife International. Barcelona and Cambridge, UK.
- Brothers N., Gales R., Reid T. 1998. Seabird interactions with longline fishing in the AFZ: 1997 seabird estimates and 1988-1997 trends. Wildlife report 98/3, Parks and Wildlife Services, Tasmania
- Crowder L.B., Myers R.A. 2001. A comprehensive study of the ecological impacts of the worldwide pelagic longline industry. *First annual report to the Pew Charitable Trusts*. 146pp.
- CCAMLR 2002. Report on the 21st meeting of the Scientific Committee. SC-CAMLR-XXI.
- CCAMLR 2001. Report on the 20th meeting of the Scientific Committee. SC-CAMLR-XX.
- Garcia M. 2000. Chilean longline fisheries. In Baird S.J. (Eds) *Report on the International Fishers' Forum on solving the incidental bycatch of seabirds in longline fisheries*. Auckland, New Zealand, 6-9 November 2000.
- Favero M., Rodriguez M.P.E. 2002. Preliminary data on the seabird bycatch along the Patagonian Shelf by Argentine longline fishing vessels: Period 1999-2001. CCAMLR-WG-FSA-02/82
- Huang H-W, Day Y-T. 2000. Taiwanese longline fisheries. In Baird S.J. (Eds) *Report on the International Fishers' Forum on solving the incidental bycatch of seabirds in longline fisheries*. Auckland, New Zealand, 6-9 November 2000.
- Hsia T-F. 2002. Tackling of bycatch of sea turtles and seabirds by Taiwan longline fishery. Report submitted to the 2nd *International Fishers' Forum on solving the incidental bycatch of seabirds and turtles in longline fisheries*. Honolulu, Hawaii, 19-22 November 2002.
- Jancke J. 2001. Seabird by-catch in small-scale longline fisheries in Northern Peru. *Waterbirds* 24: 137-141.
- Marchant S., Higgins P.J. 1990. *Handbook of Australian, New Zealand and Antarctic Birds*. Royal Australasian Ornithologists Union, Melbourne.
- Moreno C.A., Rubilar P.S., Marschoff E., Benzaquen L. 1996 Factors affecting the incidental mortality of seabirds in the *Dissostichus eleganoides* Fishery in the Southwest Atlantic (Subarea 48.3, 1995 season). *CCAMLR Sci.* 3: 79-91

- Neves T. 2000. Brazilian longline fisheries. In Baird S.J. (Eds) *Report on the International Fishers' Forum on solving the incidental bycatch of seabirds in longline fisheries*. Auckland, New Zealand, 6-9 November 2000.
- New Zealand Department of Conservation. 2002. Approved Conservation Services plan 2002/2003. Science and Research Unit, Dept. of Conservation. 40pp.
- Morgan K.H., McElderry H.I., Shisko S. 2000. Albatrosses and longline fishing in the waters off the west coast of Canada: Identification of areas of potential bycatch. In Flint E & Swift K (eds) *Second International Conference on the Biology and Conservation of Albatrosses and Petrels*, Honolulu, USA, 8-12 May 2000. Abstracts of oral and poster presentations. *Mar. Ornithol.* 28: 125-152
- Nel, D. C., Ryan P.G., Watkins B.P. 2002. Seabird mortality in the Patagonian toothfish longline fishery around the Prince Edward Islands, 1996-2000. *Antarct. Sci.* 14: 151-161.
- Olmos F., Bastos G.C.C., Neves T. 2000. Estimating seabird bycatch in Brazil. In Flint E & Swift K (eds) *Second International Conference on the Biology and Conservation of Albatrosses and Petrels*, Honolulu, USA, 8-12 May 2000. Abstracts of oral and poster presentations. *Mar. Ornithol.* 28: 125-152
- Osbourne R.F., Mullins P. 2001. Report on the hake longline scientific observer programme conducted from August to December 2000. Internal report of the Department of Marine and Coastal Management, South Africa. 13pp.
- Reid T., Brothers N., Gales R. 2001. Seabird interactions with longline fishing in the AFZ: Seabird mortality estimates and 1988-1999 trends. Dept. of Primary Industries, Water & Environment.
- Rivera K. 2002. Information on incidental mortality of seabirds and other protected species in the U.S. west coast pelagic longline fishery. CCAMLR-WG-FSA-02/39
- Ryan P.G. & Watkins B.P. 2001. Seabird by-catch in the Patagonian toothfish longline fishery at the Prince Edward islands: 2000-2001. CCAMLR-FSA-01/61
- Ryan P.G., Keith D.G., Kroese M. 2002. Seabird bycatch by tuna longline fisheries off southern Africa, 1998-2000. *S. Afr. J. Mar. Sci.* 24: 103-110
- Stagi A. 2000. Uruguayan longline fisheries. *Report on the International Fishers' Forum on solving the incidental bycatch of seabirds in longline fisheries*. Auckland, New Zealand, 6-9 November 2000.
- Stagi A., Vaz-Ferreira R., Marín Y., Joseph L. 1998. The conservation of albatrosses in Uruguayan waters. In Robertson G., Gales R. (eds) *Albatross Biology and Conservation*. Surrey Beatty & Sons, Chipping Norton.
- Stehn RA, Rivera KS, Fitzgerald S & Whol KD. 2001. Incidental catch of Seabirds by Longline Fisheries in Alaska. *Proceedings - Seabird Bycatch: Trends, Roadblocks and Solutions*. University of Alaska Sea Grant. AK-SG-01-01

Sullivan B., Reid T. 2002. Seabird interactions/mortality with longliners and trawlers in the Falkland/Malvinas island waters. CCAMLR-WG-FSA-02/36

Tuck G., Bulman C. In Press. Spatio-temporal trends in longline fisheries of the Southern Ocean and implications for seabird by-catch. *Biol. Conserv.*

Trager D. 2000. Longline Fisheries of Canada. *Report on the International Fishers' Forum on solving the incidental bycatch of seabirds in longline fisheries*. Auckland, New Zealand, 6-9 November 2000.

Uozumi Y., Tanaka H., Takeuchi Y. 1997. Review of Japanese RTMP observer program in the high seas waters since 1992. Unpubl. Report. National Research Institute of the Far Seas Fisheries, Japan.

Weimerskirch H., Capdeville D., Duhamel G. 2000. Factors affecting the number and mortality of seabirds attending trawlers and long-liners in the Kerguelen area. *Polar Biol.* 23: 236-246.

Appendix 1: List of abbreviations of Regional Fisheries Management Organisations

CCAMLR	Commission for the Conservation of Antarctic Marine Living Resources
CCSBT	Commission for the Conservation of Southern Blue-fin Tuna
IOTC	Indian Ocean Tuna Commission
SWIOTC	South West Indian Ocean Tuna Commission
WIOTO	Western Indian Ocean Tuna Organisation
ICCAT	International Commission for the Conservation of Atlantic Tunas
SEAFO	South East Atlantic Fisheries Organisation
FFA	Forum Fisheries Agency
CPPS	Comisión Permanente del Pacífico Sur
IATTC	Inter-American Tropical Tuna Commission
WPRFMC	Western Pacific Regional Fisheries Management Council
IPHC	International Pacific Halibut Commission

Table 1. The breeding territories, foraging range states, and Regional Fisheries Management Organizations (RFMOs) overlapping with the foraging ranges of threatened seabirds at risk from longline fishing operations.

Species	Amsterdam Albatross <i>Diomedea amsterdamensis</i>	Antipodean Albatross <i>Diomedea antipodensis</i>	Black-browed Albatross <i>Thalassarche melanophrys</i>	Black-footed Albatross <i>Phoebastria nigripes</i>	Buller's Albatross <i>Thalassarche bulleri</i>	Cambell Albatross <i>Thalassarche impavida</i>	Chatham Albatross <i>Thalassarche eremita</i>	Grey-headed Albatross <i>Thalassarche chrysostoma</i>	Indian Yellow-nosed Albatross <i>Thalassarche carteri</i>	Northern Royal Albatross <i>Diomedea sanfordi</i>	Southern Royal Albatross <i>Diomedea epomiphora</i>	Salvin's Albatross <i>Thalassarche salvini</i>	Short-tailed Albatross <i>Phoebastria alibris</i>	Sooty Albatross <i>Phoebastria fusca</i>	Tristan Albatross <i>Diomedea dabberena</i>	Wandering Albatross <i>Diomedea exulans</i>	Waved Albatross <i>Phoebastria irrorata</i>	Southern Giant Petrel <i>Macronectes giganteus</i>	Black Petrel <i>Procellaria parkinsoni</i>	Spectacled Petrel <i>Procellaria conspicillata</i>	Westland Petrel <i>Procellaria westlandica</i>	White-chinned Petrel <i>Procellaria aequinoctialis</i>	Total
Conservation Status	CE	V	V	V	V	V	CE	V	V	E	V	V	V	V	E	V	V	V	V	CE	V	V	
Breeding territories																							
Argentina																							1
Australia			√					√									√						5
Chile			√					√															3
Ecuador																	√						1
France ¹	√		√					√	√					√		√							8
Japan				√									√										2
New Zealand		√	√		√	√	√	√		√	√	√							√				12
South Africa								√	√					√		√						√	6
UK ²			√					√						√	√	√				√			8
USA				√																			1
Foraging Range States (EEZs)																							
Angola			√																				1
Argentina			√					√		√	√			√		√							8
Australia		√	√		√	√	√	√	√	√	√	√		√		√							14
Brazil			√							√	√			√	√					√			7
Canada				√									√										2
Chile		√	√		√		√	√		√	√	√				√					√		12
China				√									√										2
Columbia																				√			1
Ecuador					√												√			√			3
Japan				√									√										2
Mozambique								√															1
Madagascar								√															1
Mexico																					√		1
Namibia			√									√			√	√							6
New Zealand		√	√		√	√	√	√	√	√	√	√				√			√	√	√	√	16
Panama																					√		1
Peru			√		√		√					√					√			√		√	8
Russia				√									√										2
South Africa			√					√	√	√	√	√		√	√	√				√		√	11
South Korea				√									√										2
Taiwan				√									√										2
Uruguay			√					√		√	√			√	√					√		√	9
USA				√									√										2
Regional Fisheries Bodies																							
CCAMLR			√			√		√	√	√	√			√	√	√							11
CCSBT	√	√	√		√	√	√	√	√	√	√	√		√	√	√			√	√			18
IOTC	√		√			√		√	√	√	√			√		√							11
SWIOFC	√		√					√	√	√	√			√		√							10
WIOTO	√		√					√	√	√	√			√		√							10
ICCAT			√					√	√	√	√			√	√	√				√			10
SEAFO			√					√	√	√	√			√	√	√				√			10
FFA		√	√		√	√	√	√	√	√	√	√			√	√					√	√	15
CPPS		√	√		√	√	√	√	√	√	√	√				√	√				√	√	13
IATTC		√	√	√	√	√						√	√				√				√	√	11
WPRFMC				√									√										2
IPHC				√									√										2

¹ French Southern Territories

² United Kingdom Overseas Territories

CE = Critically Endangered; E = Endangered; V = Vulnerable

Table 2. Continued

		Species	Amsterdam Albatross	Antipodean Albatross	Black-browed Albatross	Black-footed Albatross	Buller's Albatross	Cambell Albatross	Chatham Albatross	Grey-headed Albatross	Royal Albatross (Northern)	Royal Albatross (Southern)	Royal Albatross Total	Salvin's Albatross	Short-tailed Albatross	Sooty Albatross	Tristan Albatross	Wandering Albatross	Waved Albatross	Yellow-nosed Albatross (Atlantic)	Yellow-nosed Albatross (Indian)	Yellow-nosed Albatross Total	Northern Giant Petrel	Southern Giant Petrel	Giant petrel Total	Black Petrel	Spectacled Petrel	Westland Petrel	White-chinned Petrel	Total Hooks (1000s)	Estimated Bycatch rate (Bird/1000hooks)	Estimated Total Seabird Bycatch	Sources
US	Tunas	North Pacific				60.9																										3,268	12
	Swordfish	West Coast				100																										0.28	27
	Cod & other Groundfish	Alaska				4									Rec																	16,800	28
IUU fishing within CCAMLR areas	Toothfish	48.3 (UK)			(8.1)					(0.7)								(2)					(0.3)	(10.8)	(11.2)					(77.8)	1,000	40	23, inferred from 29
	Toothfish	58.6 & 58.7 (France & S. Africa)			(0.32)					(14.2)					(0.1)		(0.1)				(3.4)	(3.4)	(0.77)	(1.87)	(3.29)					(67.4)	11,300	10,150	23, inferred from 30
	Toothfish	58.5.1 & 58.5.2 (France & Australia)			(3.7)					(3.2)								(1.3)												(91.8)	6,100	41,700	23, inferred from 31
	Toothfish	58.4.4																													2,200	13,900	23
	Toothfish	88.1																													3,700	150	23
Number of Countries			2?	2	11	4	3	2	3	5		2	5	1	2	2	3	8	1	1	1	5	3	5	8	1	3	2	10				
Number of fisheries			2?	3	22	6	4	3	4	8		2	6	2	2	3	4	12	1	2	1	8	6	7	12	2	4	3	21				

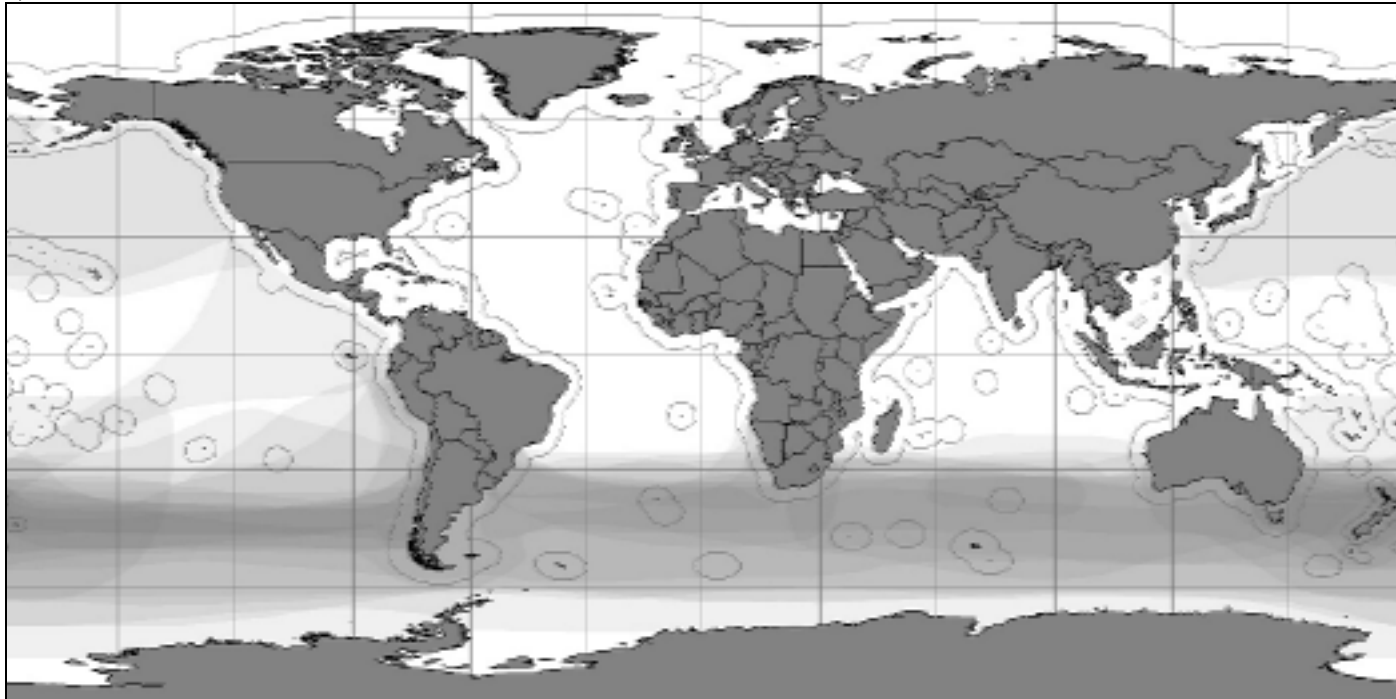
Footnotes: () indicate inferences from closely related studies or extrapolations from data supplied in references shown.
Maj = Majority of bycatch; Prob = Probably this species; Rec = Recorded
CE = Critically Endangered; E = Endangered; V = Vulnerable

References:

- Favero & Rodriguez 2002
- Reid *et al.* 2001
- Brothers *et al.* 1998
- Neves 2000
- Olmos *et al.* 2000
- Morgan *et al.* 2000
- Trager 2000
- Arata & Moreno 2002
- Garcia 2000
- CCAMLR 2001
- Uozumi 1997
- Tuck *et al.* in press
- Crowder & Myers 2001
- Baird, in press
- NZ Dept. of Conservation 2002
- Jancke 2001
- C.J.R. Robertson, pers. comm.
- Ryan & Watkins 2001
- Osbourne & Mullins 2002
- Ryan *et al.* 2002
- Huang & Day 2000
- Hsia. 2002
- CCAMLR 2002.
- Sullivan & Reid 2002
- Stagi 2000
- Stagi *et al.* 1998
- Rivera 2002
- Stehn *et al.* 2001
- Moreno *et al.* 1996
- Nel *et al.* 2002
- Weimerskirch *et al.* 2000
- D. Anderson, pers. comm.

Figure 1. The foraging distributions of threatened seabirds at risk from longline fishing in relation to National EEZs (a) and areas of competence of RFMOs (b).

a)



b)

