SEABIRDS

SUPPORTING INFORMATION

(Information collated from reports of the Working Party on Ecosystems and Bycatch and other sources as cited)

CONSERVATION AND MANAGEMENT MEASURES

Seabirds in the Indian Ocean are currently subject to a number of Conservation and Management Measures adopted by the Commission:

- Resolution 15/01 *on the recording of catch and effort data by fishing vessels in the IOTC area of competence* requires numbers of seabirds to be recorded for longline and gillnets fleets.
- Resolution 15/02 *mandatory statistical reporting requirements for IOTC CPCs* requires data on seabirds to be reported as specified in Resolution 12/06. Forms for reporting logbook data on discards according to standard IOTC reporting procedures are located at: **www.iotc.org/data/requested-statistics-and-submission-forms**
- Resolution 12/06 *On reducing the incidental bycatch of seabirds in longline fisheries*, came into force on 1 July, 2014, and requires all longline vessels in the area south of 25 degrees South latitude, to use simultaneously at least two of the following three mitigation measures:
    - Night setting with minimum deck lighting
    - Bird-scaring lines (Tori Lines)
    - Line weighting.
- Resolution 11/04 *on a Regional Observer Scheme* (commenced on 1 July 2010) requires data on seabird interactions to be recorded by observers and reported to the IOTC within 150 days. The Regional Observer Scheme (ROS) aims to collect scientific observer data on catch and incidental catches on, at least, 5% of the fishing operations of vessels over 24m and vessel under 24m fishing outside their EEZ. The requirement under Resolution 11/04, in conjunction with the reporting requirements under Resolution 12/06, means that all CPCs should be reporting seabird interactions as part of their annual report to the Scientific Committee.

RESOLUTION 12/06 ON REDUCING BYCATCH OF SEABIRDS IN LONGLINE FISHERIES

1. CPCs shall record data on seabird incidental bycatch by species, notably through scientific observers in accordance with Resolution 11/04 and report these annually.
2. CPCs that have not fully implemented the provisions of the IOTC Regional Observer Scheme outlined in paragraph 2 of Resolution 11/04 shall report seabird incidental bycatch through logbooks, including details of species, if possible.
3. CPCs shall provide to the Commission, as part of their annual reports, information on how they are implementing this measure.

RESOLUTION 11/04 ON A REGIONAL OBSERVER SCHEME

10. Observers shall:

a) Record and report fishing activities, verify positions of the vessel;

b) Observe and estimate catches as far as possible with a view to identifying catch composition and monitoring discards, by-catches and size frequency;

c) Record the gear type, mesh size and attachments employed by the master;

d) Collect information to enable the cross-checking of entries made to the logbooks (species composition and quantities, live and processed weight and location, where available); and

e) Carry out such scientific work (for example, collecting samples), as requested by the IOTC Scientific Committee..

RESOLUTION 15/02 MANDATORY STATISTICAL REPORTING REQUIREMENTS FOR IOTC CONTRACTING PARTIES AND COOPERATING NON-CONTRACTING PARTIES (CPCS)

Para. 3. Concerning cetaceans, seabirds and marine turtles data should be provided as stated in Resolutions 13/04 *on Conservation of Cetaceans*, Resolution 12/06 *on reduction the incidental bycatch of seabirds in longline fisheries* and Resolution 12/04 *on the conservation of marine turtles* (or any subsequent superseding resolutions).

CONSERVATION AND MANAGEMENT MEASURES IN OTHER REGIONS

Evidence from areas where seabird incidental catches was formerly high but has been substantially reduced (e.g. Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR) and South Africa) has shown that it is important to employ, simultaneously, a suite of mitigation measures. Research conducted in South Africa by Japanese and US researchers (Melvin et al. 2010) showed that bird scaring lines (BSL, also known as tori or streamer lines) displace seabird attacks on baits, but only as far astern as the BSL extends. If bait is sufficiently close to the surface behind the aerial extent of the BSL, the rate of attack by seabirds on baited hooks, and hence risk of incidental catches, remains high. This research shows clearly that appropriate sink rates must be used in tandem with BSLs and that unweighted branch lines or those with small weights placed well away from the hook pose the highest risks to seabirds. To date, the research also suggests no negative effect of line-weighting on target catches (Melvin et al. 2010, Gianuca et al., 2013, Jiménez et al 2013, Robertson et al. 2013, ACAP 2016). In addition, experience from CCAMLR and elsewhere has indicated a number of additional factors contribute to successful reduction of seabird incidental catches (FAO 2008, Waugh et al. 2008). These include research to optimise the effectiveness of mitigation measures and their ease of implementation, the use of onboard observer programs to collect seabird incidental catches data and evaluate the effectiveness of incidental catches mitigation measures, training of both fishermen and observers in relation to the problem and its solutions, and ongoing review of the effectiveness of these activities. Mitigation measures recommended by ACAP (Agreement on the Conservation of Albatrosses and Petrels) as effective include weighted branch lines that ensure that baits quickly sink below the reach of diving seabirds, night setting, and appropriate deployment of well designed BSLs. ACAP's advice is that the simultaneous use of all three of these measures is the most effective way to reduce seabird bycatch in pelagic longline fisheries. ACAP has recently (2016) updated its advice on the specifications for line-weighting, and to include in the list of best practice measures two hook-shielding devices, which encase the point and barb of baited hooks until a prescribed depth or immersion time has been reached (ACAP 2016, Wolfaardt et al. 2016)

Reduction of seabird incidental catches may even bring benefits to fishing operations, for example by reducing the loss of bait to seabirds. Research in Brazil showed a reduction of 60% of the capture of seabirds and higher catch rates (20–30%) of target species when effective mitigation measures were applied (Mancini et al. 2009). However, more detailed economic assessments across a diversity of regions, fishing gears and seasons are required to get a fuller picture of economic benefits.

The International Commission for the Conservation of Atlantic Tunas (ICCAT) established a conservation measure for seabirds at the November 2011 meeting of the Commission. In keeping with scientific advice given to the ICCAT, which is harmonious with the advice from the WPEB 2011, the measure requires the use of only three technologies to reduce risk to seabirds, namely bird scaring lines, line weighting and night setting. In areas of high incidental catches (or incidental catches risk), currently defined in the South Atlantic as of 25˚S, longline fishing vessels are required to use two of the three measures, consistent with IOTC Resolution 12/06.

INDICATORS – FOR SEABIRD SPECIES KNOWN OR LIKELY TO BE VULNERABLE TO MORTALITY FROM FISHING OPERATIONS IN THE IOTC AREA OF COMPETENCE.

Seabirds are species that derive their sustenance primarily from the ocean and which spend the bulk of their time (when not on land at breeding sites) at sea. Eighteen species of seabirds known to interact with longline fisheries for tuna and tuna-like species in the Indian Ocean are listed in **IOTC-2016-SC19-ES15**. However, not all reports identify birds to species level and, overall, information on seabird incidental catches in the IOTC area remains very limited (Gauffier 2007, IOTC–2011–SC13–R). Due to gaps in tracking and observer data, it is likely that there are other species at vulnerable to incidental catches which are not identified in this Executive Summary.

Worldwide, 15 of the 22 species of albatross are listed by the IUCN as globally threatened, with incidental catches in fisheries identified as the key threat to the majority of these species (Robertson & Gales 1998). Impacts of longline fisheries on seabird populations have been demonstrated (e.g. Weimerskirch & Jouventin 1987, Croxall et al. 1990, Weimerskirch et al. 1997, Tuck et al. 2001, Nel et al. 2003). In general, other IOTC gear types (including purse seine, bait boats, troll lines, and gillnets) are considered to have lower incidental catch of seabirds, however data remain limited. The Convention on Migratory Species (CMS) has recently completed a global review of incidental catches levels in gillnet fisheries (Waugh et al. 2013), and the findings of this report are relevant to seabird incidental catches in gillnet fisheries operating in the IOTC. A complementary study estimated that at least 400,000 birds die in gillnets each year (Žydelis et al. 2013), highlighting the importance of further investigation of the impact of IOTC gillnet fisheries on seabirds.

Range and stock structure

Eleven seabird families occur within the IOTC area of competence as breeding species. They are typically referred to as penguins (Spheniscidae), albatrosses (Diomedeidae), petrels and allies (Procellariidae), storm-petrels (Hydrobatidae), diving-petrels (Pelecanoididae), tropicbirds (Phaethonidae), gannets and boobies (Sulidae), cormorants (Phalocrocoracidae), frigatebirds (Fregatidae), skuas (Stercorariidae), gulls and terns (Laridae). Of these, the Order Procellariiformes (albatrosses and petrels) are most susceptible to being caught as incidental catches in longline fisheries (Wooller et al. 1992, Brothers et al. 1999), and therefore are most susceptible to direct interactions with IOTC fisheries.

The southern Indian Ocean is of global importance in relation to albatross distribution: seven of the 18 species of southern hemisphere albatrosses have breeding colonies on Indian Ocean islands[1]. In addition, all but one[2] of the 18

[1] Amsterdam, black-browed, grey-headed, Indian yellow-nosed, light-mantled, sooty and wandering albatrosses

southern hemisphere albatrosses forage in the Indian Ocean at some stage in their life cycle. The Indian Ocean is particularly important for Amsterdam albatross (*Diomedea amsterdamensis* – Critically Endangered) and Indian yellow-nosed albatross (*Thalassarche carteri* – Endangered), which are endemic to the southern Indian Ocean, white-capped albatross (*Thalassarche steadi* – endemic to New Zealand), shy albatross (*T. cauta* – endemic to Tasmania, and which forage in the area of overlap between IOTC and WCPFC), wandering albatross (*D. exulans* – 74% global breeding pairs), sooty albatross (*Phoebetria fusca* – 39% global breeding pairs), light-mantled sooty albatross (*P. palpebrata* – 32% global breeding pairs), grey-headed albatross (*T. chrysotoma* – 20% global breeding pairs) and northern and southern giant-petrel (*Macronectes halli* and *M. giganteus* – 26% and 30% global breeding pairs, respectively).

In the absence of data from observer programs reporting seabird incidental catches, risk of incidental catches has been identified through analysis of the overlap between albatross and petrel distribution and IOTC longline fishing effort, based on data from the Global Procellariiform Tracking Database (ACAP 2007). A summary map indicating distribution is shown in Figure 1 and the overlap between seabird distribution and IOTC longline fishing effort is shown in Table 1. The 2007 analysis of tracking data indicated that albatrosses breeding on Southern Indian Ocean islands spent 70–100% of their foraging time within areas overlapping with IOTC longline fishing effort. The analysis identified the proximity of the Critically Endangered Amsterdam albatross and Endangered Indian yellow-nosed albatross to high levels of pelagic longline effort. Wandering, shy, grey-headed and sooty albatrosses and white-chinned petrels showed a high overlap with IOTC longline effort. Data on distribution during the non-breeding season was lacking for many species, including black-browed albatrosses and white-capped albatrosses (known from incidental catches data to be amongst the species most frequently caught).

In 2009 and 2010, new tracking data were presented to the Working Party on Ecosystems and incidental catches (WPEB) which filled a number of gaps from the 2007 analysis, particularly for sooty albatross, and for distributions of juveniles of wandering, sooty and Amsterdam albatrosses, white-chinned and northern giant petrels (Delord & Weimerskirch 2009, 2010). This analysis indicated substantial overlap with IOTC longline fisheries.

Longevity, maturity, breeding season

Seabirds are long-lived, with natural adult mortality typically very low. Seabirds are characterised as being late to mature and slow to reproduce; some do not start to breed before they are ten years old. Most lay a single egg each year, with some albatross species only breeding every second year. These traits make any increase in human-induced adult mortality potentially damaging for population viability, as even small increases in mortality can result in population decreases.

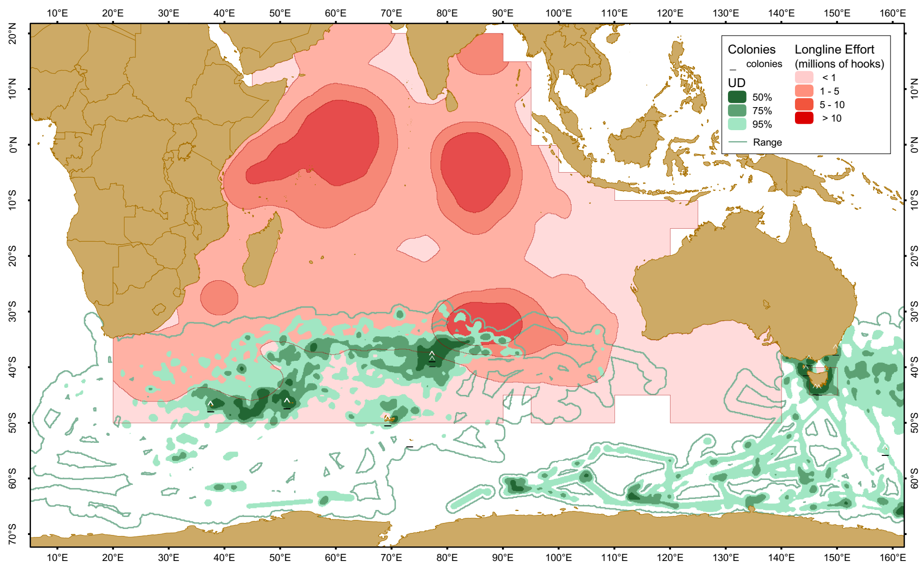

Fig. 1. Distribution of breeding albatrosses, petrels and shearwaters in the Indian Ocean (see Table 1 for a list of species included), and overlap with IOTC longline fishing effort for all gear types and fleets (average annual number of hooks set per 5° grid square from 2002 to 2005).

TABLE 1. Overlap between the distribution of breeding and non-breeding albatrosses, petrels and shearwaters and IOTC fishing effort* (Distributions derived from tracking data held in the Global Procellariiform Tracking Database.

Species/Population – Breeding	Global Population (%)	Overlap (%)
Amsterdam albatross (Amsterdam)	100	100
Antipodean (Gibson's) albatross		
Auckland Islands	59	1

[2] Atlantic yellow-nosed albatross (*Thalassarche chlororhynchos)*

Black-browed albatross		1
Iles Kerguelen	1	88
Macquarie Island	<1	1
Heard & McDonald	<1	
Iles Crozet	<1	
Buller's Albatross		2
Solander Islands	15	1
Snares Islands	27	2
Grey-headed albatross		7
Prince Edward Islands	7	70
Iles Crozet	6	
Iles Kerguelen	7	
Indian yellow-nosed albatross		
Ile Amsterdam	70	100
Ile St. Paul	<1	
Iles Crozet	12	
Iles Kerguelen	<1	
Prince Edward Island	17	
Light-mantled albatross	39	
Shy albatross		
Tasmania	100	67
Sooty albatross		
Iles Crozet	17	87
Ile Amsterdam	3	
Ile St. Paul	<1	
Iles Kerguelen	<1	
Prince Edward Island	21	
Wandering albatross		75
Iles Crozet	26	93
Iles Kerguelen	14	96
Prince Edward Islands	34	95
Northern giant petrel	26	
Southern giant petrel	9	
White-chinned Petrel		
Iles Crozet	?	60
Iles Kerguelen	?	
Prince Edward Island	?	
Short-tailed shearwater		
Australia	?	3

Species/Population – Non-breeding	**Global Population (%)**	**Overlap (%)**
Amsterdam albatross (Amsterdam)	100	98
Antipodean (Gibson's) albatross		9
Antipodes Islands	41	3
Auckland Islands	59	13
Black-browed albatross		
South Georgia (GLS data)	16	3
Heard & McDonald Islands	<1	
Iles Crozet	<1	
Iles Kerguelen	1	
Buller's albatross		13
Solander Islands	15	9
Snares Islands	27	15
Grey-headed albatross		
South Georgia (GLS data)	58	16
Iles Crozet	6	
Iles Kerguelen	7	
Prince Edward Island	7	
Indian yellow-nosed albatross		
Light-mantled albatross		
Northern royal albatross		3
Chatham Islands	99	3
Taiaroa Head	1	1
Shy albatross		
Tasmania	100	72
Sooty albatross		
Southern royal albatross		

Wandering albatross White-capped albatross Northern giant petrel Southern giant petrel White-chinned petrel Westland petrel Short-tailed shearwater		59

*Fishing data are based on the average annual number of hooks set per 5° grid square from 2002 to 2005. Overlap is expressed as the percentage of time spent in grid squares with longline effort, and is given for each breeding site as well the species' global population where sufficient data exists. Shaded squares represent species/colonies for which no tracking data were available).

Availability of information on the interactions between seabirds and fisheries for tuna and tuna-like species in the Indian Ocean

Longline vessels fishing in southern waters

The interaction between seabirds and IOTC fisheries is likely to be significant only in Southern waters (south of 25° degrees South), an area where most of the effort is exerted by longliners. Incidental catches are, for this reason, likely to be of importance only for longline fleets having vessels operating in these areas. The main fleets reporting longline fishing effort since 1955 in this area are those of Japan (accounting for 61%) and Taiwan,China (accounting for 34%) (**Fig. 1**), and data and meeting papers provided by these CPCs confirm high bycatch levels in this area. On the basis of data and papers presented to WPEB in 2016 (WPEB12), Spanish and Portuguese vessels targeting swordfish recorded very low levels of seabird bycatch, probably due to a combination of the mitigation measures used by these fleets, and the seabird densities within the areas in which they fish. It is important to note that Fig. 1 is based on reported effort which is highly incomplete (see paper ref: IOTC-2015-SC18-08, Apendix B for estimates of the level of under-reporting by longline fleets).

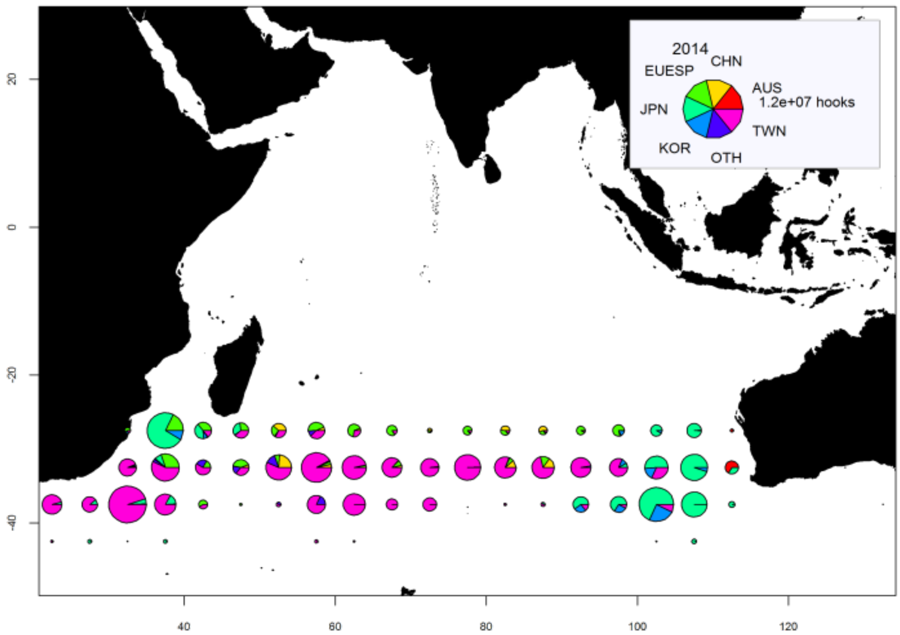

Fig. 2 Reported longline effort for fleets operating south of 25° south in 2014. (CHN = China, AUS = Australia, TWN = Taiwan,China, KOR = Rep. of Kora, JPN = Japan, EUESP = EU,Spain, OTH = Other fleets).

Bycatch data reported to the IOTC Secretariat

Globally it is recognised that onboard observer programs are vital for collecting data on catches of non-target species, particularly those species which are discarded at sea. More specifically, observers need to observe hooks during setting and monitor hooks during the hauling process to adequately assess seabird incidental catches and evaluate the effectiveness of mitigation measures in use. Levels of observer coverage levels are currently <1%, although coverage levels significantly in excess of 5% are likely to be needed to accurately monitor seabird incidental catches levels in IOTC fisheries.

IOTC CPCs are required to collect data on interactions with seabirds either through logbooks[3] or onboard observers[4] (Resolution 12/06) to better understand the nature and extent of the interactions between fisheries for tuna and tuna-

[3] www.iotc.org/data/requested-statistics-and-submission-forms

like species in the Indian Ocean and seabirds. While ad hoc pieces of information from a number of sources have been collated as far as possible for this document, it is noted that data presented in various documents such as Working Party papers and National Reports are not considered to be formal data submissions to the IOTC. Formal submissions of data in an electronic and standardized format using the available IOTC templates will considerably improve the quality of data obtained and the type of regional analyses that these data can be used for. Information reported to the IOTC Secretariat on the interactions of seabirds with longline gear is presented in **Table 2**. This table highlights which CPCs have provided some form of information to the IOTC on interactions of seabirds with longline gear, while Appendix II provides a summary of the observer data and discard data on seabird interactions that has been officially reported to the IOTC Secretariat.

[4] www.iotc.org/science/regional-observer-scheme-science

TABLE 2. Contracting Parties and Cooperating Non-Contracting Parties reporting seabird interactions with longline gear to the IOTC (2008–2015) As of 24 November 2016

	2008	2009	2010	2011	2012	2013	2014	2015	Sources/notes
CPCs									
Australia									Observer data; Discard form
Belize									
China									Observer data
Taiwan,China									Observer data
Comoros									No reported longline activity
European Union*	(ESP)	(ESP)	(ESP)	(ESP) (PRT)	(ESP) (FRA) (PRT)	(ESP) (PRT) (UK) (FRA)	(ESP) (PRT) (FRA)	(ESP) (PRT) (FRA)	ESP,FRA,PRT: Observer data ESP,PRT:(data call Res 12/06)
Eritrea									No reported longline activity
Guinea									No reported longline activity
India									
Indonesia									Observer data; IOTC-2016-SC19-NR10
Iran, Islamic Republic of									No longline activity since 2011
Japan									Observer data: submitted data (2010-2014)
Kenya									No active LL fleet 2011-2013
Korea, Republic of									Observer data (2009-2014): discard forms (2012-2015);IOTC-2016-SC19-NR14
Madagascar									Longline activities north of 25°S
Malaysia									*"no report of seabird interaction";*
Maldives, Republic of									*"observed annul catches"* IOTC-2014-SC17-NR17; No observer program in longline fleet
Mauritius									IOTC-2016-SC19-NR18 (vessel less than 24m - no observers deployed)
Mozambique									Letter to IOTC Secretariat reporting nil interactions (2015). Observer data in 2012. No fleet activity in 2013
Oman, Sultanate of									
Pakistan									No reported longline activity
Philippines									No longline activity in 2015
Seychelles									*No observer program for longline fleet*
Sierra Leone									No reported longline activity

Somalia									No reported longline activity
South Africa									Discard forms (includes foreign fleets)
Sri Lanka									Survey data: Discard form (NIL)
Sudan									No reported longline activity
Tanzania									"*There was no incidence of sea bird interaction*": IOTC-2016-SC19-NR29
Thailand									Observer program started in 2016
United Kingdom (OT)									No longline activity since 2010
Vanuatu									No longline activity in 2015
Yemen									No reported longline activity
Cooperating Non-contracting Party									
Djibouti									No reported longline activity
Senegal									No fishing activity since 2007

*Reporting countries in brackets
Green = CPC reported level of seabird interactions; Red = CPC did not report level of seabird interactions; Blue = CPC did not report active longline vessels

Longline

Observer data from longline fisheries occurring north of 20˚S is very sparse (Gauffier 2007). While seabird incidental catches rates in tropical areas are generally assumed to be low, a number of threatened seabirds forage in these northern waters. Due to their small population sizes, incidental catches at significant levels could be occurring but not, or almost never being observed.

Other gears

The impact of purse seine fishing on tropical seabird species, including larids (gulls, terns and skimmers) and sulids (gannets and boobies), is generally considered to be low, but data remain sparse and there are anecdotal observations which suggest that these interactions might merit closer investigation. However, no observation of incidental catch of seabird in the purse-seine fishery has been made in the Indian Ocean since the beginning of the fishery 25 years ago. The scale and impacts of gillnet fishing impacts on seabirds in the IOTC convention area is unknown. Outside the convention area, gillnet fishing has been recorded as catching high numbers of diving seabird species, including shearwaters and cormorants (e.g. Berkenbusch & Abraham 2007). The large coastal gillnet fisheries in the northern part of the IOTC clearly merit closer investigation, and should be considered a priority, as should the impact of lost or discarded gillnets (ghost fishing) on seabirds. See reference above to recent global reviews of seabird incidental catches in gillnet fisheries.

Indirect impacts of fisheries

Many tropical seabird species forage in association with tunas, which drive prey to the surface and thereby bring them within reach of the seabirds. The depletion of tuna stocks could therefore have impacts on these dependent species. More widely, the potential 'cascade' effects of reduced shark and tuna abundances on the ecosystem is largely unknown. Although these kinds of impacts are difficult to predict, there are some examples that suggest meso-predator release has occurred in the Convention area (e.g. Romanov & Levesque 2009)

ASSESSMENT

A number of comprehensive assessments of the status of Indian Ocean seabirds are available, in addition to the IUCN threat status:

- Modelling work on Crozet wandering albatrosses and impact of longline fisheries in the IOTC zone (Tuck et al. 2011).
- ACAP Species assessment for: Amsterdam Albatross, Indian Yellow-nosed Albatross, Northern Royal Albatross, Southern Royal Albatross, Shy Albatross, Sooty Albatross, Wandering Albatross, Northern Giant Petrel, Southern Giant Petrel, Grey Petrel, Spectacled Petrel, White-chinned Petrel (http://www.acap.aq/acap-species).

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APPENDIX I

OFFICIALLY REPORTED DATA

TABLE 3. Seabird interactions with longline gear by fleet (numbers of birds) based on observer data submitted to the IOTC Secretariat[5] as of 24 November 2016.

CPC	2010	2011	2012	2013	2014	2015	Coverage level (%)*
Australia	0	0	0		0		4.39
China	0		0	0	2		0.76
EU(France)	0	0	0	0	0	0	3.03
EU(Portugal)		0	0	22	0	0	8.65
Indonesia					64		0.02
Japan	11	201	28		32		6.05
Korea	76		16	6	2		7.24
Sri Lanka					0		<1.00
Mozambique			0				0.06
South Africa		195	97	93	129	17	3.53

*estimated mean annual observer coverage
** Observer data from South Africa includes foreign and national flagged vessels

TABLE 4. Seabird interactions with longline gear by fleet and gear (numbers of birds) based on discard data reported to the IOTC Secretariat[6] as of 24 November 2016.

CPC	2008	2009	2010	2011	2012	2013	2014	2015
Australia								12
EU(Spain)								4
EU(Portugal)						22		
Japan	116							
Korea					106	48	2	
Taiwan, China	18	156	428	12	42	87	47	21
South Africa (Foreign flag)	157 (1)	455	157	382	125	258	106 (147)	35(232)

*Discard data from South Africa is for South African vessels, except for numbers in brackets for foreign flagged vessels

[5] www.iotc.org/science/regional-observer-scheme-science

[6] www.iotc.org/data/requested-statistics-and-submission-forms