

A review of the information on Bycatch in the Indian Ocean

IOTC Secretariat

Written by Pauline Gauffier

Abstract

As requested by the Scientific Committee and the Working Party on Bycatch, the Secretariat of the Indian Ocean Tuna Commission (IOTC) reviewed the information available on incidental catch of non-target species in the Indian Ocean. In the effort to assess the extent of the bycatch issue, several data collection programs were contacted in 6 IOTC members such as Australia, the United Kingdom – for the British Indian Ocean Territory, the European Community representing –representing France, Spain Italy and Portugal, Japan, Madagascar and China, 2 Cooperating Non Contracting Parties, namely Indonesia and South Africa, as well as Non Governmental Organizations (NGOs) like WWF and BirdLife. Other members and CCP were contacted but did not provide any data. The main incidental catch concerning all fishing gears is sharks and seabirds for longline only. Turtle interactions remain poorly documented and reported, but catches occur in longline fisheries, in purse-seine fisheries when using Fish Aggregation Devices (FADs) where they can get entangled and in artisanal fisheries. Some countries, like Zanzibar in Tanzania, are taking mitigation measures to reduce dolphin bycatch.

More institutions than expected were found to collect data on bycatch but, the quality of the information recovered remains generally low due to a poor resolution of the data collected (*ie.* not recorded per gear/species) and/or low coverage rates of the data collection. This poor quality does not allow a good assessment the extent of the issue.

In some cases, slowness or unwillingness of some institutions to give the authorization for data transmission made impossible to get the raw data, while these are necessary to have a global view of the situation in the Indian Ocean. However the increase in the bycatch concern and new ongoing actions were found very positive.

The IOTC should encourage its members to improve existent data collection programs and/or implement new actions reducing the incidental catch of non-target species.

Introduction

During fishing operations targeting tuna and tuna-like species in the Indian Ocean, a number of other species are caught incidentally. They are usually called “bycatch”. These species include fishes of various species (sharks...) but also sea turtles, seabirds and marine mammals. Depending on fishermen decisions and maritime – national or international - laws, these animals can be either retained on board or discarded at sea, dead or alive.

This document presents the results of 6 month training period at the Secretariat of the Indian Ocean Tuna Commission (IOTC) on bycatch in the Indian Ocean. It provides an overview of the information available on bycatch by tuna fisheries within IOTC area of competence.

Firstly, bycatch will be defined and the mitigation measures IOTC has taken so far will be presented. Secondly, the construction of the catalogue will be described. A fourth part will present the results concerning the contact persons, programs and data recovered through this work, followed by a discussion and recommendations.

1) What is bycatch?

Several definitions of bycatch and discards can be found in the fisheries scientific literature. Hall (1996) defined very precisely what a bycatch is as follow:

- *Capture*, anything that is caught by the fishing gear,
- *Catch*, (*target catch* and *non-target catch*) the proportion of the capture that is retained on board,
- *Bycatch*, the proportion of the capture that is discarded dead or deadly injured at sea (for economic or legal reasons)
- *Release*, the proportion of the capture that is discarded at sea alive (with good survival expectations)

This definition allows separating the additional income for the fishery that can be brought by *non-target catch* and the waste that *bycatch* represents.

To make it easier, in the present document “bycatch” or “incidental catch” will refer to all the animals that are incidentally captured without being primarily targeted. In fact this definition will serve the purpose of the “ecological cost” of the Indian Ocean tuna fisheries. If necessary, distinctions will be made on an *ad hoc* basis.

Bycatches does not include the same species for the different fishing gears. As an example, in the tropical tuna purse seine fishery, other fishes, and in particular sharks and rays, but also occasionally sea turtles can be encircled in the net, while in longline fisheries, seabirds can be hooked or entangled in the line in addition to the previous animals. In the Indian Ocean, artisanal tuna fisheries also capture incidentally other fishes, seabirds and sea turtles as well as marine mammals.

2) The IOTC Working Party on Bycatch (WPBy)

The Members of the IOTC have taken steps to mitigate the incidental mortality of sea turtles and seabirds, as well as to assess the extent of the incidental take of other species.

As one of these steps, the Working Party on Bycatch (WPBy) was established in 2004 to collect data and study the effects of these catches on the ecosystem. The concern regarding the catch of sharks by longliners was expressed during the 4th Scientific Committee (SC) of IOTC but the necessity of a WP on By-catch and Environment was not agreed unless enough participation could be assured (IOTC 2001 respectively §23 and 73). However, during the 5th SC of IOTC, some terms of references for a WPBy were drafted (IOTC 2002a §103-106) and approved at the following Session of the Commission in December 2002 (IOTC 2002b §44, 45). The WPBy was operating by email for a few years thanks to its Chairman Dr. Kalish elected in 2003 (IOTC 2003 §88) and finally the first meeting of the WPBy was held in July 2005 in Phuket, Thailand.

Since 2005, two Recommendations and two Resolutions have been adopted by IOTC to mitigate the incidental catch of sharks, sea turtles and seabirds. (Full texts in the Collection of resolutions and decisions by the Indian Ocean Tuna Commission see Annex 1)

a) Sharks

- Resolution 05/05 concerning the conservation of sharks caught in association with fisheries managed by IOTC:

The Commission adopts that Contracting Parties and Cooperating non-Contracting Parties (CPCs) shall annually report their data for shark catches, require that their fishermen use their entire catches of shark (fin-body ratio less than 5%), encourage the release of sharks incidentally caught, promote research on sharks; the Commission requires the WPBy to provide preliminary advice on the stock status of key shark species.

b) Sea turtles

- Recommendation 05/08 on sea turtles

The Commission encourages the CPCs to implement the FAO-COFI Guidelines to mitigate the impact of fishing operations on sea turtles, to collect and voluntarily provide the Secretariat with information on interactions with sea turtle in IOTC fisheries.

c) Seabirds

- Recommendation 05/09 on incidental mortality of seabirds

The Commission recommends that: CPCs should inform the SC and the Commission of the status of their National Plans of Action (POA) for Reducing Incidental Catches of Seabirds in Longline Fisheries and implement the FAO International POA, be encouraged to collect and voluntarily provide information on interactions with seabirds and support the developing countries to implement the FAO IPOA; when feasible, the SC should present an assessment of the impact of the tuna fisheries on seabirds.

- Resolution 06/04 on reducing the incidental bycatch of seabirds in longline fisheries

The Commission adopts that: CPCs shall collect and provide all information available on seabird interactions in IOTC fisheries, seek to reduce seabird bycatches; the Commission shall develop effective mechanisms to record and exchange data on seabird interactions; all vessels fishing south of 30°S shall carry and use a tori pole and bird-scaring lines.

In addition to these resolutions, the 9th SC discussed the integration of an ecosystem approach in IOTC management policy. For this purpose, the SC recommended to extend the Terms of References of the WPBy. New Terms of References for a Working Party on Ecosystem and Bycatch (WPEB) were drafted in order to be considered at the next IOTC Session (see Annex 2).

In the first instance, the WPBy was supposed to identify the major bycatch species in the Indian Ocean tuna fisheries, assess the extent of their incidental take and elaborate mitigation measures. But the two meeting of the working party acknowledged the paucity and the poor resolution on bycatch data available in the IOTC database.

The Secretariat has therefore decided to allocate extra resources to develop a catalogue of the information available on bycatch by tuna fisheries in the Indian Ocean region.

Table 1: Summary of the construction of the Working Party on Bycatch

Year	Decision/Action	IOTC Meeting
2001	§23. catch of sharks by longliners §43. non necessity of a WPBy meeting	4 th Scientific Committee
2002	§103-105. draft terms of references of the WPBy §106. brief meeting during the WP on Tropical Tunas	5 th Scientific Committee
2002	§44. endorsement of the proposition of a new WPBy	7 th Session of the Commission
2003	§88. Chairman, Dr. John Kalish (Aust.) will start WPBy activities	6 th Scientific Committee
2004	§80-82. WPBy will operate by email, Chairman will identify the scientists who wish to participate by correspondence	7 th Scientific Committee
2005	Resolution 05/05 concerning the conservation of sharks caught in association with fisheries managed by IOTC	9 th Session of the Commission
2005	Recommendation 05/08 On sea turtles	-
2005	Recommendation 05/09 On incidental mortality of seabirds	-
2005	First meeting	1 st Working Party on Bycatch
2006	Resolution 06/04 On reducing incidental bycatch of seabirds in longline fisheries	10 th Session of the Commission
2006	Second meeting	2 nd Working Party on Bycatch

3) Building a “bycatch catalogue”

What do we know? The first step of the construction of this catalogue was to review the information on bycatch already available at the Secretariat, such as papers presented during the previous WPBy.

Who else is working on bycatch? The second step was to identify other potential data sources and find contacts in order to obtain them. This would lead to the building of a “bycatch network”.

What kind of information exists on bycatch? It was therefore planned to build a catalogue of the information available about tuna fisheries. Information sources could include surveillance or scientific observer programs, that provide the best data quality; port sampling programs (especially in fisheries where all the bycatch is landed), that usually do not allow to assess the extent of the catch but provide part of the information, and can be completed with logbook data. Finally, some publications could document incidental catches by fisheries that target primarily tuna and tuna-like species.

As the SC asked IOTC to encourage the promotion of Indian Ocean Tuna fisheries Observer Programs and the standardization of data collection, it was decided to get the maximum details about the observer programs that are currently implemented in the Indian Ocean. This

information could then be compared to the IOTC draft guidelines recommended for all Indian Ocean Tuna fisheries Observer Programs (IOTC-2005-SC-INF07).

4) Results

a. IOTC database

The information on incidental catch already available at the Secretariat was described in the two reports of the meetings of the WPBy (IOTC 2005b, IOTC 2006). The major issue highlighted in these reports was the paucity of data regarding bycatch and therefore the impossibility of producing the preliminary advice on the stock status of bycatch species, and especially sharks, seabirds and sea turtles as requested by IOTC Resolutions 05/05 and 06/04 and Recommendation 05/08.

b. A bycatch network

To find the persons related to bycatch in the different Indian Ocean countries, emails were sent to all the previous WPBy participants and to other contacts from IOTC directories.

In case of no reply, or non-satisfactory reply from a country, deeper researches were done. In this purpose, lists of participants of other meetings in relation with incidental catches in Indian Ocean tuna fisheries were used (such as FAO Workshop in Tanzania April 2006, Mayotte Workshop November 2006...), as well as CTURTLE and Bird bycatch mailing list.

Other RFMOs such as IATTC, ICCAT, CCSBT and SPC were also contacted to get more contact details or relevant publications. IATTC sent many relevant publications about fish, turtle and dolphin bycatch in the Western Pacific purse seine fishery. CCSBT provided IOTC Secretariat with all the documents presented by their members to their Ecologically Related Species Group.

c. Indian Ocean tuna fisheries data collection programs

The Secretariat tried to make a review of the existing Indian Ocean data collection programs, focusing on the one collecting bycatch details.

c.1. On-board observer programs

On-board observer programs are supposed to be the best way to collect sufficient reliable data to assess the catch of target and non-target species. Indeed, the observers are hired by fishing authorities or by a consultant company (independent from the fishing industry) where they are trained for specific data collection and therefore can provide reliable data; that is why the education and capacity building of the observers are major issues. Furthermore, as they do not take part in the fishing activities, they have more time to collect details on the species, particularly concerning bycatch species and discards. When the coverage of the fishing operation is sufficient, data collected by the observer programs can then be used to assess the extent of the catch of non-target species. Babcock *et al.* (2003) suggest that coverage levels of at least 20% for common species and 50% for rare species in a fishery with more than a few thousand trips per year would give reasonably good estimates of total bycatch.

- *British Indian Ocean Territory (BIOT) : foreign longliners and purse-seiners inside the Fisheries, Conservation and Management Zone*

Since 1994, BIOT has been running a scientific observer program on-board foreign tuna longliners and purse seiners fishing in the Fisheries, Conservation and Management Zone (FCMZ) surrounding the Chagos Archipelago. Every year, two observers are deployed by MRAG Ltd for three months maximum during the main fishing season, *i.e.* from December to February. They aim to cover both purse seiners and longliners, with an overall coverage that could be near 3% of the fishing operations (C. Mees, pers. comm.). The observers collect fishing conditions and environmental data as well as discards and bycatch details. Sometimes, biological data are also recorded and samples are taken to determine other factor like the age of the fish.

The terms of references, the five recording forms and the observer tour report template have been sent to the Secretariat.

Contact: MM. Chris MEES and John PEARCE

- *South Africa : domestic longliners and foreign fleets inside the EEZ*

Since 1998, South Africa has established an on-board scientific observer program for its tuna/swordfish longline vessels but also on foreign fleets. The observers are collecting fisheries data and biological samples, as well as seabird, sea turtle and shark bycatch data. The coverage of the program on-board foreign fishing vessel fishing in the South African EEZ is 100%. However, domestic vessels are expected to be much less covered.

The Secretariat received the observers' recording forms from this program.

Contact: MM. Craig SMITH and Dave JAPP

- *WWF/Birdlife marine programme responsible fisheries project South Africa Namibia*

Since 2005, World Wide Fund for Nature (WWF) and BirdLife put observers on South African and Namibian pelagic longliners. Observers collect details concerning fishing gears, fishing operations, catch, bycatch (shark, turtle, seabird, cetacean...), shark and marine mammal depredation, and seabird behaviour. This program aims to assess the impact of longline fishing on the threatened seabirds, sharks and turtles. It also aims to raise the awareness within the fishing industry of the potential impact of bycatch on threatened species and the benefits of the mitigation measures for the fishing industry itself (*e.g.* by minimizing loss of baits to birds). Observers are working close with fishermen to help them to find the appropriate mitigation measure for their vessel, and then train them to this measure and to safe release methods. They also collect detailed information on the biology of the birds caught and count the birds surrounding the fishing vessel. WWF and BirdLife observers are therefore completing MCM observers in the bycatch mitigation policy.

<http://marineprogramme.birdlife.co.za>

Contact: Samantha Petersen

- *Madagascar, domestic and foreign longliners in the Malagasy EEZ*

Since 2002, the Centre de Surveillance des Pêches (CSP) has an observer program on foreign tuna longliners fishing inside the Malagasy EEZ. The observers record fishing conditions, catch and effort data, and a few details on fish bycatches. 30 observers are hired but they are also deployed on other fishing fleets as shrimp trawlers and bottom longliners. Coverage rate for the tuna longline fishery is unknown.

The two recording forms concerning the tuna longline fleet have been recovered by the Secretariat.

Contact: Mr. Harimandimby RASOLONJATOVO.

- *EC Spain : domestic purse-seiners and longliners in the Indian Ocean*

Purse seiners

Since 2003, Instituto Español de Oceanografía (IEO) in collaboration with AZTI-Tecnalia has deployed observers on-board the EC-Spanish purse-seiners, and IRD France did it on the EC-French ones since 2005. The information collected includes data from the fishery, catch and effort, tuna discards and bycatches. Observers are also required to record the operations with the floating objects used by the fleet. They plan to reach a 10% coverage rate in 2008, but the real coverage rate has been much lower until now.

Longliners

In 2005, IEO conducted a Pilot Action on-board two Spanish surface longliners targeting swordfish and tropical tunas, experimenting different types of hooks and bait and their consequences on catch and bycatch. The observers collected information about catch condition (species, type of hook, bait...) as well as biological data (length, weight, sex, maturity...) of the species caught

Contact: Mrs. Alicia DELGADO and M. Javier ARIZ

- *EC France : purse-seiners and longliners in the Indian Ocean*

Since 2005, IRD France has carried out an observer program on French purse-seiners fishing in the Indian Ocean. The methodology was drawn in association with IEO and AZTI (see above). The coverage rate has been low until now but will improve in 2007, as the recruitment of the observers is being outsourced.

Contact: Mr. Renaud PIANET

Since January 2005, the administration of Terres Australes et Antarctiques Françaises (TAAF) is in charge of monitoring the activity of foreign purse-seiners fishing inside the French EEZ surrounding the Iles Eparses and Mayotte. The observers control the total quantity of tuna and tuna-like species caught by the foreign vessels. But since January 2006, they were also required to record discard and bycatch details as well as information about floating objects interactions.

Contact: Mr. Thierry CLOT

In March 2007, IRD France is planning to restart an observer program concerning the longline fleet targeting swordfish from La Réunion. Pilot cruises have been carried out to define the feasibility of the project. More formal trips should start in March.

Contact: MM. Renaud PIANET and Pascal BACH

- *EC: a joint meeting by IEO, IRD, AZTI*

A European Union Working Party, gathering IRD, IEO and AZTI, took place on the 26-30 March 2007 in Lanzarote (Canaries Islands) to organize a new database compiling all French and Spanish monitoring campaigns in the Indian Ocean since 1982. The three organisations plan to produce a paper together for the 3rd WPBy.

- *The Australian Western Tuna and Billfish Fishery (WTBF)*

Since 2003, the Australian Fisheries Management Authority (AFMA) has established an observer program in the Western Tuna and Billfish Fishery. The observers collect data on fishing operations, catch of target and non-target species, mitigation measures and interaction with non-target species, including seabirds, sea turtles, sharks and other fishes. Concerning bycatch, numbers (and weight if possible) and life status are recorded as well as whether the animal is retained or discarded. (Stobutzki *et al.* 2006)

AFMA has also carried out a small scale trial observer program in the Eastern Tuna and Billfish Fishery. The observers focused on data collection of seabird bycatch that is supposed to be high in this fishery. In addition, AFMA has developed a method that ensures that the seabird capture remains below 0.05 seabirds per thousands hooks, depending on level of observer effort and number of hooks set (Lawrence, 2006).

Contact: Kevin McLoughlin

- *CCAMLR 100% coverage observer program*

The Commission for the Conservation of Antarctic Marine Living Resource (CCAMLR) has established since 1992 an observer program on all demersal longline and finfish trawl vessels operating in the waters of the CCAMLR Convention. The observers collect details on catch and fish, seabird and marine mammal bycatch, as well as biology of the species caught, gear configuration, bycatch mitigation measures and waste disposal at sea. Sightings of IUU vessels are recorded, and tagging is also performed in some fisheries. A 100% observer's coverage rate is mandatory on all licensed fishing vessels in the Convention Area.

About 15 very detailed forms are used by the observers and they have been transmitted to the Secretariat.

Contact: Eric Appleyard

- *Indonesia, actions concerning the longline fleet*

Since August 2005, Indonesia has implemented a trial observer program for the longline fleet operating out of Benoa (Bali). This is one component of the Indonesia-Australia project "Capacity development to monitor, analyse and report on Indonesian tuna fisheries" which is funded by the Australian Centre for International Agricultural Research (ACIAR). Six observers were recruited and trained by ACIAR. They are supposed to record all the catch

and identify bycatch when possible. After their return from sea, the observers have to prepare a trip report for the vessel-owner. Working close to the Directorate General of Capture Fisheries, the Indonesian Tuna Commission and the tuna industry, a more extensive observer program could be developed during 2007. The ACIAR-funded project will run until September 2008.

Besides, a Fisheries High School “Observer” program operates out of Benoa since 1995. It is managed by the Office of Control & Surveillance of Fishing Vessels (WASKI). This program sees students from Indonesian Fisheries High Schools do a trip at sea on a Benoa-based longliner as part of their final year of training. The students record catch and collect some bycatch information. Data since 2000 has been entered into a database by research staff in Bali.

Contact: MM. Budi ISKANDAR (RCCF) and Craig PROCTOR (CSIRO).

Finally, WWF Indonesia has initiated an observer program in a partnership with tuna longline associations. They first interviewed fishermen on sea turtles bycatch and it was established that interactions between fishing gear and sea turtles occurred in Indonesian longliners, shrimp trawlers and artisanal fisheries. As the fishermen were willing to release the turtles alive, they were trained on handling methods of entangled or hooked turtles. A trial observer program was then implemented to design the best methods and protocols, and a more formal onboard program started in May 2006.

WWF-Indonesia also started a pilot program concerning the use of circle hooks in the 4 major tuna longline fleets (*i.e.* Pelabuhan Ratu-West Java, Cilacap-Central Java, Benoa-Bali and Bitung North Sulawesi) that needs to be expanded.

Contact: Ms. Lida PET-SOEDE, Mr. Imam MUSTHOFA.

- *Taiwanese deep seas longline observer program*

Since 2002, Taiwan, China has deployed observers on their deep-sea longline vessels fishing in the Indian Ocean. Taiwanese observers collect information on vessel’s equipment and fishing operations (baits, hooks...), catch per species, discards, measurement and biology of the catch, identification of incidental catch. 13 vessels have been observed since 2002, with the number of observers increasing yearly from 1 to 6 observers in 2005. Bycatch species identification includes non-targeted fishes, sharks and seabirds. No catch of sea turtles was recorded during 2002-2005 observations.

Contact: Mr. Eric (Shuikai) CHAN

c.2. Port sampling programs

Port sampling programs consist of the monitoring and sampling of the fishes unloaded in port. The catch is usually unloaded by the proper fishing vessels but sometimes carrier vessels transport it from the fishing boats to the port landing sites. The data collected cover only the part of the total capture that is officially landed, which is difficult to assess. They do not provide any information about the discards at sea, the areas where bycatch is more frequent or the quantity of fishes sold on the “black market” (usually bycatch species). Usually in these programs, the term “Bycatch” only refers to mutilated tuna and tuna-like

species or fish and shark species that will be sold on the local market (and not be transformed or exported).

- *Madagascar, sampling French and Spanish purse-seiners*

In 2002-2004, the Unité Statistique Thonière d'Antsiranana (USTA), coordinated by the French Institut de Recherche pour le Développement (IRD), use to have a port monitoring program where they were collecting landing data on tunas and other fishes, including sharks. About 70% of all unloading wells were sampled collecting target species information, while about 100% of the wells regarding non-target fishes. It has been stopped since 2005, due to a lack of funding. It may be restarted in 2007-2008.

Contact: Mr. Robert RABERANTO.

- *Indonesia, sampling the domestic longliners*

A multilateral tuna catch monitoring program, involving domestic and foreign institutions (DGCF¹-RCCF²-IOTC³/OFCF⁴-CSIRO⁵) was implemented in June 2002 in different Indonesian tuna landing sites. Landings come from Indonesian longliners. Bycatch species refer to tunas, billfishes and sharks (registered per species when possible), as well as barracudas and oilfish, mainly fishes that cannot be exported, and are sold on the local market. The fishes are counted and weighted after processing (processing method is registered).

Contact: MM. Budi ISKANDAR and Craig PROCTOR.

- *Port monitoring in Thailand*

A multilateral tuna catch monitoring program, involving IOTC-OFCF-AFRDEC⁶ has been established in Thailand.. Length and/or weight of landed fishes are recorded. "Bycatch" only refers to the tuna and tuna-like fishes that cannot be exported, and are sold on the local market.

Contact: Prulai NOOTMORN

c.3. Logbook data

- *Indonesian longliners*

A source of information could be the long term dataset held by the first longline company operating in Indonesia, Perikanan Samodra Besar. This state-owned company has good catch record since 1972. They may have collected some bycatch data. Delving deeper into this historical dataset will evaluate its potential bycatch component. (C. Proctor, pers. Comm.)

¹ Directorate General of Capture Fisheries, Indonesia

² Research Centre for Capture Fisheries, Indonesia

³ Indian Ocean Tuna Commission, Seychelles

⁴ Overseas Fisheries Cooperation Foundation, IOTC/OFCF Project, Seychelles

⁵ Commonwealth Scientific and Industrial Research Organization, Australia

⁶ The Andaman Sea Fisheries Research and Development Centre

At the third WPBy, it could be interesting to have a presentation of these program by their coordinators developing the methodology and the documents (forms, training materials...) used. A short questionnaire was drawn to summarize the characteristics of each project. Some documents have been already sent to the Secretariat, and will be available for the debate. The idea could be to work on standardization of data collection methodology as requested by the Scientific Committee and compare education materials.

d. Description of the new data obtained through the project

d.1. On-board observer programs

- *British Indian Ocean Territory*

Mr. John Pearce transmitted data gathered by BIOT Scientific Observers. The dataset consists of *Fish biological data* detailing species, length, weight, processed weight, sex and maturity per fishing operation (vessel, flag, date and school type). 6565 fishes from more than 50 species were recorded including 5201 from the three main tuna species (skipjack, yellowfin and bigeye tuna), other tropical tunas, billfishes and other fishes including sharks (see Table 2). Vessels surveyed involve six Japanese and six Taiwanese longliners as well as three French and one Spanish purse seiners (two of them under Seychelles' flag).

Table 2: List of the 5 main species measured (in number) for purse seine and longline (unpublished BIOT data, transmitted by Mr. Pearce)

Purse-seiners species	% (n=2548)	Longliners species	% (n=3901)
<i>Thunnus albacares</i>	67.9	<i>Thunnus albacares</i>	42
<i>Katsuwonus pelamis</i>	22.2	<i>Thunnus obesus</i>	31.9
<i>Coryphaena hippurus</i>	2.6	<i>Dasyatididae</i>	4.8
<i>Carcharhinus falciformis</i>	1.5	<i>Xiphias gladius</i>	3.8
<i>Elagatis bipinnulata</i>	1.2	<i>Alepisaurus ferox</i>	3.2
Total	95.4	Total	85.7

Then *Longline Effort data* from 58 longline sets observed consist of fishing vessel and flag, length of line, number of hooks set and recovered ; Vessels belong to Taiwan,China, Japan, Bolivia and Cambodia.

Finally, *Hook Survey* from 100% hooks observations on longliners includes 41 set details (vessel, flag, date and position, number of baits left and empty hooks) and quantity of fishes observed by species and status (landed, discarded, mutilated). From all longliners surveyed, 6 were Japanese (28 sets), 4 Taiwanese (10 sets) and 1 Bolivian (3 sets). Species described include tuna and tuna-like species in addition to other fishes and sharks (see Table 3).

Table 3: list of the 15 main species landed on-board and discarded from a hook survey on foreign longliners (unpublished BIOT data, transmitted by Mr. Pearce)

Species retained (n=2761)	%	Species discarded (n=1137)	%
<i>Thunnus albacares</i>	39,0	<i>Alepisaurus ferox</i>	81,1
<i>Thunnus obesus</i>	36,6	<i>Dasyatididae</i>	9,3
<i>Xiphias gladius</i>	4,4	<i>Xiphias gladius</i>	1,1
<i>Alepisaurus ferox</i>	2,8	<i>Pampus spp</i>	1,1

<i>Dasyatididae</i>	2,8	<i>Rajiformes</i>	1,1
<i>Prionace glauca</i>	2,5	<i>Thunnus obesus</i>	0,9
<i>Thunnus alalunga</i>	1,9	<i>Thunnus albacares</i>	0,5
<i>Pampus spp</i>	1,3	<i>Alopias pelagicus</i>	0,5
<i>Istiophorus platypterus</i>	1,1	<i>Gempylidae</i>	0,5
<i>Carcharhinus falciformis</i>	0,8	<i>Alopias superciliosus</i>	0,4
<i>Alopias pelagicus</i>	0,7	<i>Mola mola</i>	0,4
<i>Coryphaena hippurus</i>	0,6	<i>Sphyrnaena spp</i>	0,4
<i>Makaira indica</i>	0,6	<i>Prionace glauca</i>	0,3
<i>Makaira mazara</i>	0,6	<i>Coryphaena hippurus</i>	0,3
<i>Acanthocybium solandri</i>	0,5	<i>Selachimorpha</i>	0,3
Total	96,2	Total	98,4

Table 3 shows that the main species caught as target species are *Thunnus albacares* and *Thunnus obesus* representing 75% of the species landed and the major bycatch species or group of species retained are *Alepisaurus ferox*, rays (*Dasyatididae*) and blue sharks (*Prionace glauca*). Concerning the species discarded, 81% are *Alepisaurus ferox*, followed by 9% of rays (*Dasyatididae*).

In addition, Mr. Chris Mees submitted to the Secretariat biological details about two reef shark species *Carcharhinus albimarginatus* (silvertip reef shark) and *Carcharhinus amblyrhynchos* (grey reef shark) taken as by-catch in the FCMZ inshore fishery. In 2001, a total of 20 silvertip reef sharks and 32 grey reef sharks were measured and weighted, their average total length being respectively 111.7 and 95.3 cm and average weight 10.2 and 6.2 Kg. In 2003, observers measured and weighted 34 *C. albimarginatus* and 46 *C. amblyrhynchos*. Many data were collected like total length (average respectively 102.6 and 94.8 cm), body weight (av. 6.6 and 5.8 Kg), fork length (av. 81.6 and 76.0 cm) and dorsal fin height (both av. 98 mm). Shark sex was also recorded for all the animals observed, and sex ratio (M:F) appeared to be 2.1:1 for the silvertip reef shark and 1:1.9 for the grey reef shark. This document shows that both species display a similar body length-weight relationship with the curve depicting an allometric tendency, while fork length-body weight relationships are quite different. However, fork length is a good linear parameter for both shark weights. Plotting dorsal fin height (DFH) against fork length shows a curved line ($DFH^{0.51}$ for *C. albimarginatus* and $DFH^{0.74}$ for *C. amblyrhynchos*) and indicates that they do not grow proportionally. These results give a dorsal fin-to-body ratio for two shark species that were used by BIOT to assess the total weight of sharks caught, when only the fins used to be retained.

- *South African and Namibian Birdlife observers on domestic longliners*

Mrs. Samantha Petersen sent data from 2006 South African and Namibian Birdlife observer program on domestic pelagic longliners. Both datasets have the same format and gather details concerning fishing gears, conditions of setting and hauling, catch, bycatch (shark, turtle, seabird, cetacean...), shark and marine mammal depredation, and seabird behaviour. This data complete the document presented to the previous WPBy analysing 1998-2005 South Africa/Birdlife and WWF data (Petersen and Honig 2006).

South African observers surveyed 32 sets on three domestic longliners, and Namibian 18 sets.

The great majority of bycatch species found alive were released while the dead were retained on board, and all dead seabirds were sampled.

Table 4: Main bycatch species in South African and Namibian domestic longliners (2006 Birdlife data)

Main species (South Africa)	% (n=456)	Main species (Namibia)	% (n=1663)
Sharks	92.1	Sharks	99.3
Blue shark	66.9	Blue shark	79.3
Shortfin Mako shark	18.6	Shortfin Mako shark	18.1
Pelagic stingray	3.5	Crocodile shark	1.62
Copper shark	3.1	Thresher Sharks	0.24
Seabirds	4.8	Seabirds	0.18
Shy Albatross	3.9	Yellow-nosed Albatross	0.12
White chinned Petrel	0.9	Shy Albatross	0.06
Sea turtles	1.3	Marine mammals	0.18
Loggerhead turtle	0.9	Cape Fur Seal	0.18
Leatherback turtle	0.4	Total	100
Total	100		

A bycatch survey showed that blue shark (*Prionace glauca*) and shortfin mako shark (*Isurus oxyrinchus*) are the main species caught in both countries (see Table 4 above). In addition, two species of sea turtles (2 Loggerhead and 1 Leatherback) have been caught in South Africa and 3 marine mammals from the species *Arctocephalus pusillus* (Cape Fur Seal) in Namibia. Concerning seabird bycatch, South African longliners caught a majority of shy albatross (18 individuals).

- *WWF-Indonesia observer data*

Mr. Imam Musthofa from WWF Indonesia transmitted the data collected by the observers on 16 longline vessels between April and December 2006, from three different ports Benoa (Bali), Pelabuhan Ratu (West Java) and Bitung (North Sulawesi, Pacific Ocean side). 539 sets have been surveyed by 8 observers (See Table 5).

Table 5: observed bycatch in Indonesian longline fisheries (WWF-Indonesia observer program, 2006)

Hooks	832208
Species	Number
Tunas	11872
Other fishes	6077
Loggerhead Turtle	3
Leatherback Turtle	3
Hawksbill Turtle	5
Green Turtle	6
Olive Ridley Turtle	65
Unidentified Turtle	3
Cetaceans	3
Seabirds	2
Sharks	507

Main target species are Bigeye and Yellowfin tuna, but Albacore, Bluefin and Skipjack tuna are also taken. Major bycatch species include 507 sharks, *i.e.* almost one per set in average, unfortunately not recorded per species, other mixed fishes and sea turtles recorded per species, with a great majority of Olive Ridley turtle. 3 cetaceans and 2 seabirds were also recorded as caught.

- *Madagascar, domestic and foreign longliners inside the Malagasy EEZ*

Mr. Harimandimby Rasolonjatovo transmitted the data collected by the observers inside the Malagasy EEZ. Between July 2005 and June 2006, 22 fishing trips have been surveyed *i.e.* 1389 fishing days, from the 52 longliners authorized to fish in the area. Vessel flags were either from Madagascar, Indonesia, China and Taiwan-China, Seychelles, Mongolia or Korea. Tuna and tuna-like species catch were evaluated as well as dolphin fish and sharks. Longliners take a majority of albacore, bigeye and yellowfin tuna but sharks appear number four in the catch even though it is in lower quantities (See Table 6). Unfortunately, the catches of sharks are not available per species due to an uncertainty in species identifications by the observers. Billfishes and skipjack tuna catch are also recorded.

Table 6: Hooks survey on foreign longliners (Centre de Surveillance des Pêches, Madagascar)

Species	Total weight (kg)	%
<i>Thunnus alalunga</i>	575427	39.3
<i>Thunnus obesus</i>	400999	27.4
<i>Thunnus albacares</i>	227368	15.5
Sharks	100415	6.9
<i>Coryphaena hippurus</i>	46621	3.2
<i>Xiphias gladius</i>	45502	3.1
<i>Katsuwonus pelamis</i>	30333	2.1
<i>Istiphorus platypterus</i>	16377	1.1
<i>Makaira mazara</i>	11688	0.8
<i>Makaira indica</i>	7620	0.5
Total	1462350	100

Only one Malagasy observer has once noticed a seabird hooked in longline gear until now even though the birds are flying around the fishing vessels. Tori-lines are not mandatory in the area so none of the vessels used one. No turtles catch has been observed.

Mr. Rasolonjatovo would like to improve bycatch data collection, regarding other fishes but also seabirds.

- *Domestic and foreign longliners inside South African EEZ*

Mr. Craig Smith transmitted a dataset gathering seabirds and sea turtles bycatch taken by South African domestic longliners or Asian flag vessels. Seabirds and sea turtles are recorded per species and per month between 1999 and 2005, and the position of the catch is also collected. Observers are hired by CAPFISH SA, 30 have been trained for the tuna fishery but they also work with other fisheries. Between 1999 and 2005 about 3.9 million of hooks were surveyed, mainly from Asian flag vessels (about 400 000 hooks from domestic). Leatherback is the main turtle species caught by both domestic and Asian longliners. White-chinned petrel and Shy albatross are the two main species caught by both types of vessels. Most Asian flag vessels carried a tori-line while domestic longliners did not.

d.2. Port sampling programs

- *USTA port monitoring program in Madagascar*

Purse seiners

Mr. Robert Raberanto transmitted the data from 2002-2004 USTA port sampling to IOTC Secretariat. Landings in metric tons are listed for small or damaged yellowfin, bigeye and skipjack tuna as well as all wahoo, frigate tuna, rainbow runner, dolphin fish, triggerfish and sharks (See Table 7). These data come from 100 % of unloading wells sampled.

Table 7: USTA port sampling in Antsiranana in 2002-2003 and 1st semester 2004 (USTA dataset, transmitted by Mr. Raberanto)

Sampled species	2002	%	2003	%	2004	%
Frigate tuna	240.2	51.3	100.9	26.4	1.3	4.1
Skipjack tuna	97.8	20.9	63.1	16.5	1.5	5.0
Yellowfin tuna	44.6	9.5	30.3	7.9	0.5	1.5
Bigeye tuna	0.8	0.2	1.5	0.4	0.0	0.0
Rainbow runner	18.3	3.9	9.1	2.4	0.2	0.6
Wahoo	2.8	0.6	3.4	0.9	0.1	0.5
Sharks	3.9	0.8	3.0	0.8	0.1	0.2
Triggerfishes	6.2	1.3	5.5	1.4	0.2	0.6
Dolphin fish	36.2	7.7	26.3	6.9	0.4	1.4
Damaged big tunas	17.9	3.8	139.9	36.5	26.4	86.2
TOTAL (tons)	468.6	100	383	100	30.7	100
Wells sampled	146	-	107	-	11	-

2004 data are incomplete because USTA has stopped sampling non-target species and damaged tunas. Sharks are not recorded per species.

- *Bycatches in Saudi Arabian tuna fisheries*

Mr. Khalid Alshaye provided IOTC Secretariat with data on landed bycatch species in Saudi Arabian tuna and tuna-like fisheries. Data are transmitted per gear and per fishing area. Fishing gears concern gill net, surrounding net, hand line, troll line and longline in the Gulf and the Red Sea, as well as fish and shrimp trawl in International waters. A few IOTC species are targeted, several tuna species (called tunas) and the Narrow-barred Spanish mackerel (*Scomberomorus commerson*). Bycatches include other fishes, sharks and rays, squids, shrimps and crabs; more than 40 species or groups are listed. Tuna and tuna-like species (mainly *S. commerson*) are also part of bycatch from other fisheries (shrimp trawl, longline, handline and gill net).

- *Indonesian port monitoring*

The Secretariat received bycatch data coming from three landing sites for Indonesian longliners, Bena, Muara Baru and Cilacap. Bycatch species are counted and weighted after processing, then gathered by species or group of species, including tuna, billfishes, sharks, barracudas, wahoo and oilfish. Some billfish landings are available per species, as well as a few sharks.

- *Dolphin bycatch in Tanzania*

Mr. Omar A. Amir published two documents (Amir *et al.*, 2002 and 2005) about dolphin bycatch around Unguja Island, Zanzibar. In 2002, Amir *et al.* describe Zanzibar fisheries and their interactions with dolphins. In Zanzibar fisheries, drift nets target some IOTC pelagic species including *Scombridae* and *Istiophoridae* while bottom set gill nets target demersal fishes as *Carcharhinidae* and *Dasyatidae*. Dolphin bycatches concern mainly three species, Indo-Pacific bottlenose dolphin (*Tursiops aduncus*), spinner dolphin (*Stenella longirostris*) and Indo-Pacific humpback dolphin (*Sousa chinensis*). The extrapolations conducted to 93 dolphins that may have been caught during the year 1999 by the 200 fishing boats of the area. Further studies were made to assess the occurrence and distribution of dolphin species around Unguja Island. Most bycatches occurred near the Northern coast (Amir *et al.*, 2005). The high number of bycatches appeared to be a potential threat to dolphin populations in the area.

5) Other ongoing projects

a. Improving the observer programs

To improve the observer programs, the communication between people involved in bycatch monitoring and their participation at the Working Party on Bycatch should be encouraged. This could lead to a necessary standardization of the data collection procedures and training programs, and to discuss the efficiency of mitigation measures. Communication between RFMOs should also be encouraged, assuming that many fisheries are facing similar bycatch problems worldwide, and some of them have been running observer programs for years, *e.g.* IATTC in the purse seine fishery, and NMFS Pacific Islands Regional observer programs in the Hawaii based longline fleets or CCAMLR in the Antarctic Ocean.

An example of communication between bycatch stakeholders is the request from the Malagasy observer program. The Centre de Surveillance des Pêches in Madagascar was planning to start collecting data on seabirds, therefore the Secretariat contacted CCSBT and CCAMLR to ask the authorization for Madagascar to use the pamphlets these commissions produced on seabird bycatch. Once they accepted, both documents were transmitted to Malagasy observers. Furthermore, the Secretariat contacted BirdLife International to help planning future data collection on seabirds in Madagascar.

International conferences tried to improve the efficacy of fisheries observers. One example is the International Fisheries Observer Conference that hosted a workshop on development of best practices for longline data collection to facilitate research and bycatch reduction of protected species (Dietrich *et al.*, 2007) The International Fishers Forum also focused on observer programs, data collection and transmission.

FAO organized a Workshop on Assessing the Relative Importance of Sea Turtle Mortality Due to Fisheries in Zanzibar, Tanzania 25-28 April 2006. According to the participants, gillnetters and longliners targeting tuna, swordfish and sharks are respectively the first and second fishery-related threats to marine turtles in the South Western Indian Ocean. That is why the workshop recommends that fisheries administration such as RFMOs encourage data collection on sea turtle in both fisheries, as well as development of observer programs and research regarding possible mitigation measures, including hook modification in the longline fishery (FAO, 2006).

b. BirdLife and IOTC effort overlapping maps

As requested by the 9th Scientific Committee, the Secretariat contacted BirdLife International regarding seabirds' distribution in the Indian Ocean. Thanks to a worldwide tracking database (*i.e.* the Global *procellariiform* Tracking Database), BirdLife can produce albatross density distributions for a 5x5 degree grid per species. Longline effort data has to be reported monthly in 5 degree grid squares within the IOTC region, but it will be converted into kernels by Mrs. Frances Taylor (BirdLife International) to make them easier to understand and to overlay with albatross distributions.

The percentage overlap with different levels of fishing effort will be calculated for each of the species within IOTC area (see Table 8 below), split by colony where necessary. The latest effort data will be used for these calculations. Where sufficient data exists, the overlap will also be reported using quarterly data, to look at the seasonality of overlap. Maps will be created for all cases which show more than a minimal overlap. (F. Taylor, pers. Comm.)

Table 1: List of species which overlap with the IOTC area (Source: BirdLife Global *procellariiform* Tracking Database, transmitted by Mrs. Frances Taylor)

Species	Colony	Contributor
Amsterdam Albatross	Ile Amsterdam	Henri Weimerskirch
Antipodean Albatross	Antipodes Islands	David Nicholls
Black-browed Albatross	Iles Kerguelen	Henri Weimerskirch
	Macquarie Island	Rosemary Gales
Buller's Albatross	Snares Islands	Jean-Claude Stahl, Paul Sagar
	Solander Islands	Jean-Claude Stahl, Paul Sagar
Gibson's Albatross	Auckland Islands	David Nicholls
Grey-headed Albatross	Marion Island	Deon Nel
Indian Yellow-nosed Albatross	Ile Amsterdam	Henri Weimerskirch
Light-mantled Albatross	Macquarie Island	Rosemary Gales
Northern Royal Albatross	Chatham Islands	Christopher Robertson, David Nicholls
	Taiaroa Head	Christopher Robertson, David Nicholls
Short-tailed Shearwater	French & Montague Islands	David Nicholls, Nic Klomp & Mark Schultz
Shy Albatross	Tasmania	Rosemary Gales
Sooty Albatross	Iles Crozet	Henri Weimerskirch
Wandering Albatross	Iles Crozet	Henri Weimerskirch
	Iles Kerguelen	Henri Weimerskirch
	Marion Island	Deon Nel
	Indian Ocean	David Nicholls
White-chinned Petrel	Iles Crozet	Henri Weimerskirch

Preliminary results should be presented at the 3rd Working Party on Bycatch.

Concerning seabird bycatch, the Agreement on the Conservation of Albatrosses and Petrels (ACAP) may be represented at the next WPBy by Mr. Barry Baker, convener of ACAP Seabird Bycatch Working Group.

c. Other relevant ongoing works

IRD research program FADIO (Fish Aggregating Devices as Instrumented Observatories of pelagic ecosystems) conducted researches on Fish Aggregating Devices (FADs) in the Indian

Ocean (<http://www.fadio.ird.fr/>). They are planning to produce an article referencing the species that can be caught as bycatch by the purse seiners, encountered around FADs during the first part of the project (L. Dagorn, pers. Comm.)

Japan plans to submit two documents to the coming session of the IOTC Working Party on Bycatch; *Analysis of shark CPUE data in Japanese longline vessels*, coming from time series data of shark catch in commercial longline fishery, *Report of Japanese observer information collected in the Indian Ocean in 2006*, coming from a few observer data on commercial longline fishery. Japan has also a small number of research and training vessels operating in the Indian Ocean and collecting scientific data on catch and bycatch. (M. Kiyota, pers. Comm.)

Mr. Moazzam Khan informed the Secretariat that Pakistan may like to initiate a formal study on bycatch.

The Indian Ocean and South-East Asian Marine Turtle Memorandum of Understanding (IOSEA MoU) is a specialized intergovernmental agreement that develops a network of interested stakeholders and provides a program of necessary actions regarding sea turtle in the area. The IOSEA MoU came into effect on 1st September 2001 and 26 countries have signed it until April 2007 (Australia, Bahrain, Bangladesh, Cambodia, Comoros, Eritrea, Indonesia, Islamic Republic of Iran, Jordan, Kenya, Madagascar, Mauritius, Myanmar, Oman, Pakistan, Philippines, Saudi Arabia, Seychelles, South Africa, Sri Lanka, Thailand, United Arab Emirates, United Kingdom, United Rep. of Tanzania, United States of America, Viet Nam). The Conservation and Management Plan focuses on reducing threats to marine turtles including exploitation for meat, eggs and shell, destruction of nesting and feeding habitats and incidental fishing-related mortality. It also promotes regional cooperation and public awareness. (<http://www.ioseaturtles.org/>)

6) Discussion and recommendations

- a. Towards standardization of data collection
 - i. Resolution of the data

More agencies than expected were found to collect data on bycatch, and even more seemed to be interested in the subject and were planning to implement incidental catch monitoring program or research study on possible mitigation measures. However, the quality of the information transmitted to the Secretariat remains generally poor. This is sometimes due to the poor resolution of the data collected that are often aggregated, not recorded per species or not transmitted per gear. Recording data per species should be encouraged at least concerning the species most frequently caught and the endangered ones. Another problem is the low coverage rate of some observer programs. The main non-target species caught may be identified but too low coverage rates do not allow assessing the extent of the issue, especially when the catch is not representative of the entire fleet. Minimum level of data quality and coverage rate should be defined by the Working Party on Bycatch and then required by the Commission to ensure sufficient resolution of the data from all the programs running inside IOTC management area.

- ii. Training of the observers

Many problems of species identification seem to be due either to a lack of educational

material, to imprecise identification keys or to not sufficient training of the observers or controllers. Identify species is very important especially concerning endangered species, but also for the other species caught, including tunas. One issue during the observer training is the access to dead or alive animals to practice species identification, implementation of mitigation measures and safe-releasing methods. Other RFMOs have published identification guide and sheets concerning seabirds, sea turtles or sharks. IOTC members could compare their training materials and a proper species identification booklet should be chosen as a reference for all the observer programs in the Indian Ocean. The possibility of training programs at sea or in port should also be discussed to increase the resolution of the data collected.

iii. Database work

As some species were impossible to identify due to errors in the data entry (wrong 3-alpha code, local common name or error during the entry process), only one code should be used such as FAO 3-alpha codes and new codes could be decided for the species that do not have one. Whenever possible, the use of both 3-alpha code and scientific name is recommended. Methodology of data collection could be presented by the coordinators at the WPBY, to ensure that the data collected by the different programs, e.g. length measurement or fishing and observer effort, are equivalent.

The Working Party on Bycatch should encourage the member countries to improve existent observer programs and/or implement new actions reducing the incidental catch of non-target species. A close work with NGOs is also very important.

b. Government authorizations for data transmission

Sometimes it was difficult for the Secretariat to recover the data collected by the observers. Slowness or unwillingness of some institutions to give the authorization for data transmission made it very slow or even impossible to receive the raw data, while these would be necessary to have a global view of the situation in the Indian Ocean. All IOTC members should cooperate with the Secretariat to assess the extent of the incidental catch of non-target species.

c. Encouraging scientists and program coordinators from all member countries to participate in the bycatch project

A large part of IOTC members are not represented at the Working party on Bycatch, even when they are running a program collecting bycatch data or they want to implement one. This absence is mostly due to a lack of funding, especially concerning developing countries. It is negative for the IOTC because part of the information on bycatch is missing and it is also negative for the member country because exchange and advice cannot be provided by the WPBy. In 1995 was created the “Assistance Fund under Part VII of the Fish Stock Agreement for the implementation of the provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the conservation and management of straddling fish stocks and highly migratory fish stocks”. The purpose of this Fund is to provide financial assistance to developing States Parties, to assist them to implement the UN Fish Stocks Agreement’s provisions. This includes facilitating participation in RFMOs meeting such as IOTC meeting sessions and subsidiary bodies. IOTC member countries can submit an application for financial assistance from this Fund.

Conclusion

This document provides a better idea of the information available on bycatch in the Indian Ocean. The main incidental catch concerning all fishing gears is sharks and seabirds for longline only. Turtle interactions remain poorly documented and reported, but catches occur in longline, purse-seine and artisanal fisheries. Some countries, like Zanzibar in Tanzania, are taking mitigation measures to reduce dolphin bycatch.

More agencies than expected were found to collect data on bycatch but the quality of the information recovered remains generally low due to a poor resolution of the data collected (often not recorded per gear/species) and/or low coverage rates of the observers programs that do not allow assessing the extent of the issue. In addition, problems were faced to get the information, mainly government slowness or unwillingness to give the authorization for data transmission. However the increase in the bycatch concern and new ongoing actions were found very positive. Due to the complexity and the sensitivity of the bycatch issue, the members of the Indian Ocean Commission should consider the increase of the Secretariat staff with a full-time position to deal with this matter.

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<http://www.fisheriesobserverconference.com/> International Fisheries Observer Conference

<http://www.ioseaturtles.org/> Indian Ocean and South East Asian Marine Turtle Memorandum of Understanding

<http://www.fadio.ird.fr/> IRD research program FADIO (Fish Aggregating Devices as Instrumented Observatories of pelagic ecosystems)

<http://www.ccsbt.org/docs/eco.html> Commission of the Conservation of Southern Bluefin Tuna, Ecologically Related Species Working Group

APPENDIX 1

IOTC Recommendations and Resolutions concerning bycatch

Resolution 05/05 concerning the conservation of sharks caught in association with fisheries managed by IOTC

The Indian Ocean Tuna Commission (IOTC),

RECALLING that the United Nations Food and Agriculture Organisation (FAO) International Plan of Action of Sharks calls on States, within the framework of their respective competencies and consistent with international law, to cooperate through regional fisheries organisations with a view to ensuring the sustainability of shark stocks as well as to adopt a National Plan of Action for the conservation and management of sharks (defined as elasmobranchs);

CONSIDERING that many sharks are part of pelagic ecosystems in the IOTC area, and that tunas and tuna-like species are captured in fisheries targeting sharks;

RECOGNISING the need to collect data on catch, effort, discards and trade, as well as information on the biological parameters of many species, in order to conserve and manage sharks;

ADOPTS, in accordance with paragraph 1 of Article IX of the IOTC Agreement that:

1. Contracting Parties, Cooperating non-Contracting Parties (CPCs) shall annually report data for catches of sharks, in accordance with IOTC data reporting procedures, including available historical data.
2. In 2006 the Scientific Committee (in collaboration with the Working Party on Bycatch) provide preliminary advice on the stock status of key shark species and propose a research plan and timeline for a comprehensive assessment of these stocks.
3. CPCs shall take the necessary measures to require that their fishermen fully utilise their entire catches of sharks. Full utilisation is defined as retention by the fishing vessel of all parts of the shark excepting head, guts and skins, to the point of first landing.
4. CPCs shall require their vessels to not have onboard fins that total more than 5 % of the weight of sharks onboard, up to the first point of landing. CPCs that currently do not require fins and carcasses to be offloaded together at the point of first landing shall take the necessary measures to ensure compliance with the 5 % ratio through certification, monitoring by an observer, or other appropriate measures.
5. The ratio of fin-to-body weight of sharks described in paragraph 4 shall be reviewed by the scientific committee and reported back to the Commission in 2006 for revision, if necessary.
6. Fishing vessels are prohibited from retaining on board, transshipping or landing any fins harvested in contravention of this Resolution.
7. In fisheries that are not directed at sharks, CPCs shall encourage the release of live sharks, especially juveniles and pregnant sharks, to the extent possible, that are caught incidentally and are not used for food and/or subsistence.
8. CPCs shall, where possible, undertake research to identify ways to make fishing

gears more selective (such as the implications of avoiding the use of wire traces).

9. CPCs shall, where possible, conduct research to identify shark nursery areas.

10. The Commission shall consider appropriate assistance to developing CPCs for the collection of data on their shark catches.

11. This resolution applies only to sharks caught in association with fisheries managed by the IOTC.

12. This provision to apply without prejudice to many artisanal fisheries which traditionally do not discard carcasses.

Recommendation 05/08 On sea turtles

The Indian Ocean Tuna Commission (IOTC),

NOTING the need to improve the collection of scientific data regarding all sources of mortality for sea turtle populations, including but not limited to, data from fisheries within the IOTC Area to enhance the proper conservation of sea turtles;

RECOGNISING that at the 26th FAO-COFI Session in March 2005, the Guidelines to Reduce Sea Turtle Mortality in Fishing Operation (hereinafter referred to as “the Guidelines”) was adopted,

ACKNOWLEDGING the activities undertaken to conserve marine turtles and the habitats on which they depend, within the framework of the Indian Ocean – South-East Asian Marine Turtle Memorandum of Understanding (IOSEA MoU); noting the decision of the 22 IOSEA Signatory States to establish a voluntary reporting mechanism to monitor implementation of the Guidelines; and noting further IOSEA MoU Resolution 3.1 regarding collaboration with IOTC on marine turtle by-catch issues;

RECOMMENDS, in accordance with paragraph 8 of Article IX of the IOTC Agreement, that:

1. The Commission encourages Contracting Parties and Cooperating non-Contracting Parties (hereinafter referred to as “CPCs”) to implement the Guidelines, inter alia, the necessary measures for vessels fishing for tuna and tuna-like species in the IOTC Area to mitigate the impact of fishing operations on sea turtles:

A. General

i) Requirements for appropriate handling, including resuscitation or prompt release of all bycaught or incidentally caught (hooked or entangled) sea turtles.

ii) Retention and use of necessary equipment for appropriate release of bycaught or incidentally caught sea turtles.

B. Purse seine

i) Avoid encirclement of sea turtles to the extent practical.

ii) Develop and implement appropriate gear specifications to minimize bycatch of sea turtles.

iii) If encircled or entangled, take all possible measures to safely release sea turtles.

iv) For fish aggregating devices (FADs) that may entangle sea turtles, take necessary measures to monitor FADs and release entangled sea turtles, and

recover these FADs when not in use.

C. Longline

- i) Development and implementation of appropriate combinations of hook design, type of bait, depth, gear specifications and fishing practices in order to minimize bycatch or incidental catch and mortality of sea turtles.
- ii) Retention and use of necessary equipment for appropriate release of bycaught and incidentally caught sea turtles, including de-hooking, line cutting tools and scoop nets.

2. The Commission encourages CPCs to collect and voluntarily provide the Scientific Committee with all available information on interactions with sea turtles in fisheries targeting the species covered by the IOTC Agreement, including successful mitigation measures, incidental catches and other impacts on sea turtles in the IOTC Area, such as the deterioration of nesting sites and swallowing of marine debris.
3. Encourages CPCs to coordinate their respective IOTC and IOSEA implementation measures, where applicable; and urges the respective secretariats to intensify their collaboration and exchange of information in this area.
4. CPCs are encouraged to support developing countries in their implementing the Guidelines.

Recommendation 05/09 On incidental mortality of seabirds

The Indian Ocean Tuna Commission (IOTC),

TAKING INTO ACCOUNT the FAO International Plan of Action for Reducing the Incidental Catch of Seabirds in Longline Fisheries;

RECOGNISING the need to evaluate the incidental mortality of seabirds during longline fishing operations for tunas and tuna-like species;

NOTING that fisheries other than longline fisheries targeting tuna and tuna-like species may also contribute to the incidental mortality of seabirds;

FURTHER NOTING that other factors, such as swallowing marine debris, are also responsible for seabird mortality.

RECOMMENDS, in accordance with paragraph 8 of Article IX of the Agreement, that:

1. Contracting Parties and Cooperating non-Contracting Parties (hereinafter referred to as “CPCs”) should inform the Scientific Committee, if appropriate, and the Commission of the status of their National Plans of Action for Reducing Incidental Catches of Seabirds in Longline Fisheries. The Commission should urge CPCs to implement, if appropriate, the International Plan of Action for Reducing Incidental Catches of Seabirds in Longline Fisheries if they have not yet done so.
2. CPCs should be encouraged to collect and voluntarily provide Scientific Committee with all available information on interactions with seabirds, including incidental catches in all fisheries under the purview of IOTC.
3. When feasible and appropriate, Scientific Committee should present to the Commission an assessment of the impact of incidental catch of seabirds resulting from the activities of all the vessels fishing for tunas and tuna-like species, in the

IOTC Area.

4. CPCs are encouraged to support developing countries in their implementing the FAO International Plan of Action for Reducing the Incidental Catch of Seabirds in Longline Fisheries.

Resolution 06/04 On reducing incidental bycatch of seabirds in longline fisheries

The Indian Ocean Tuna Commission (IOTC),

RECALLING *Recommendation 05/09 On Incidental Mortality of Seabirds*;

RECOGNISING the need to strengthen mechanisms to protect seabirds in the Indian Ocean;

TAKING INTO ACCOUNT the United Nations Food and Agriculture Organisation (FAO)

International Plan of Action for Reducing the Incidental Catch of Seabirds in Longline

Fisheries (IPOA-Seabirds), and the IOTC Working Party on Bycatch objectives;

ACKNOWLEDGING that to date some Contracting Parties and Cooperating non-

Contracting Parties (hereinafter referred to as “CPCs”) have identified the need for, and have either completed or are near finalising, their National Plan of Action on Seabirds;

RECOGNISING the concern that some species of seabirds, notably albatross and petrels, are threatened with global extinction;

NOTING that the Agreement on the Conservation of Albatrosses and Petrels, which opened for signatures at Canberra on 19 June 2001, has entered into force;

NOTING that the ultimate aim of the IOTC and the CPCs is to achieve a zero bycatch of seabirds, especially threatened albatross and petrel species, in longline fisheries;

ADOPTS, in accordance with paragraph 1 of Article IX of the IOTC Agreement, that:

1. The Commission shall, within a year, develop effective mechanisms to enable CPCs to record and exchange data on seabird interactions, including regular reporting to the Commission, and seek agreement to implement all mechanisms as soon as possible thereafter.
2. CPCs shall collect and provide all available information to the Secretariat on interactions with seabirds, including incidental catches by their fishing vessels.
3. CPCs shall seek to achieve reductions in levels of seabird bycatch across all fishing areas, seasons, and fisheries through the use of effective mitigation measures.
4. All vessels fishing south of 30°S shall carry and use bird-scaring lines (tori poles):
 - Tori poles shall be in accordance with agreed tori pole design and deployment guidelines (provided for in Annex 1);
 - Tori lines are to be deployed prior to longlines entering the water at all times south of 30°S;
 - Where practical, vessels are encouraged to use a second tori pole and bird-scaring line at times of high bird abundance or activity;
 - Back-up tori lines shall be carried by all vessels and be ready for immediate use.
5. Surface longline vessels, whilst targeting swordfish, utilising the “American longline system” 1 and equipped with a line-throwing device, shall be exempted from the requirements of paragraph 4 of this Resolution.
6. The Commission shall, upon receipt of information from the Scientific Committee,

consider, and if necessary, refine, the area of application of the mitigation measures specified in paragraph 4.

7. The Commission shall consider adopting additional measures for the mitigation of any incidental catch of seabirds (including those applied and tested by the Convention on the Conservation of Antarctic Marine Living Resources) at its annual meeting in 2007.

¹ “American longline system” shall be taken to mean the use of light monofilament gear components for both mainline and droplines, incorporating light sticks. By design, baits will sink rapidly when this gear is set.

APPENDIX 2

DRAFT TERMS OF REFERENCE FOR AN IOTC WORKING PARTY ON ECOSYSTEMS AND BYCATCH (WPEB)

These revised Terms of Reference for the former Working Party on Bycatch reflect the wish of the Scientific Committee to reinforce the ability of integrating ecosystem considerations in the advice that the Scientific Committee is mandated to provide to the Commission.

Recognizing that a number of priority issues have been identified for the Working Party by the Scientific Committee, largely emanating from the requirements of IOTC Resolutions and Recommendations, the work of the Working Party on Ecosystems and Bycatch will include the specific tasks listed below. ,.

1. Monitoring

- Create and maintain an inventory of non-target, associated and dependent species caught by fleets targeting tuna and tuna-like species in the Indian Ocean.
- Improve conventional statistics (catch, effort, size) of species under the IOTC mandate that are caught incidentally in non-targeted fisheries.
- Monitor and improve information on interactions with species that are not under the IOTC mandate, with emphasis on those species of interest to the Commission and for which no Species Group has been established (e.g., sharks, sea turtles and sea birds).
- Facilitate access by scientists to oceanographic and environmental data.

2. Research

- Evaluate the relative impact of the different abiotic and biotic factors (including oceanographic and climate phenomena, directed and incidental fishing, predation, competition, pollutions and other human impacts) that affect the abundance, distribution and migration of IOTC species.
- Characterize main feeding and reproductive habitats of IOTC species.
- Characterize the volume, composition and disposition of non-target species that are caught incidentally in tuna and tuna-like fisheries within the IOTC Convention area.
- Investigate trophic interactions of IOTC species.
- Investigate the impact that changes in fishing gears or fishing technology have on the catch of target and non-target species.

3. Modelling

- Develop and monitor reference points and indicators that explicitly incorporate ecosystem considerations.
- Participate in the development of simulation, dynamic and statistical models focusing on mixed-fisheries, multi-species, by-catch and ecosystem issues.

4. Advice

- Develop mechanisms which can be used to better integrate ecosystem considerations into the scientific advice provided by Scientific Committee to the Commission.
- Investigate through operational models, potential benefits at an ecosystem level of alternative management strategies, such as time-area closures.
- Advise on the impacts of tuna and tuna-like fisheries on the populations of non-target species of interest to the Commission.