



**Report of the Second Session of the IOTC
Working Party on Bycatch**

Seychelles, 31 July – 1 August 2006

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1. OPENING OF THE MEETING AND ADOPTION OF THE AGENDA

1. The Second Meeting of the Working Party on Bycatch (WPBy) was opened on 31 August 2006 in Victoria, Seychelles, by the Chair Mr Kevin McLoughlin.
2. Mr McLoughlin welcomed the participants (Appendix I) and the agenda for the Meeting was adopted as presented in Appendix II.
3. The list of documents presented to the meeting is given in Appendix III.

2. REVIEW OF THE DATA

2.1 Status of IOTC databases

Data currently available on bycatch species (IOTC-2006-WPBy-03)

4. The collection and reporting of data on bycatch has been uneven overtime and as a consequence, the data held in the IOTC database are very incomplete. Non-tuna species that have catches recorded in the IOTC database are listed in Table 1.
5. Most of the bycatch data held by IOTC relates to sharks; however, several factors combine to make it difficult to estimate the total catches of sharks in the Indian Ocean. For example, the catches of sharks, when reported, typically represent only the sharks that were retained on board, and in many cases, they refer to dressed weights and no indication is given on the type of processing that took place. Furthermore, in the past, when only fins were retained on board, fishers rarely recorded the weights or numbers of sharks from which the fins were taken.
6. To date, the IOTC Secretariat has not received any reports from members or cooperating parties on the amounts of sea birds, sea turtles or other fauna caught incidentally by their vessels. The information that is available comes from research programmes or from other Regional Fishery Bodies, such as the CCSBT. These data refer in most cases to the catches of seabirds or other species by longline fisheries in specific areas and periods. The WPBy recalled the adoption of Resolutions (during the last two IOTC Sessions) intending to mitigate the catches of these species and/or promoting the collection and reporting of data and further encouraged all IOTC members and cooperating parties to increase the amount of information available in the future.
7. Observer programmes are one of the most important sources of data on bycatch species. The WPBy noted that coverage by observer programmes in the Indian Ocean is currently very low which means that it is unable to provide reliable estimates of the overall total catch of non-target species. Furthermore, the IOTC Secretariat currently holds no data from any of the observer programmes operating in the Indian Ocean.

Data related issues for bycatch

8. The following problems related to the data for the major bycatch species have been identified:
 - **Some shark catch data not available:** there is little information prior to the early 1970's available, and some countries continue not to collect shark data while others do collect it but do not report it to IOTC. It appears that significant catches of sharks have gone unrecorded in several countries. Furthermore, many catch records probably under-represent the actual catches of sharks because they do not account for discards (the catches of sharks for which only the fins are kept on board or of sharks usually discarded because of their size or condition and are rarely recorded) or they reflect dressed weights instead of live weights.
 - **Poor resolution of shark catch data:** The catches of sharks are usually not recorded per species or gear. Furthermore, the mis-identification of whole sharks is very common and identification of carcasses, fins or other products is difficult. Consequently, the estimates of shark catches by species are highly uncertain.
 - **Few shark size-frequency data are available:** There is a paucity of length or weight data available for Indian Ocean shark species.

- **There is little biological information on sharks available:** There is a paucity of biological data available for Indian Ocean shark species. Factors to convert from processed to round weight: some conversion factors for sharks are available from the FAO but these usually do not cover fins. The IOTC Secretariat has been deriving length to weight relationships for IOTC species, including sharks.
- **There is a paucity of information on the catches of sea turtles, sea birds or other associated fauna.** The only information available on the incidental catches of sea turtles, sea birds or other fauna by tuna and/or tuna-like fisheries in the Indian Ocean comes from observer programmes. While such programmes remain one of the most valuable sources information, the low coverage of observer programmes in the region currently restricts assessment of bycatch. Some information on the incidental catches of sea birds by some longline fleets operating in the Southern Indian Ocean is also available (from CCSBT).

Improvements to data on bycatch species

9. The WPBy acknowledged the paucity of information on bycatch available in the IOTC databases but were optimistic that, given the recent management measures relating to bycatch species implemented by the Commission that both the quality and quantity of data would start to improve in the near future. The WPBy reiterated the Commissions strong reminder made at its Tenth Session about the obligations of Members and national scientists to collect and provide relevant information. Furthermore, the WPBy expressed its satisfaction with IOTC Secretariat indications that it would allocate extra resources to the collation and collection of bycatch data over the next six months.

2.2 Information from bycatch studies in the IOTC area

Check list and catch rate data by hook type and bait for Bycatch species caught by Spanish experimental longline cruises in the south-western Indian Ocean during 2005 (IOTC-2006-WPBy-04)

10. This document presented catch data obtained from experimental cruises carried out by the Instituto Español de Oceanografía (IEO) in 2005 using two surface Spanish longliners in the south-western Indian Ocean between 25°S – 35°S and 30°E – 50°E to examine the efficacy of several types of hooks and baits. Observers recorded information on time, species, hook, bait and biological data including size, sex, individual weight and gonad weight. A total of 539 sets were made using 531,916 hooks, and 28,106 individuals of different species were caught. The fishing gear was mainly working at depths of between 40 and 90 m (range 16-210 m). The total catch weighed 1162 t, comprising 1076 t commercial species; 40 t nominal discards (commercial species not included in ships holds) 30 t bycatch; and 15t of discards because of predation. One tonne of tuna was opportunistically tagged.

11. Twenty five turtles were caught (19 tangled, 4 hooked). This equated to 0.047 turtles per 1000 hooks or 0.046 individuals per set. All were freed alive. The most common species was *Dermochelys coriacea* (17 individuals). Three marine mammals were also caught including a dolphin, a sea bear and a pilot whale. All were caught with circular hooks. A total of two albatrosses and one petrel were caught during the study. All were caught on hooks. Interestingly, these seabirds were caught in a two day period (16 and 17 October) and there were no other interactions between gear and sea birds over the year. In the case of sharks and rays, *Pteroplatytrygon violacea* had the highest catch rates (2.61 per 1000 hooks). By weight, sharks belonging to Subfamily *Rhinopteridae* had the highest catch rates (8.50 kg per 1000 hooks). All other species had catch rates below 0.5 per 100 hooks. The dominant fish species were *Alepisaurus ferox* (0.45 per 1000 hooks) and *Mola mola* (1.88 individuals per 1000 hooks). Other species had catch rates below 0.1 per 1000 hooks.

Table 1. Non-tuna species that have catches recorded in the IOTC Database (1994-2003).

Gear	Species	Espèce
Purse Seine	Species Aggregates	<i>Agrégés d'espèce</i>
Baitboat	Blue mackerel	<i>Maquereau tacheté</i>
	Dogtooth tuna	<i>Bonite à gros yeux</i>
	Striped bonito	<i>Bonite orientale</i>
	Species Aggregates	<i>Agrégés d'espèce</i>
Gillnet	Blue shark	<i>Peau bleue</i>
	Oceanic whitetip shark	<i>Requin océanique</i>
	Shortfin mako	<i>Taupe bleue</i>
	Silky shark	<i>Requin soyeux</i>
	Species Aggregates	<i>Agrégés d'espèce</i>
	Dogtooth tuna	<i>Bonite à gros yeux</i>
	Indian mackerel	<i>Maquereau des Indes</i>
	Striped bonito	<i>Bonite orientale</i>
	Species Aggregates	<i>Agrégés d'espèce</i>
Line	Blacktip reef shark	<i>Requin pointes noires</i>
	Blue shark	<i>Peau bleue</i>
	Broadnose sevengill shark	<i>Platnez</i>
	Copper shark	<i>Requin cuivre</i>
	Dusky shark	<i>Requin de sable</i>
	Shortfin mako	<i>Taupe bleue</i>
	Smooth hammerhead	<i>Requin marteau commun</i>
	Smooth-hound	<i>Emissole lisse</i>
	Tope shark	<i>Requin-hâ</i>
	Species Aggregates	<i>Agrégés d'espèce</i>
	Kanadi kingfish	<i>Thazard kanadi</i>
	Common dolphinfish	<i>Coryphène commune</i>
	Dogtooth tuna	<i>Bonite à gros yeux</i>
	Striped bonito	<i>Bonite orientale</i>
	Species Aggregates	<i>Agrégés d'espèce</i>
Longline	Angular rough shark	<i>Centrine communes</i>
	Bigeye thresher	<i>Renard à gros yeux</i>
	Blue shark	<i>Peau bleue</i>
	Bonnethead, hammerhead sharks	<i>Requins marteau</i>
	Broadnose sevengill shark	<i>Platnez</i>
	Copper shark	<i>Requin cuivre</i>
	Dusky shark	<i>Requin de sable</i>
	Longfin mako	<i>Petite taupe</i>
	Oceanic whitetip shark	<i>Requin océanique</i>
	Porbeagle	<i>Requin-taupe commun</i>
	Scalloped hammerhead	<i>Requin marteau halicorne</i>
	Shortfin mako	<i>Taupe bleue</i>
	Silky shark	<i>Requin soyeux</i>
	Smooth hammerhead	<i>Requin marteau commun</i>
	Smooth-hound	<i>Emissole lisse</i>
	Tiger shark	<i>Requin tigre commun</i>
	Tope shark	<i>Requin-hâ</i>
	Species Aggregates	<i>Agrégés d'espèce</i>
	Barracudas	<i>Brochets de mer</i>
	Black escolar	<i>Escolier noir</i>
	Butterfly kingfish	<i>Thon papillon</i>
	Common dolphinfish	<i>Coryphène commune</i>
	Dogtooth tuna	<i>Bonite à gros yeux</i>
	Oilfish	<i>Ruvet</i>
	Rainbow runner	<i>Comète saumon</i>
	Species Aggregates	<i>Agrégés d'espèce</i>
	Other	Species Aggregates
Blue mackerel		<i>Maquereau tacheté</i>
Dogtooth tuna		<i>Bonite à gros yeux</i>
Indian mackerel		<i>Maquereau des Indes</i>
Striped bonito		<i>Bonite orientale</i>
Species Aggregates		<i>Agrégés d'espèce</i>

Study of Alternative Models of Artificial Floating Objects for Tuna Fishery (Experimental Purse-seine Campaign in the Indian Ocean) (IOTC-2006-WPBy-05)

12. This document described a project that aims to improve the fishing over objects where bigeye and yellowfin tunas and bycatch species maybe adversely affected. It involves four Spanish boats (two purse seiners and two supplies) from ALBACORA S.A. and the Spanish Oceanographic Institute (IEO). Experiments were undertaken to test the efficiency of a range of artificial floating objects to reduce bycatch

(in particular sea turtles) without reducing catches of target species. Experimental objects were deployed alongside traditional objects and data was collected for six months, from May to November 2005. Very few sets were performed over objects during the first three months (half the time available) due to a lack of fish. In the end, only 8 sets were performed over 5 of the 22 models making it impossible to draw solid conclusions about the different objects used. However, the following observations were made: the average catch on traditional objects was 44 t compared to 67 t on experimental objects; the experimental objects appeared to attract more tuna and fewer associated species; only one live turtle (no dead) was found entangled in the experimental objects.

Data obtained from purse-seine observers carry out by the Instituto Español de Oceanografía from the National Database Plan between 2003 and 2006 (IOTC-2006-WPTT-05)

13. This document that was originally presented to the IOTC Working Party on Tropical Tuna, reported information obtained for the National Database Plan by Spanish Oceanographic Institute (IEO) observers embarked on Spanish-registered tuna purse-seiners from April 2003 to early March 2006. The information includes data from the fishery, catch and effort, tuna discards and bycatch. To date, 17 campaigns have taken place, comprising 601 days at sea and 477 sets, involving catches of 17,184 t of tuna, of which 490 t were discarded. Catch data are presented for yellowfin, skipjack, bigeye and 'others' (frigate tuna, kawakawa, and albacore) by association with free school and floating object. Bycatch was classified into four groups: swordfish, other fish, elasmobranchii and turtles.

14. Preliminary results indicate that yellowfin was the most common species caught over free schools, while skipjack was the dominant species over floating objects. Catches of discard species were highest over floating objects and skipjack was the most discarded species followed by frigate tuna and kawakawa. Over free schools the most common species caught were oceanic white-tip sharks and rainbow runner. Over floating objects, the most common bycatch species were rainbow runner and spotted oceanic triggerfish. Silky shark was caught in 54.5% of sets over objects. Striped marlin was caught in 7.7% of sets over objects. Two whale sharks were caught and released alive. Biological data was collected from all bycatch species. A total of fourteen turtles were caught, and all were associated with a floating object. Twelve turtles were returned live to the sea. No marine mammals were caught during these observations.

Analysis of data obtained from observer programmes conducted in 2005 and 2006 in the Indian Ocean on board French purse seiners (IOTC-2006-WPBy-06)

15. This document presented the results from a preliminary analysis of the data obtained under the National Database Plan (PNDB). Between October 2005 and July 2006, three observers from the Development and Research Institute (IRD) have been working onboard four French tuna purse seiners collecting bycatch and discard estimates and detailed information on the fishing activities and the use of FADs. Areas covered during the 134 days were NW Seychelles, SE Seychelles, E. Somalia and Maldives-Chagos. 194 sets (116 positives and 86 negative) were observed. Most (84%) were on free schools (162 sets, 51% positive) and 16% were on associated schools (32 sets, 81% positives). During the day, the main activities of the boat were searching (31% of the total activity) and fishing (13%). The levels of discards were negligible (and comprised mainly yellowfin tuna). Bycatch represented less than 1% of total catch (in weight) and comprised mainly triggerfish, rainbow runner and wahoo. Selacians (except whalesharks) represented nearly 12% of the total bycatch (in weight) with mainly silky shark over FADs and skate over free school. Billfish made up 5% of total by-catch (in weight) with mainly Indo-Pacific Sailfish over free school and black marlin over FADs.

Japan's National Plan of Action for the Conservation and Management of Sharks (IOTC-2006-WPBy-07)

16. This document outlined Japan's NPOA Sharks including: basic principles and objectives; the fisheries and species subject to the NPOA, the collection of information; the promotion of effective utilisation; educational activities and extension; promotion of international cooperation; and management measures.

Japan's National Plan of Action for reducing incidental catch of seabirds in longline fisheries (IOTC-2006-WPBy-08)

17. This document outlined Japan's NPOA Seabirds including: basic principles and objectives; the fisheries subject to the NPOA; species of seabirds relevant to longline fishing; guidance, outreach and educational

activities; research and development; improvement of breeding growing habitat and promotion of reproduction; collection of information, research and monitoring; promotion of international cooperation; and measures to reduce incidental catch.

Summary of Japanese activities for the management of pelagic sharks and for the mitigation of incidental catch of seabirds and sea turtles in longline fishery (IOTC-2006-WPBy-09)

18. This document described activities being conducted by Japan to resolve the interactions between pelagic tuna longline fishery and sharks, seabirds and sea turtles according to the NPOAs and FAO guidelines.

19. Sharks: Japan has collected logbook data on shark catch in pelagic longline fisheries since 1971 and despite difficulties in species discrimination and reporting rate they provide a valuable long-term time series on the abundance of pelagic sharks. Data on sharks and other bycatch species such as seabirds and sea turtles are collected by research and training vessels and by scientific observers onboard commercial vessels. These data provide the basis for the stock assessment of sharks and other species. A tagging program has been conducted since 1996 to examine growth, migration and stock structure of pelagic sharks. In total, 10,800 sharks (9,600 blue shark, 520 bigeye thresher, and 180 shortfin mako shark) have been tagged in the North Pacific; however, the recovery rates are low (around 1%). Studies on age, growth and maturation of pelagic shark species are being conducted using samples collected by research and training vessels.

20. Seabirds: The NPOA-Seabirds requires Japanese fishermen to rescue and release live seabirds caught incidentally, as well as to control offal and discards. In the southern bluefin tuna fishery, the use of tori-poles is obligatory and vessels are requested to adopt at least one of the following measures: night setting, weighted branch lines, use of bait casting machines or fully-thawed baits. In the North Pacific north 20 °N, at least one of the following measures is required: tori-poles, night setting, line weighting, bait casting machines, and fully-thawed baits. In the critical area around Torishima Island of the Izu Islands, where breeding colonies of short-tailed albatross exist, use of two or more mitigation measures is requested during the period from October to May. In Japan, efforts continue to develop mitigation measures to reduce incidental capture of seabirds, including bird deterrent devices; improvements to the sinking speed of baited hooks; reducing the visibility of bait; and reducing attractiveness of the vessel. Surveys of seabirds have been conducted using research vessels in order to understand the distribution of albatrosses in the waters adjacent to Japan. Stomach content and stable isotope analyses have been undertaken to compile information on trophic status in marine food web. Work to improve understanding of the range of natural and anthropogenic factors that influence the seabirds is also taking place. Educational activities for fishers are being carried out to inform them about the importance of accurate reporting of the incidental take of seabirds, how to avoid incidental catch, and appropriate handling of birds captured alive. This includes identification sheets and guidebook for seabirds, booklets and leaflets that illustrate methods for avoiding incidental take and appropriate and handling of seabirds capture alive. Furthermore, the Fisheries Agency, the Global Guardian Trust, and the National Research Institute of Far Seas Fisheries (NRIFSF) hold seminars for fishers in local fishing communities to introduce the NPOA-Seabirds and NPOA-Shark.

Measures Taken for Bycatch Species Conservation for Taiwanese Longline Fishery (IOTC-2006-WPBy-11)

21. The Taiwanese longline fleet is undertaking a range of measures with the aim of achieving a harmony between sustainable fisheries resources and environment.

22. Observer Program: A pilot observer program was launched in 2001. In 2005, 16 observers were dispatched to the three Oceans, with six of them in the Indian Ocean for nine trips. The observers collected a range of information on the bycatch species operations including biological samples.

23. Administrative Regulations: Since February 2005, fishing vessels operating on the high seas have been required to carry equipment to release sea turtles and seabirds alive. Bycatch information is required to be recorded in logbooks. To reduce seabird incidental catch, a special regulation was introduced in 2004 whereby vessels fishing in waters south of 30°S are required to deploy a tori line during line setting. Since the incidental catch of seabirds and consequent loss of baits have caused concerns to the fishermen fishing in waters of high latitude in the south hemisphere, they have also taken voluntary measures such as setting line before dawn, installing second set of tori line, using semi-thawed baits, etc. With respect to sharks, in order

to be in compliance with the Resolutions adopted by IOTC, ICCAT and IATTC, vessels are requested to transship and offload fin and carcasses together. Up to the first point of landing, the ratio of fin-to-body weight of sharks shall be under 5%.

24. NPOA: A "National Plan of Action for Reducing Incidental Catch of Seabirds in Longline Fisheries (NPOA-Seabirds)" was adopted in June 2006 and will come into effect in October 2006. A NPOA on sharks was finalised in May 2006. In the NPOA, finning is prohibited, and the ratio of fin-to-body weight is also set to comply with relevant regulations of international RFMOs.

25. Education: Posters, information sheets and booklets on how to reduce seabird by-catch, thorough utilization of shark catch, and identification of seabirds, sharks and sea turtles have been disseminated to fishermen. In addition, information on the conservation of bycatch species is conveyed to fishermen through radio broadcasts, by observers, and training courses that fishermen have to attend regularly when in port. The Wild Bird Federation of Taiwan was commissioned to conduct an education program for Taiwanese fishermen in Port Louis, Mauritius in 2005. The program introduced seabird mitigation measures, how to reduce mortality of live birds, and international agreements.

26. Research: Bycatch data from the observer program will be analysed when more data are available. A modified tori line is ready for testing. A short-term pilot circle hook experiment was conducted between 2004 and 2006 by observers on a longline vessel in the Pacific Ocean. No sea turtles were hooked during the trips, and preliminary results showed no significant differences in baiting time and bigeye hooking rate between circle and traditional J hooks, and the survival rate of the catch was greater with circle hooks set. However, the circle hooks need to be further tested in areas where interactions with sea turtles are more common. To further review the ratio of shark fin-to-body weight, a research project was conducted in 2005. For the two common processing forms: (1) fins, head and guts were removed; and (2) additional belly meat was removed, the fins unloaded included pectoral fins, the first dorsal fin and caudal fin and the estimated ratios of the fins to the processed weight were 13.3% and 20.0%, respectively. Preliminary results from the observer data and the research project suggest the necessity to review the 5% shark fin ratio and to define clearly the "shark fin weight" and the "body weight".

Incidental- and By-Catches in the Indian Ocean from Taiwanese Observer Data of 2002-2005 (IOTC-2006-WPBy-12)

27. This document presented observer information on the bycatch of the ecologically related species (ERS) from the Taiwanese longline fishery in the Indian Ocean during 2002-2005. The data collected by observers includes: vessel size; equipment used; environmental information; operation and effort information such as buoy line length, branch line length, number of baskets, setting time, setting direction, number of hooks, number of hooks per basket; catch information such as catch in number, in weight and discards in number for all species (tuna and tuna-like species, sharks by major species); length measurements for the first 60 fish per set (the first 30 fish for 2002-03); and incidental catch information. The observer logbook format was changed in 2004 to require more information from the trip especially on the incidental catch species. Species-specific information on seabirds has been collected since the new observer logbook was adopted. The observers also collected biological samples from tuna and tuna-like species, and ERS for various research projects.

28. Observations were carried out from 14 longline vessels which targeted mainly albacore, bigeye, and southern bluefin tuna. The observed vessels fished 3,300 - 4,500 hooks per day. Most of the effort was in the temperate areas of the central Indian Ocean before 2004. Albacore and southern bluefin tuna comprised 90% of the total catches in 2002-03. In 2005 there was unexpected high catch of oilfish in the waters off South Africa. There was no incidental take of sea turtles, whales or dolphins during the 2002-05 observations. The most common bycatch species were seabirds and sharks. Most seabirds were caught in the central Indian Ocean between 25°S-35°S, and off South Africa, between 30°S-40°S. In general, the catch rates were around 0.009-0.023 seabirds per 1000 hooks, depending on the fishing location and year. South of 25°S, where more seabirds were observed, the catch rates were around 0.015-0.031. A preliminary study shows that the catch rate is not only associated with the setting of the tori line, but also with the type of bait used. Operations using saury bait seem to have higher incidental catch rate. Albatrosses comprised over 70% of total catch of seabirds. About 40-55% seabirds were alive and released except in 2005 when only 3 of the 29 seabirds caught were alive and released (about 10%). The catch composition of sharks was lowest south of 25°S (0.3-

1.7%) and highest north of 25°S (3.5% in 2005). Blue sharks were the most common bycatch species followed by shortfin mako. Catch rates in ranged from 0.03-0.39 sharks/1000 hooks.

Seabird bycatch in swordfish longline fisheries worldwide (IOTC-2006-WPBy-13)

29. This document reviewed seabird bycatch data from swordfish fisheries from the southern Indian Ocean and elsewhere. Nineteen of the world's 21 albatross species are globally threatened with extinction and incidental catch in fisheries, especially longline fisheries, is recognised as one of the principal threats to many species. The IOTC area includes around 21% of the global breeding distribution of albatrosses and petrels.

30. The available data from swordfish fisheries from the Southern Indian Ocean and elsewhere highlight three issues. First, in some regions of the world, the American Longline System is a method associated with high seabird bycatch rates. Light sticks, long branch lines, light monofilament gear and squid bait increase buoyancy and decrease hook sink rates, which can increase the risk of seabird bycatch. It is BirdLife International's view that the current exemption in the IOTC 2006 seabird resolution for swordfish vessels using the 'American Longline system' should be removed. In the US, the use of a tori line on swordfish vessels was found to reduce seabird bycatch by 80%. Data from South Africa indicate that over 90% of seabird bycatch on observed swordfish vessels was on vessels that were not using tori lines. Secondly, a number of mitigation measures exist, in addition to tori lines, which can be used to reduce seabird bycatch. The prime example is the fact that swordfish vessels typically fish at night, and setting hooks at night is a common strategy employed and recommended to reduce bycatch of albatrosses. Nevertheless, it is important that hooks are set at night, not in the afternoon, dusk or at sunset, when albatross mortality can be high or even higher than during the day. In addition, the effectiveness of night-setting is reduced by moonlight and in summer it may also be almost practically impossible for swordfish vessels to set in true darkness. Further, night setting may not reduce the bycatch of some petrel and shearwater species which are active at night. As such, night-setting (hooks set in true darkness) can be an effective measure to reduce seabird bycatch, but should be combined with use of a tori line, or other technique. Other measures for consideration include dyed baits, weighted branch lines (need to be designed with fisher safety in mind) and strategic offal discharge. Other measures currently being tested include underwater setting tubes, side setting and a bait pod which encloses the hook until release at a prescribed depth, and which may also be effective in reducing turtle bycatch. Thirdly, the data emphasise that seabird bycatch data has a high degree of variability from one study to another. In part this reflects the stochastic nature of seabird bycatch, but also the significant effect of small differences in gear configuration, and differences in methods of data collection by observers. The IOTC's plan to develop standardized methods for recording bycatch within IOTC longline fisheries will be of great value in helping to remedy this variability.

Seabird, turtle and shark bycatch in South African pelagic longline fisheries (IOTC-2006-WPBy-15)

31. This document reviewed all available data collected by fisheries observers South Africa's pelagic longline fisheries for swordfish and tuna fleets over the period 1998 to 2005. Bycatch rates (catch per 1000 hooks) in the swordfish fishery were higher than those in the tuna directed fishery (e.g. for seabirds (0.1 vs 0.5), turtles (0.1 vs 0.005) and sharks (7 vs 3)). Seabird catch rates in both fisheries are higher than the FAO recommended 0.05 birds/1000 hooks. Seabird mitigation measures are a condition of permits in both fisheries.

32. In the swordfish fishery effort totalled 4.6 million hooks between 2000 and 2005 and ranged between 870,000 and 1.5 million per year. Bycatch data was collected from 9% of these hooks (405,000 hooks) during this time. Fishing predominantly takes place on the Agulhas Bank and between 27 and 33 degrees south and 31 and 44 degrees east. Seabird bycatch comprised 55.3% white-chinned petrels, 26.3% shy albatrosses, 2.6% yellow-nosed albatrosses, 2.6% wandering albatross and 31.2% unidentified. Although catch rate varied by season and year, it averaged 0.1 birds/1000 hooks (0.04 albatrosses/1000 hooks and 0.05 petrels/1000 hooks) and a maximum of 1.2 birds/1000 hooks in 2002. Seabirds were predominantly caught on the Agulhas Bank, but also in the open ocean especially between 28 and 29 degrees south and 43 and 44 degrees east. Turtle bycatch comprised 35.3% leatherback, 14.7% loggerhead, 2.9% hawksbill, 2.9% green turtles and 44.1% unidentified. Although catch rate varied by season and year, it averaged 0.1 turtles/1000 hooks (0.01 loggerheads/1000 hooks and 0.03 leatherback/1000 hooks) and a maximum of 0.3 turtles/1000

hooks in 2002. Catch rates as high as 1.7 turtles/1000 hooks was experience on the Agulhas Bank. Catch rates were generally lower in the open ocean and average at 0.1 turtles/1000 hooks. Shark bycatch comprised 43% Blue, 20% Crocodile, 12% Short-fin Mako, 9% Bronze Whalers, 4% Dusky, 2% Oceanic White Tip, 2% Hammerhead spp. Although catch rates varied by season and year, it averaged 7 sharks/1000 hooks (3 blue sharks/1000 hooks, 1.37 crocodile sharks/1000 hooks and 0.8 mako sharks/1000 hooks). Blue and mako sharks were caught throughout the area fished, whereas crocodile sharks were predominantly caught in the open ocean between 28 and 29 degrees south and 43 and 44 degrees east.

33. In the tuna fishery a total of 21 million hooks were set between 2000 and 2005, 14% were observed for seabird, turtle and shark bycatch. Seabird bycatch comprised 56.3 % white-chinned petrels, 13.3% shy albatross, 2.9% black-browed albatross, 1.9% yellow-nosed albatross. Although catch rate varied by season and year, it averaged 0.5 birds/1000 hooks (0.1 albatrosses/1000 hooks and 0.3 petrels/1000 hooks). Highest catch rates were experience along the continental shelf, although catch rates 0.02 occurred in oceanic water further off shore. Turtle bycatch comprised 53% leatherback, 13% loggerhead and the remaining 33% unidentified. Although catch rate varied by season and year, it averaged 0.005 turtles/1000 hooks and a maximum of 0.1 turtles/1000 hooks in 2002. Shark bycatch comprised 54% Blue, 33% Short-fin Mako, 5% Crocodile, 4% Thresher, 1% Bronze Whalers. Although catch rate varied by season and year, it averaged 2.7 sharks/1000 hooks (1.5 blue sharks/1000 hooks, 0.1 crocodile sharks/1000 hooks and 0.9 mako sharks/1000 hooks). Blue and mako sharks were caught throughout the fishery while crocodile sharks were only caught in the open ocean between 28 and 29 degrees south and 43 and 44 degrees east.

34. Seabird catch rates in both fisheries are higher than the FAO recommended 0.05 birds/1000 hooks and thus are of concern. Given their vulnerability turtle bycatch rates are likely to be significant and may warrant further investigation; tori or bird-scaring lines should be deployed on all vessels (i.e. tuna and swordfish vessels) operating south of 27 degrees; an independent observer programme collecting verifiable seabird, turtle and shark data is essential for understanding this issue within IOTC.

Recommendations for addressing seabird bycatch data requirements in IOTC longline fisheries (IOTC-2006-WPBy-14)

35. IOTC Resolution 06/04 calls for IOTC to develop effective mechanisms to enable members to record and exchange data on seabird interactions. Independent observer data is well recognized as the only effective means for collecting this information. This paper draws on experience gained from several programmes and recommends a way forward to enable the documentation and quantification of seabird bycatch within IOTC fisheries; to understand what factors (e.g. spatial, temporal, gear and operational) contribute to observed seabird bycatch rates recorded; to scale up reliably observed information to that of the fishery; and to assess the effectiveness of mitigation measures aimed at reducing the incidental mortality of seabirds. CCAMLR has demonstrated the importance of a centralized observer programme using independent, appropriately trained observers and the need for a high observer coverage to assess bycatch levels adequately. We thus recommend high observer coverage over a limited period of time in order to evaluate bycatch levels after which time the necessary level of coverage is reviewed. Data requirements to ensure objectives are met are listed in examples of data sheets.

36. Observer programmes are a major undertaking, but they are essential to addressing bycatch of vulnerable species e.g. seabirds, turtles and sharks, as well as collecting data on the target species and thus need to be implemented as a matter of urgency. In order to fulfil paragraph 1, resolution 06/04 we recommend the following steps be considered: 1. Agree on a timeline for development and implementation of observer programme, 2. Agree minimum observer standards for collecting bycatch data (a) establish a minimum coverage (temporal and spatial considerations), (b) establish minimum data requirements; 3. Set up a central database, 4. Implementation of (a) observer training (b) deployment of observers (c) submission of data to a central database; 5. Assessment of total bycatch at the scale of the fishery

Seychelles National Plan of Action for the Conservation and Management of Sharks - an update of the status

37. Shark fishing has always been a traditional activity in Seychelles but further considerable development of the fishery has taken place in recent years. In response to evidence of a decline in shark abundance on the Mahe plateau over the last 70 years, the Seychelles Fishing Authority has introduced range of management measures including a shark-net ban in 1998; the wild animal (whaleshark) protection regulation in 2003;

logbooks for shark fisheries in 2003; a shark fining ban for foreign owned vessels licensed to fish in the Seychelles EEZ in 2005; and a shark identification booklet in 2006. In addition to these national measures, the European Union banning of fining on all their vessels enacted in 2003, and the IOTC Resolution 05/05 concerning the conservation of sharks caught in association with fisheries apply. In August 2005, a first draft of a National Plan of Action was produced by the SFA. The NPOA proposes ten points to ensure conservation and long-term sustainable use of shark fisheries. In 2006, workshops and consultations with stakeholders were held and the plan should be implemented in 2007.

38. The Seychelles National plan will run for four years initially (2007-2010) and has two aims: to establish the capacity, systems and databases to enable informed adaptive management of shark stocks in Seychelles; and to implement an active and progressive precautionary approach to the management of targeted and non-targeted shark fishing effort that takes into account the transitional needs of stakeholders. To achieve these, an 11 point working programme has been proposed in the National Plan and actions have been identified and prioritised. First actions are expected to place at the beginning of 2007 and focus on the gathering of data (which are considered key for reliable stock assessment and good management advices). A shark identification booklet with Scientific, English and Creole names is being finalised by SFA and will soon be distributed to fishermen.

2.3 Matters arising from presentations and general discussions

Data

39. Given the general paucity of information on all bycatch species (IOTC-2006-WPBy-03), the WPBy agreed to, intersessionally, identify which species should be a priority for its work, then make a concerted effort to ascertain the availability of data on these species with a view to obtaining access to the data and storing it on IOTC database.

40. The WPBy agreed that being able to estimate the levels of discards with an acceptable level of precision should be an important objective for the Commission.

Sharks

41. In response document IOTC-2006-WPBy-09, Japan indicated that they would provide CPUE trends for Indian Ocean sharks to the next WPBy meeting.

42. The WPBy recalled that paragraph 2 of IOTC Resolution 05/05 states that in 2006 the Scientific Committee (in collaboration with the Working Party on Bycatch) will 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. And noted that the Commission at its 10th Session noted that it is very unlikely that the Working Party on Bycatch would be able to produce definitive status indicators for shark species at its next meeting and that addressing this requirement would only be achieved in the near future if there is a strong commitment on the part of the Members and national scientists to collect and provide the relevant information. In an effort to progress this matter, the WPBy called on scientists to review existing information including shark stock assessments and assessments undertaken on other species for which there is a paucity of data and report their findings to the WP at its next meeting.

43. Aware that paragraph 5 of IOTC Resolution 05/05 states: 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. The WPBy discussed several papers on this subject (IOTC-2006-WPBy-INF06). The WPBy noted the conclusions of the researchers that the fin to body weight ratio for sharks varied widely depending on species, fin-set and finning techniques, and generally agreed that using ratios for particular species and/or fleets might be needed, although difficult to implement. Furthermore, since management measures using a shark fin to body weight ratio were common to several RFMO's the WPBy agreed that a collaborative approach by RFMOs be taken to further resolve this matter.

Seabirds

44. The WPBy discussed the possible nature and extent of an IOTC observer programme IOTC-2006-WPBy-14 and made a recommendation on this subject below. The WPBy noted that estimates of coverage usually rely on having reasonable estimates of total catches of species. Given the existing data this is

currently not possible. The WPBy concurred that one way to progress this issue would be to apply a regime of intensive observer coverage at first, then refine coverage levels based on the results obtained.

45. The WPBy discussed the matter of the current exclusion of the American longline system in IOTC Resolution 06/04 *On reducing incidental bycatch of seabirds in longline fisheries* given the information in IOTC-2006-WPBy-13 that indicated this method is associated with high bycatch rates in some regions. The WPBy concurred that, based on information presented at the meeting, the exemption from using a bird scaring line for vessels targeting swordfish using the American Longline System may not be warranted. The WPBy recommended that additional information on the efficacy of American longline system should be put forward for consideration by the Scientific Committee.

Sea turtles

46. Given that other RFMO's are also working on issues relating to the interactions between fisheries and sea turtles, The WPBy requested that the Secretariat source and make available the recent reports on sea turtles from other RFMOs at the next meeting.

47. The WPBy was informed about the FAO Workshop: *Assessing the Relative Importance of Sea Turtle Mortality due to Fisheries* held in Zanzibar, Tanzania (25 - 28 April 2006). While the final report from the meeting is not yet published, some of the power point presentations are available from http://www.ioseaturtles.org/electronic_lib2.php?cat_id=1.

Other matters

48. The WPBy also discussed the need for greater inclusion of ecosystem research at WPBy meetings, noting that an EAF (Ecosystem Approach to Fisheries) typically includes the use of ecosystem indicators by managers. In particular, elucidation of possible relationships between environmental processes and bycatch and target species may assist managers in the future. To this end, the WPBy encouraged future discussions and presentations in this area at future meetings.

49. WPBy was informed about the SWIOFP (the South West Indian Ocean Fisheries Project - www.swiofp.org), a multinational programme to improve the understanding and management of marine resources in the South West Indian Ocean (initiated under the Global Environmental Facility - GEF). The SWIOFP aims to build human and institutional capacity in the nine participating countries and to assist the countries with the assessment and management of their offshore resources (in a manner consistent with an ecosystems and trans-boundary approach). SWIOFP plans to collect the requisite scientific information needed to make informed decisions about the development and management of living resources in the respective 200 nm Exclusive Economic Zones (EEZ) of Madagascar, Kenya, Tanzania, Mozambique, Mauritius, Seychelles, La Reunion, Comoros and South Africa. The WPBy agreed that research undertaken within this project could potentially address some of IOTCs bycatch research questions.

50. The WPBy was given an update on CLIOTOP (CLimate Impacts on Oceanic TOP Predators), the collaborative international research programme which is being developed as part of the IGBP (International Geosphere Biosphere Programme) core project GLOBEC (GLOBal ECosystem dynamics <http://www.globec.org>). CLIOTOP aims to better understand open ocean pelagic ecosystems dynamics in which top predators including tunas are living. The main goal of the project is to improve our understanding of oceanic top predators within their ecosystems and ultimately to develop a reliable predictive capability of their dynamics. The WPBy encouraged members to collaborate with the programme.

3. WPBY WORK PLAN AND RECOMMENDATIONS TO THE SCIENTIFIC COMMITTEE

3.1 Work plan

51. As noted above, as a result of IOTC Resolution 05/05, the WPBy has been tasked with providing preliminary advice on the stock status of key shark species but that this has not been possible with available information. Developing the ability to provide information on shark status remains an important focus for the Group. To progress this and other objectives the following work plan was agreed to by the WPBy for 2006-2007:

- Identify which species should be a priority for the WPBy, then make a concerted effort to ascertain the availability of data on these species with a view to obtaining access to the data and storing it on IOTC database (to be undertaken intersessionally by the WPBy).
- Members to source information on non-tuna data holdings, including socio-economic data (ongoing).
- Comment on the potential of the available bycatch data to develop estimates of bycatch catch rates for the wider Indian Ocean and/or specific regions (to be undertaken by the Secretariat for the next meeting).

Recalling Resolution 06-04 Paragraph (1) in which the Commission resolves to develop within a year, effective mechanisms to enable CPC's to record and exchange data on seabird interactions, begin to formulate options; and Paragraph (7) in which the Commission resolves to 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; and in anticipation of advice being required by the Commission or individual members:

- Develop options to enable CPC's to record and exchange data on seabird interactions.
- Examine the efficacy of alternative measures for the mitigation of any incidental catch of seabirds.

3.2 Recommendations

52. Members are encouraged to submit all relevant data on bycatch to IOTC Secretariat

53. Information on the efficacy of the American longline system to mitigate the incidental bycatch of seabirds in longline fisheries be put forward for consideration by the Scientific Committee.

54. Recognising that the best opportunities for obtaining accurate data on bycatch are likely to come from observer programmes, the WPBy strongly encourages further collaboration between observer programmes and expansion and implementation of new observer programmes for the Indian Ocean. Furthermore, the following attributes in any such programme are desirable:

- All the major fleets should be covered and the levels of coverage should be such that estimates of total catch have an acceptable precision, including those for rare species.
- Observers should focus on areas such as the nature and extent of discards as the opportunities for obtaining such information are short-lived compared to information on target species (some of which can be collected at the dock).

55. Bycatch species specialists should be encouraged to participate in the WPBy.

56. Bycatch mitigation experts should be encouraged to participate in the WPBy.

4. OTHER BUSINESS

57. No other business was discussed.

5. ADOPTION OF THE REPORT

58. The Report of the Second Session of the Working Party on Bycatch was reviewed by correspondence.

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APPENDIX II. AGENDA OF THE MEETING

1. REVIEW OF THE DATA ON BYCATCH

- Review of the data available in the IOTC database
- Data from other sources

2. IDENTIFY MAJOR BYCATCH SPECIES

- Review of the list of major bycatch species

3. SHARKS

- Papers as provided by participants
- Review of any National Plans of Action for the reduction of shark bycatch in tuna fisheries
- Advice on interactions between sharks and tuna fisheries in the Indian Ocean

4. SEABIRDS

- Papers provided by participants
- Review of any National Plans of Action for Reducing Incidental Catches of Seabirds in Longline Fisheries
- Advice on interactions between seabirds and tuna fisheries in the Indian Ocean

5. TURTLES

- Papers provided by participants
- Review of any National Plans of Action for the reduction of turtle bycatch in tuna fisheries
- Advice on interactions between turtles and tuna fisheries in the Indian Ocean

6. RESEARCH RECOMMENDATIONS AND PRIORITIES

7. OTHER BUSINESS

APPENDIX III. LIST OF DOCUMENTS PRESENTED TO THE MEETING

Document	Title
IOTC-2006-WPBy-01	Draft agenda of the Working Party on Bycatch
IOTC-2006- WPBy-02	WPTT List of documents
IOTC-2006- WPBy-03	Status of the IOTC databases for Bycatch
IOTC-2006-WPBy 04	Check list and catch rate data by hook type and bait for Bycatch species caught by Spanish experimental longline cruises in the South-western Indian Ocean during 2005. <i>J. Ariz, A. Delgado de Molina, M^a L. Ramos and J. C. Santana</i>
IOTC-2006-WPBy-05	Study of Alternative Models of Artificial Floating Objects for Tuna Fishery (Experimental Purse-seine Campaign in the Indian Ocean). <i>A. Delgado de Molina, J. Ariz, J.C. Santana and S. Déniz</i>
IOTC-2006-WPBy-06	Analysis of data obtained from observer programmes conducted in 2005 and 2006 in the Indian ocean on board French purse seiners. <i>A. Viera and R. Pianet.</i>
IOTC-2006-WPBy -07	Japan's National Plan of Action for the Conservation and Management of Sharks. <i>Government of Japan</i>
IOTC-2006-WPBy -08	Japan's National Plan of Action for Reducing Incidental Catch of Seabirds in Longline Fisheries. February 2001 (Partly revised in March 2005). <i>Fisheries Agency of Japan, Government of Japan.</i>
IOTC-2006-WPBy-09	Summary of Japanese activities for the management of pelagic sharks and for the mitigation of incidental catch of seabirds and sea turtles in longline fishery. <i>M. Kiyota</i>
IOTC-2006-WPBy-10	Seychelles National Plan of Action for the Conservation and Management of Sharks – An update on the status
IOTC-2006-WPBy-11	Brief Notes on the Measures Taken for Bycatch Species Conservation for Taiwanese Longline Fishery - <i>S-K. Chang and Y-Y. Huang</i>
IOTC-2006-WPBy-12	Incidental and By-catches in the Indian Ocean from Taiwanese Observer Data of 2002-2005. <i>S-K. Chang, J-P. Tai and C-H. Shiao</i>
IOTC-2006-WPBy-13	Seabird bycatch in swordfish longline fisheries worldwide. <i>BirdLife International</i>
IOTC-2006-WPBy-14	Recommendations for addressing seabird bycatch data requirements in IOTC longline fisheries. <i>R. Bristol, S. Petersen, C. Small & M. Tasker</i>
IOTC-2006-WPBy-15	Seabird, turtle and shark bycatch in South African pelagic longline fisheries . South Africa/BirdLife & WWF Responsible Fisheries Programme. <i>S. Petersen & M. Honig</i>
IOTC-2006-WPBy-16	Data obtained from purse-seine observers carry out by the Instituto español de oceanografía from the national database Plan between 2003 and 2006. <i>R. Sarralde, A. Delgado de Molina, J. Ariz and J.C. Santana.</i> IOTC-2006-WPTT-07
IOTC-2006-WPBy-INF01	WWF and TRAFFIC Joint Position Statement on Bycatch to the Second Meeting of the Working Party on Bycatch Indian Ocean Tuna Commission. <i>WWF Australia, Traffic East Southern Africa.</i>
IOTC-2006-WPBy-INF02	Bycatch mitigation approaches in Australia's western tuna and billfish fishery. <i>I. Stobutzki, E. Lawrence, N. Bensley & E. Ho-Shon.</i>
IOTC-2006-WPBy-INF03	Ecological risk assessment for the effects of fishing. <i>This is a summary of the full document: A. Hobday, H. Smith, R. Webb, S. Daley, S. Wayte, C. Bulman, J. Dowdney, A. Williams, M. Sporcic, J. Dambacher, M. Fuller, T. Walker. (2006) Ecological Risk Assessment for the Effects of Fishing: Methodology. Report R04/1072 for the Australian Fisheries Management Authority, Canberra</i>
IOTC-2006-WPBy-INF04	Agreement on the Conservation of Albatrosses and Petrels. <i>M. Tasker.</i>
IOTC-2006-WPBy-INF05	Educational and training material for use in reducing seabird bycatch. <i>M. Tasker</i>
IOTC-2006-WPBy-INF06	Four papers on shark fin to bodyweight ratios. 1. Review of 5% fin-to-body weight retention ratio for sharks. ICCAT Report 2004-2005, SCRS Plenary Session 9-19. 2. Factors for conversion of fin weight into round weight for the blue shark (<i>Prionace glauca</i>). <i>M. Neves do Santos & A. Garcia.</i> ICCAT Col. Vol. Sci. Pap. ICCAT, 58(3). 3. Body weight (dressed weight) and fin-weight ratios of several species of shark caught by Spanish longliners in the Indian Ocean. <i>J. Ariz, A. Delgado de Molina, M. Ramos & J. Santana.</i> IATTC Document SAR-7-09. 4. Preliminary reassessment of the validity of the 5% fin to carcass weight ratio for sharks. <i>E. Cortés & J. Neer.</i> ICCAT Col. Vol. Sci. Pap. ICCAT, 59(3).