Report of the First Session of the IOTC Working Party on Bycatch

Phuket, Thailand, 20 July, 2005

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1. Opening of the Meeting and Adoption of the Agenda

1. The First Meeting of the Working Party on Bycatch (WPBy) was opened on 20 July 2005 in Phuket, Thailand, by the Chair of the IOTC Scientific Committee, Dr. Geoffrey Kirkwood, who welcomed the participants (Appendix I).

2. The working party members unanimously elected Mr Kevin Mcloughlin (Australia) as Chair of the WPBy for next biennium (2005 and 2006).

3. The Agenda for the Meeting was adopted as presented in Appendix II. 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-2005-WPBy-03b)**

4. According to the IOTC Data Summary No 24 (an excerpt is given as document IOTC-2005-WPBy-03b), the statistical data systems in place for both, industrial and artisanal tuna fisheries up to the end of 2003, did not account well for the collection of statistics on non-tuna species. While the amount of discards by artisanal fisheries is probably very low, given the experiences in other oceans, it could be assumed that the amount of non-tuna bycatch discarded by industrial fisheries in the Indian Ocean is significant. To-date the Secretariat has been requesting information on both IOTC and non-IOTC species via IOTC Form 1 on retained catches i.e. total catches per fleet (flag country-type of vessel-gear used) year, IOTC Area (East or West) and species (both IOTC and other) and IOTC Form 2 i.e. total amounts discarded per year per fleet and species (both). Also catch-and-effort and size data. However, the catch of non-tuna species has not been well reported and it is not possible to estimate reliable levels of bycatch because the existing data are highly incomplete and there is little information at the species level. Figure 1 illustrates one of the apparent discrepancies in the current data. In this case catches of non-tuna species have not increased proportionally to the catches of tuna species as might be expected.

5. Notwithstanding the limitations of the data currently available, the non-tuna, tuna-like species caught by fleets targeting IOTC species includes, sharks, rays and skates; various finfish, including dolphinfish, rainbow runner, oilfish, escolar, triggerfish, barracuda; mammals such as dolphins; seabirds such as albatrosses and sea turtles.

6. Table 1 lists the non-tuna species recorded in the IOTC Database and the percentage that particular species groups make up of the total catches of non-tunas. Sharks are the major bycatch species group.

Figure 1. Catches of non-tuna species *versus* catches of tuna species in the IOTC nominal catches database

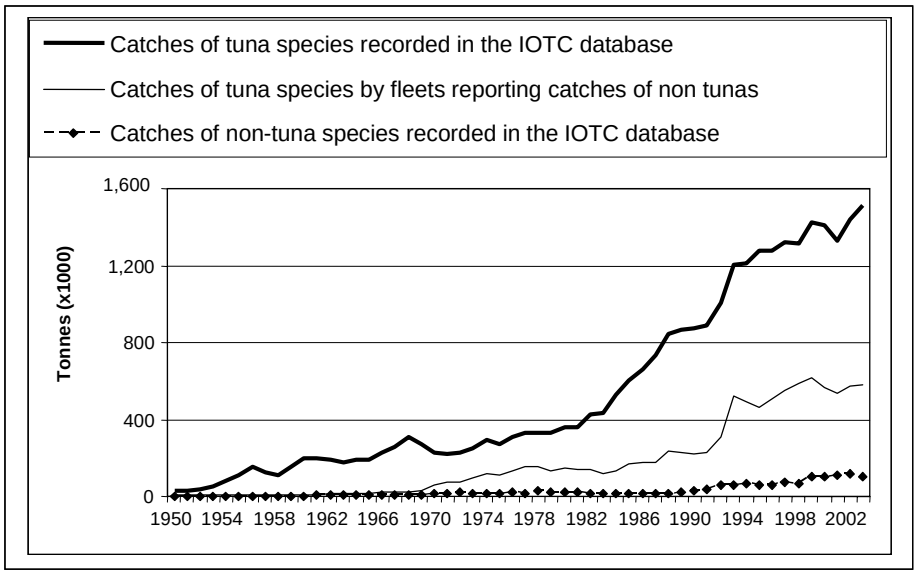

Table 1. Non-tuna species that have catches recorded in the IOTC Database (1993-2002) and the percentage that particular species groups make up of the total catches of non-tunas

Gear	Group	Species	Espece	%93-02
PS	Other / Autres	Non targeted, associated and dependent species	Espèces non ciblées, associées et dépendantes	0.01
LL	Sharks / Requins	Blue shark	Peau bleue	9.01
		Broadnose sevengill shark	Platnez	
		Copper shark	Requin cuivre	
		Dogfishes nei	Aiguillats nca	
		Hammerhead sharks nei	Requins marteau nca	
		Longfin mako	Petite taupe	
		Oceanic whitetip shark	Requin océanique	
		Porbeagle	Requin-taupe commun	
		Requiem sharks nei	Requins nca	
		Sharks nei other than oceanic whitetip shark and blue shark	Requins nca hors requin océanique et peau bleue	
		Sharks various nei	Requins divers nca	
		Shortfin mako	Taupe bleue	
		Silky shark	Requin soyeux	
		Smooth hammerhead	Requin marteau commun	
		Smooth-hound	Emissole lisse	
		Thresher sharks nei	Renards de mer nca	
		Tiger shark	Requin tigre commun	
		Tope shark	Requin-hâ	
	Other / Autres	Butterfly kingfish	Thon papillon	0.71
		Common dolphinfish	Coryphène commune	
		Dogtooth tuna	Bonite à gros yeux	
		Mackerels Indian, nei	Maquereaux (Indo-pacif.) nca	
		Non targeted, associated and dependent species	Espèces non ciblées, associées et dépendantes	
		Other non tuna-like fishes nei	Poissons non du type thon nca	
		Rays, stingrays, mantas nei	Raies, pastenagues, mantes nca	
BB	Other / Autres	Blue mackerel	Maquereau tacheté	8.04
		Dogtooth tuna	Bonite à gros yeux	
		Mackerels Indian, nei	Maquereaux (Indo-pacif.) nca	
		Other non tuna-like fishes nei	Poissons non du type thon nca	
		Striped bonito	Bonite oriental	
GILL	Sharks / Requins	Blue shark	Peau bleue	65.44
		Hammerhead sharks nei	Requins marteau nca	
		Oceanic whitetip shark	Requin océanique	
		Requiem sharks nei	Requins nca	
		Sharks mackerel, porbeagles nei	Requins taupe nca	
		Sharks various nei	Requins divers nca	
		Shortfin mako	Taupe bleue	
		Silky shark	Requin soyeux	
		Thresher sharks nei	Renards de mer nca	
	Other / Autres	Dogtooth tuna	Bonite à gros yeux	1.44
		Indian mackerel	Maquereau des Indes	
		Mackerels Indian, nei	Maquereaux (Indo-pacif.) nca	
		Non targeted, associated and dependent species	Espèces non ciblées, associées et dépendantes	
		Other non tuna-like fishes nei	Poissons non du type thon nca	
		Striped bonito	Bonite oriental	
LINE	Sharks / Requins	Blacktip reef shark	Requin pointes noires	0.82
		Blue shark	Peau bleue	
		Broadnose sevengill shark	Platnez	
		Copper shark	Requin cuivre	
		Dusky shark	Requin de sable	
		Hammerhead sharks nei	Requins marteau nca	
		Sharks mackerel, porbeagles nei	Requins taupe nca	
		Sharks various nei	Requins divers nca	
		Shortfin mako	Taupe bleue	
		Smooth-hound	Emissole lisse	
		Thresher sharks nei	Renards de mer nca	
		Tope shark	Requin-hâ	
	Other / Autres	Common dolphinfish	Coryphène commune	4.24
		Dogtooth tuna	Bonite à gros yeux	
		Mackerels Indian, nei	Maquereaux (Indo-pacif.) nca	
		Other non tuna-like fishes nei	Poissons non du type thon nca	
		Striped bonito	Bonite oriental	
OTHER	Sharks / Requins	Sharks various nei	Requins divers nca	8.96
	Other / Autres	Blue mackerel	Maquereau tacheté	1.34
		Dogtooth tuna	Bonite à gros yeux	
		Indian mackerel	Maquereau des Indes	
		Mackerels Indian, nei	Maquereaux (Indo-pacif.) nca	
		Non targeted, associated and dependent species	Espèces non ciblées, associées et dépendantes	
		Other non tuna-like fishes nei	Poissons non du type thon nca	
		Striped bonito	Bonite oriental	

7. Acknowledging that there was likely to be more information available on bycatch than is held by the IOTC Secretariat, the Secretariat sent out a call for any information on data on non-tuna catches in the Indian Ocean tuna fisheries. The data listed indicated in the catalogue of data on non-tuna catches in the Indian Ocean tuna fisheries listed in Appendix IV are in most cases not currently held by the Secretariat. Participants at the meeting commented that there are additional data sets to those listed in Appendix IV.

Improvements to data on bycatch species

8. In 2005, a range of new IOTC Resolutions and Recommendations call for information on catches of sharks (Resolution 05/05 *Concerning the conservation of sharks caught in association with fisheries managed by IOTC*),

sea turtles (Recommendation 05/08 *On sea turtles*) and seabirds (Recommendation 05/09 *On incidental mortality of seabirds*).

2.2. Information from bycatch studies in the IOTC area

Distribution of albatrosses and petrels in the Southern Indian Ocean and the overlap with IOTC longline fisheries (IOTC-2005-WPBy-05)

9. Document IOTC-2005-WPBy-05 compared albatross and petrel distributions with longline effort for the oceans between 30-50° S. The IOTC area includes 21% of the global breeding distribution of albatrosses (Table 2). Fishing effort below 30°S (and hence overlapping with albatross distribution) is greatest in the 2nd & 3rd quarters of each year. This also coincides with the periods of greatest densities of non-breeding albatrosses within the area (e.g. Shy albatrosses from the Auckland Islands, New Zealand, and Black-browed, Grey-headed and Atlantic Yellow-nosed albatrosses from the Atlantic). Non-breeding birds are less tied to breeding colonies and are often found further north, closer to the South African coast and with greater overlap with the pelagic longline fisheries. The document indicated that around 300,000 seabirds and 100,000 albatrosses are killed each year, and 19 out of the 21 species of albatross are considered to be threatened with extinction. The life history characteristics of albatrosses i.e. they are long-lived, have delayed sexual maturity, slow breeding and small populations mean that mortality due to fishing could be a major risk to the species. The Birdlife representative expressed interest in collaborating with the IOTC to produce an assessment of seabirds interactions in the IOTC area.

Table 2. Regional Fisheries Management Organisations in relation to breeding albatross distribution (% time), and longline fishing effort below 30°S (area of overlap) managed by each RFMO.

RFMO	Ocean	Breeding albatross distribution (%)	Longline fishing effort below 30°S
CCSBT	All, 30-50º S	67 %	120-130 million hooks
WCPFC	West Pacific	46 %	Approx. 30 million hooks[1]
IOTC	Indian	21 %	75-100 million hooks
ICCAT	Atlantic	17 %	Approx. 100 million hooks
CCAMLR	Southern	16 %	100-120 million hooks

Incidental mortality of seabirds, turtles and sharks: a review of data collected east of 20 degrees by South African observers (IOTC-2005-WPBy-06)

10. This document described the incidental mortality of seabirds, turtles and sharks from observer data collected by sea-fisheries observers on board South African flagged pelagic longline vessels from 2000 to 2003 and a range of mitigation measures for bycatch reduction of these species. The southwest Indian Ocean is important for albatross, particularly for the Critically Endangered Amsterdam albatross and the Endangered Indian yellow-nosed albatross. Five species of turtles are reported to occur within the area (loggerhead, leatherback, green, hawksbill and Olive Ridley) all of which are Endangered (i.e. in the IUCN redlist). Thirty six species of sharks that are currently classified as threatened, near-threatened or data-deficient by the IUCN redlist also occur in the area. The South African longline fleet operates partially within the IOTC convention area, in particular in the south western Indian Ocean between 20 and 45° E and 23 and 40° S. A total of 4.1 million hooks were set between 2000 and 2003 by domestic pelagic long-liners within the IOTC convention area. Bycatch (seabirds, turtles and sharks) data were collected from 9% of the hooks set. Less than 1% observer coverage was achieved on the foreign flagged vessels; however, seabird bycatch data was collected from 10 trips (1999-2005) which set approximately 350,000 hooks. White-chinned petrels were the most commonly caught species, followed by black-browed, shy and Indian yellow-nosed albatrosses. The catch rate averaged 0.2 birds/1000 hooks for the domestic fleet and 0.8 birds/1000 hooks for foreign vessels. Catch rates differed between areas and seasons. Four species of turtles were caught and catch rates averaged 0.05 turtles per 1000 hooks. 55% of trips caught no turtles and 25 % of trips caught one turtle; however, there were trips where up to 35 turtles were caught (14 sets) and up to 10 turtles in a single set. In 85 %

[1] Unlike the other RFMOs, the WCPFC also has albatross distribution above 30S. Fishing effort shown here indicates only that proportion below 30S, but does not indicate the full extent of overlap with WCPFC longline fisheries.

of cases turtles were alive. The use of appropriate de-hooking and release techniques could improve the survival of turtles returned to the water. Sharks were caught on every set and catch rates averaged 7 sharks/1000 hooks and ranged between 0 and 65 per 1000 hooks. Blue sharks were caught in most sets (87 %) and catch rates averaged 3.3 Blue Sharks/1000 hooks (range 0-65). Mako catches averaged 1.3/1000 hooks (range: 0-2.1). Blue and Mako sharks comprised 60 % (range 3-100 %) and 15 % (0-100 %) of the shark bycatch, respectively. Although blue sharks were the most frequently species caught, they were mainly discarded, often after being finned. The document comments on a range of possible measures to reduce bycatch interactions.

Bycatch from tuna purse seine and longline fishing gears in the eastern Indian Ocean by MV SEAFDEC (IOTC-2005-WPBy-07)

11. The training and research vessel MV SEAFDEC undertook purse seine and longline fishing in the eastern Indian Ocean between 2001 and 2005. Fifteen families with about 30 species of fishes and one family of octopus were caught by purse seine. In 54 fishing operations, 94% of total catch comprised tuna species namely frigate, skipjack, yellowfin and bigeye. Of the remaining 6 %, rainbow runner made up 46% and triggerfish 15%. Apart of purse seine operation using drifting FADs or Payao, it was found that the net installed for aggregating the target species also caught dolphins and sea turtles. The 27 long-line operations targeted and caught yellowfin, bigeye and skipjack tunas and swordfish, marlins and sailfish. Other species caught included mainly sharks (thresher, blue, white-tip, spottail, crocodile and silky) and also stringrays, lancetfish, escolar, snake mackerel, great barracuda, oilfish, common dolphinfish, sickle pomfret and wahoo. Two green turtles were also caught.

Report on the bycatch from a Korean observer on the Korean tuna longliner in the Indian Ocean in 2004 (IOTC-2005-WPBy-08)

12. This paper provided a summary of the bycatch taken by a Korean tuna longliner operating in the Indian Ocean between August and September 2004. The vessel fished around 2400 hooks per day. In addition to tunas, 15 species of fish were caught (215 fish total) over a 39 day period. Hake was the dominant species comprising 35.4 % of the catch, followed by escolar (20.8 %), oilfish (15.6 %), blue shark (9.9 %), and mako shark (8.0 %). No non-fish bycatch including sea turtles and seabirds were also caught.

Preliminary analyses of catch rates by hook type and bait from observer data obtained during the longline experimental cruise on Spanish longliners in the Southwestern Indian Ocean (IOTC-2005-WPBy-11)

13. This document provided preliminary information about an experimental campaign being carried out by the Spanish Oceanographic Institute (IEO) on two surface longliners in the waters of the south-western Indian Ocean since mid December 2004. These experimental fisheries used several types of hooks and bait, and scientific observers. For each set the observers record catch data (situation, time, species, hook, bait, etc) and biological data (species, size, sex, individual weight, gonadal weight, etc). 14088 fish comprising over 50 species have been caught up to July 2005, with swordfish accounting for 37 %, blue shark 24%, and bigeye tuna 7 %; these equated to catch rates of 20, 13 and 3.5 per 100 hooks respectively. These data should be considered provisional and are to be more fully analysed once the pilot work is completed.

Tropical tuna acoustic selectivity studies and experimental new FADs ecologically designed (reducing by-catch) through experimental cruises in Spanish purse seiners in the Indian Ocean (IOTC-2005-WPBy-12)

14. 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). Acoustic data is being be collected using sonar and echosounders and will be analysed to determine techniques that will exnable fishers to reduce catches of juveniles tropical tuna (yellowfin, and essentially, bigeye) based on acoustic signatures. At the same time, experiments will be 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. Data will be collected for six months, from May to November 2005. There are two teams. Each is allocated to a purse seiner and a support vessel. One team will collect acoustic information to validate with the fishing outcomes of the other purse seiner. Examples of the tuna and bycatch data forms are provided.

Activity of the Spanish purse seine fleet in the Indian Ocean and by-catch data obtained from observer programmes conducted in 2003 and 2004 **(IOTC-2005-WPBy-13)**

15. Data collected by scientific observers accompanying the European purse seine fleet in the Indian Ocean is entered into a National Database Plan (PNDB) which aims to collect information about fishing that cannot be obtained from fishing logs, sampling in ports and at offloads. This preliminary document showed some of the results obtained to-date under the PNDB undertaken by the Spanish Oceanographic Institute (IEO). The data analysed was obtained from 11 campaigns with observers from the PNDB-IEO in 2003 and 2004 and amounted to over 336 observation days. Observer data provides valuable information about different aspects of fisheries. It is essential that such data be analysed with the utmost care, owing to important biases that may occur when coverage is low or extrapolation is performed without bearing in mind strata (space, time, fleet, type of fishery, etc), which minimise these biases through statistical analysis. The results to-date list 56 species, including four species of sea turtles.

Scientific estimations of bycatch landed by the Spanish surface longline fleet targeting swordfish (Xiphias gladius) in the Indian Ocean: 2001 – 2003 period **(IOTC-2005-WPTT-14)**

16. This paper presented data on the bycatch species landed by the Spanish surface longline fleet targeting swordfish (*Xiphias gladius*) in the Indian Ocean between 2001 and 2003. The species classified as bycatch amounted to 51.9% of the total landings in weight: large pelagic sharks amounted to 43.1%, tunas 6.0%, billfish 0.7% and 'other' species 2.1%. Large pelagic sharks were the most prevalent bycatch with 83.0% of the catch in weight, whereas tunas amounted to 11.6%, billfish 1.3% and 'other' species 4.0%. The three most prevalent species in the catch, *Xiphias gladius*, *Prionace glauca* and *Isurus oxyrhinchus* represented 90% of the total landings in weight during this period. *P. glauca* and *I. oxyrhincus* are the most prevalent species in the group of large pelagic sharks, comprising 88.5% and 10.0%, respectively. Preliminary data on accidental catch of turtles and sea birds caught in 555 observed sets, suggest global incidence rates per hook around 3.52903E-05 for turtles (dead + alive),1.60411E-06 for dead turtles and 1.60411E-06 for dead sea birds.

Scientific monitoring of longline fishing of Western Australia **(IOTC-2005-WPBy-15)**

17. This paper described the observations from scientifically trained independent observers placed on Australian vessels using pelagic longline gear to catch tuna and swordfish off Western Australia. The longliners operated in the open ocean, with trips ranging from a few days to several weeks.. The observers collected biological samples and data from the catches. Observers monitored 13 longline trips from April 2003 to June 2004. The trips involved 104 daily operations, which deployed a total of 134 755 hooks and caught 3593 fish and other animals. The observers identified 46 different species in the longline catches, a diverse mixture of surface- and deep-dwelling fish and other animals. More than half the animals caught were "bycatch". The bycatch included species like stingrays, which do not have markets, and several species, like mahi mahi, which are sold locally. Sharks dominated the bycatch. Blue shark, were the most frequently caught species. Their catch rates, at approximately 6 per 1000 hooks, exceeded those of commercially valuable target species, such as broadbill swordfish and bigeye tuna. The top ten species taken, in order of decreasing catch rate, were blue shark, swordfish, crocodile shark, bigeye tuna, longnosed lancetfish, yellowfin tuna, albacore tuna, escolar, dolphinfish and oilfish.

18. Most bycatch species were alive when longlines were retrieved and the animals were released without being brought on board the vessel. Survival after release will vary with the animal's condition, environmental conditions and the prevalence of scavengers that might attack released animals. The observers reported five turtles. Seabirds, such as shearwaters, petrels and albatrosses, often followed the vessels as they retrieved their longlines. Shearwaters were occasionally snagged in branch-lines during hauling. However, they escaped or were released unharmed by crewmembers. No seabirds were reported killed, probably because fishers are not allowed to deploy longlines during the day in southern waters. In those areas seabirds sometimes dive for baits as longlines are being deployed. The pilot scientific monitoring program is to be continued for another year, providing an opportunity to improve spatial coverage and refine data and sample collection.

By-catches of tuna long lining conducted in the Indian EEZ **(IOTC-2005-WPBy-16)**

19. The Fishery Survey of India carried out tuna fishing surveys in the Indian EEZ along West coast of India and around Andaman and Nicobar Islands from 2000 to 2004. Among the target species of tunas, yellowfin, bigeye and skipjack were commonly caught during the surveys. By-catch belonged to three major categories – fourteen

shark species, three marlin, sailfish and swordfish species and other species including seer fish, wahoo, dolphin fish and barracuda. Overall, the hooking rate for the bycatch species combined was found to be higher in Andaman and Nicobar waters than that of in Arabian Sea. The bycatch in general and sharks in particular were observed to be in higher proportion in Andaman and Nicobar waters than in the Arabian Sea, and the catch of bycatch species appeared to be influenced by season.

***Contribution of the IOSEA Marine Turtle Memorandum of Understanding to the compilation of information on marine turtle-fisheries interactions and relevant mitigation measures* (IOTC-2005-WPBy-17)**

20. In March 2005, recognising that some sea turtle stocks are seriously impacted by fishing, the Food and Agriculture Organization of the United Nations (FAO) adopted Guidelines to Reduce Sea Turtle Mortality in Fishing Operations. These voluntary guidelines are meant to apply wherever fisheries interactions with turtles occur or are suspected to occur. FAO member States are encouraged to report biennially on their implementation. The IOSEA Marine Turtle Memorandum of Understanding is an intergovernmental agreement among 22 Signatory States that aims to conserve and manage marine turtles and their habitats of the Indian Ocean and South-East Asia. The IOSEA MoU has developed an innovative online reporting system that will be used to actively monitor application of the FAO Guidelines.

3. WPBy work plan and recommendations to the Scientific Committee

3.1. Workplan

21. Data

- Further develop the IOTC catalogue on non-tuna data holdings (including socio-economic data) by members (to be undertaken by the Secretariat). Cooperation is sought from members to provide the required information on data holdings.
- 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 WPBy for the next meeting)

22. Current state of knowledge

- Review the current state of knowledge (including biology, catches, stock status) on bycatch species/species groups, particularly sharks, seabirds and sea turtles (to be undertaken by the WPBy for the next meeting)
- Ongoing work to identify species/species groups of concern by regions and gear-type (to be undertaken by the WPBy for the next meeting)
- Describe the types of information required to improve knowledge; how such information might be obtained (to be undertaken by the WPBy for the next meeting)
- Encourage further development of pelagic ecosystem models for the Indian Ocean incorporating tuna and key bycatch species and species groups

23. By the 2006 Scientific Committee meeting (as per the Commission's 2005 resolutions and recommendations)

- Develop preliminary advice on status of key shark species and propose a research plan and timeline for a comprehensive stock assessment (see above).
- Review ratios of fin to body weight of sharks

3.2. Recommendations

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

25. 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.

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

27. Noting paragraph 1 of IOTC Recommendation 05/09, the WPBy encourages a collaborative and regional approach to dealing with incidental seabird mortality.

4. Other business

28. No other business was discussed.

5. Adoption of the report

29. The Report of the First Session of the Working Party on Bycatch was reviewed by correspondence between 8 and 19 August. This final version reflects the comments received from that review.

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APPENDIX II. AGENDA OF THE MEETING

1. **REVIEW OF THE DATA**
2. **REVIEW OF REGIONAL POA-Sharks**
3. **RESEARCH RECOMMENDATIONS AND PRIORITIES**
4. **OTHER BUSINESS**

APPENDIX III. LIST OF DOCUMENTS PRESENTED TO THE MEETING

NUMBER	TITLE
IOTC-2005-WPBy-01	WPBy 2005 Agenda
IOTC-2005-WPBy-02	WPBy List of documents
IOTC-2005-WPBy-03a, b	Status of IOTC databases for bycatch. *Secretariat* (a) Data available on bycatch species – a ppt presentation (b) an excerpt from the IOTC Data Summary No 24.
IOTC-2005-WPBy-04	Bycatch metadata for the Indian Ocean *Secretariat*
IOTC-2005-WPBy-05	Distribution of albatrosses and petrels in the Southern Indian Ocean and the overlap with IOTC longline fisheries *Cleo Small*
IOTC-2005- WPBy-06	Bycatch of seabirds, turtles and sharks caught by tuna vessels operating in South Africa's pelagic longline fishery *Samantha Petersen*
IOTC-2005-WPBy-07	Bycatch from Tuna Purse Seine and Longline Fishing Gears in the Eastern Indian Ocean by MV SEAFDEC. *Sutee Rajruchithong, Pratakphol Prajakjitt and Somboon Siriraksophon*
IOTC-2005-WPBy-08	Report on the bycatch from a Korean Observer on the Korean tuna longliner in the Indian Ocean in 2004. *Won-Soek Yang, Dae-Yeon Moon, Soon-Song Kim and Jeong Rack Koh.*
IOTC-2005-WPBy-09	Seychelles draft NPOA-Sharks. *Vincent Lucas*
IOTC-2005-WPBy-10	Australia NPOA Sharks – *presented by Kevin McLoughlan* (http://www.daff.gov.au/content/output.cfm?ObjectID=D2C48F86-BA1A-11A1-A2200060B0A00884)
IOTC-2005-WPBy-11	Preliminary analyses of catch rate by hook type and bait from observer data obtained during the longline experimental cruise on Spanish longliners in the Southwestern Indian Ocean. *J. Ariz, A. Delgado de Molina, Mª L. Ramos and P. Pallarés*
IOTC-2005-WPBy-12	Tropical tuna acoustic selectivity studies and experimental new FADs ecologically designed (reducing by-catch) through experimental cruises in Spanish purse seiners in the Indian Ocean. *A. Delgado de Molina , J. Ariz, P. Pallarés, R. Delgado de Molina y S. Déniz.*
IOTC-2005-WPBy-13	Activity of the Spanish purse seine fleet in the Indian Ocean and by-catch data obtained from observer programmes conducted in 2003 and 2004. *Alicia Delgado de Molina2, Javier Ariz1, Roberto Sarralde, Pilar Pallarés and José. Carlos Santana*
IOTC-2005-WPBy-14	Scientific estimations of bycatch landed by the Spanish surface longline fleet targeting swordfish (*Xiphias gladius*) in the Indian Ocean: 2001-2003 period. *B. Garcia-Cortes and J. Mejuto.*
IOTC-2005-WPBy-15	Scientific monitoring of longline fishing off Western Australia. *Peter Ward and Danielle Curran.*
IOTC-2005-WPBy-16	By-catches of tuna long lining conducted in Indian EEZ. *V.S. Somvanshi, S. Varghese, S.A. Rajkumar, P. Chalapati Rao & K. Gopalakrishnan*
IOTC-2005-WPBy-17	Contribution of the IOSEA Marine Turtle Memorandum of Understanding to the compilation of information on marine turtle-fisheries interactions and relevant mitigation measures. *Douglas Hykle*
IOTC-2005-WPBy-INF01	Reproductive and distribution parameters of the blue shark *Prionace glauca*, on the basis of on-board observations at sea in the Atlantic, Indian and Pacific Oceans. *Jamie Mejuto and Blanca Garcia-Cortes*
IOTC-2005-WPBy-INF02	Tagging-recapture activities of large pelagic sharks carried out by Spain or in collaboration with the tagging programs of other countries. *Jamie Mejuto, Blanca Garcia-Cortes, Ana Ramos-Cartelle*

APPENDIX IV. CATALOGUE OF DATA ON NON-TUNA CATCHES IN INDIAN OCEAN TUNA FISHERIES

Catalogue of Data on Non-tuna catches in Indian Ocean Tuna Fisheries

Data set name	Flag	Gear type	Source	Target species	Area	Years	Frequency	Format	Data description				Contact	
									Gear	Species composition	Size	Other	Name	Email
WTBF Pilot Observer Program	Australia	longline	observer	SWO, YFT, BET	south-western Indian Ocean	2003–ongoing	14 trips	MS Excel spreadsheets	longline dimensions, materials, bait, lightsticks	all species identified	length	sex, health	Peter Ward	peter.ward@brs.gov.au
Australian Foreign Longline Observer Program	Japan	longline	observer	YFT, BET, SBT	Western Australian Fishing Zone (AFZ)	1991–97	24 trips	MS Access database	longline dimensions, materials, bait	all species identified	length	sex, health	Peter Ward	peter.ward@brs.gov.au
BIOT Observer Programme	French /Spanish / Seychelles	Purse seine	observer	YFT, BET, SKJ	BIOT FCMZ, Indian Ocean	1993 - ongoing	Target 90 observer days annually	MS Access	Weight and species composition of catch	Detailed effort data	Biological sampling (length, weight, sex, biometrics)		John Pearce	j.pearce@mrag.co.uk
BIOT Observer Programme	Japan / Taiwan, China	longline	observer	YFT / BET	BIOT FCMZ, Indian Ocean	1993 - ongoing	Target 90 observer days annually	MS Access	As above, but also detailed catch composition from 100% hook surveys	Detailed effort data	Biological Sampling (length, weight, sex, biometrics)		John Pearce	j.pearce@mrag.co.uk
Re Union observer program	Re Union	longline	observer	SWO	southern Indian Ocean									
Seychelles observer program	Seychelles		observer	SWO	western Indian Ocean									
	EU	Purse seine	observer											
	Spain	longline	observer											
	Indonesia	small LL	observer											