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REVIEW OF IOTC DISCUSSIONS AND RECOMMENDATIONS FOR SHARK CONSERVATION IN THE INDIAN OCEAN

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Contents

1 Introduction

At the Ninth Session of the Indian Ocean Tuna Commission (IOTC), Resolution 05/05 *Concerning the conservation of sharks caught in association with fisheries managed by the IOTC* was adopted in response to concerns about threats to shark populations from fishing, and specifically the waste of sharks as a result of finning (WPEB04, paragraph 35). The purpose of this Resolution was to ensure the sustainability of shark populations impacted by IOTC fisheries by specifying requirements for members to fully utilise sharks caught in association with fisheries managed by the IOTC (IOTC Resolution 05/05, paragraph 3) and to ensure that shark fins make up no more than five per cent of the total weight of sharks onboard (IOTC Resolution 05/05, paragraph 4).

Sharks and their relatives are generally characterised by slow growth, late maturity, low fecundity and long gestation periods. It is because of these characteristics that sharks have very low rates of population increase and limited potential to recover from overfishing. According to the International Union for Conservation of Nature (IUCN) Shark Specialist Group (Camhi et al. 2009), 20 species (32%) of pelagic sharks and rays are considered Threatened (Critically Endangered, Endangered, or Vulnerable) while a further 15 species (24%) are considered Near Threatened (Appendix I). Pelagic sharks and rays tend to range widely through high seas and the Exclusive Economic Zones (EEZs) of coastal states; they are therefore subject to a range of fishing impacts that must be managed cooperatively, i.e. through Regional Fisheries Management Organisations (RFMOs) such as the IOTC.

At the Fifteenth Session of the IOTC, Australia tabled a draft Resolution on the conservation of sharks caught in association with fisheries managed by the IOTC (IOTC-2011-S15-PropL). The purpose of this proposal was to ensure the sustainability of shark populations impacted by IOTC fisheries. The proposal specified requirements *inter alia* for catch reporting, attachment of shark fins to their respective carcasses, live release of sharks caught as bycatch and not used for food and/or subsistence, increased bycatch prevention through prohibition of wire traces, and promotion of research, education and training on strengthening the conservation and management of sharks.

This proposal was not adopted as consensus could not be reached (IOTC15, paragraph 123). Some members were of the opinion that it was not yet operationally feasible for fins to be landed attached, either naturally or by other means, to their respective carcass. It was also the view of some members that there was no scientific justification for the proposed ban on wire traces. While the report of the meeting records that no scientific justification was provided to IOTC15 supporting the prohibition of wire traces in order to reduce shark bycatch, the scientific justification had previously been submitted to meetings of the IOTC Working Party on Ecosystems and Bycatch (WPEB), the Scientific Committee (SC) and to the Commission itself, by way of the reports from these subsidiary bodies. This paper summarises that scientific justification.

Australia remains concerned that Resolution 05/05 *Concerning the conservation of sharks caught in association with fisheries managed by IOTC*, is not effectively mitigating the risk of fishing impacts on shark populations, nor reducing the wasteful practice of shark finning in the Indian Ocean. Like other IOTC members, Australia seeks compliance with IOTC Resolutions, notably with the data collection and reporting requirements for shark catches specified in Resolution 05/05. However, Australia is concerned that the Resolution is ineffective as currently written. By reviewing discussions that have previously taken place and reconsidering proposed enhancements to this Resolution it is envisaged that real progress will be made on shark conservation and management in the Indian Ocean.

2 Aims

Australia, with the support of other interested Members, intends to present a proposal at IOTC 16 that would amend both Resolution 05/05 and Resolution 10/12. The proposal seeks to strengthen conservation and management arrangements for sharks caught in association with fisheries managed by the IOTC, in line with the discussion and recommendations of the WPEB and SC. The purpose of this paper is to present a synthesis of these discussions and recommendations, in order to provide the Commission with the necessary information to inform its deliberations on this matter.

There have been ongoing discussions at the IOTC's WPEB, SC and the Commission about Resolution 05/05. The discussions have centred on the following issues, and this paper is structured accordingly:

1. technical aspects of Resolution 05/05

2. scientific basis of the five per cent ratio of shark fin to body weight

3. need for improved data on shark catches

4. scientific basis for the prohibition of wire traces.

3 Technical aspects of Resolution 05/05

The WPEB provided advice to the SC and to the Commission outlining that the reason for adopting the five per cent fin ratio definition in paragraph 4 of Resolution 05/05 was to prevent shark finning (WPEB03, paragraph 42(3)). Further advice presented to the Commission from the WPEB said that "although not specified in Resolution 05/05, the adoption of the management measure appears to be in response to concerns about the threats to shark populations from fishing and the practice of shark finning" (WPEB04, paragraph 35 and SC11, paragraph 57(i)). Resolution 05/05 is therefore a "measure to slow down the rate of fishing or deter fishing on sharks by not allowing fins only to be landed and requiring vessels to return to port more often to unload fins and body parts (and therefore not be fishing so much)" (WPEB03, paragraph 35 and SC12, paragraph 57(ii)).

The WPEB commented that given the broad nature of resolution 05/05 that "it is unlikely to address any sustainability issues that might exist for particular shark species and it does not necessarily mean that the species most vulnerable to fishing will be better off" and that "the measure has limited ability to reduce shark finning practices" (WPEB04, paragraph 35). The limited ability of the measure to reduce shark finning was illustrated at SC11 (see Appendix II) and SC12, where it was noted that finning was still occurring in semi-industrial longline fisheries in the IOTC area (SC12, paragraph 33).

Resolution 05/05, particularly paragraph 4, lacks clarity in a number of terms, including the weight referred to, whether the fins are included in the ratio and the cutting technique (SC12, paragraph 57(iv)). The WPEB assumed the reference to weight refers to dressed weight, but without a clear definition included in this Resolution it remains ambiguous (WPEB03, paragraph 42(3)).

4 Scientific basis for the five per cent fin to body weight ratio

The definition of an appropriate ratio for shark fin weight to body weight as an effective conservation measure (i.e. ensuring that no more fins are landed than must have come from the shark carcasses on board) remains a contentious issue (WPEB04, paragraph 35). In 2001, scientific experts noted that large inter- and intra-species variation exists in calculated fin to body weight ratios (WPEB03, paragraph 42(3)). This variation may result from the number and type of fins and the type of carcass weight (dressed or whole weight) used in the calculations, or methods of dressing carcasses and fin cutting (WPEB04, paragraph 35)).

The use of a five per cent shark fin to body weight ratio has no clear scientific justification (WPEB04, paragraph 42(3); SC11, paragraph 57(ii)). Papers presented to the WPEB (IOTC-2008-WPEB-INF01, IOTC-2008-WPEB-INF04) have highlighted the uncertainties in deriving an appropriate target ratio and the difficulties ensuring fishers comply. Consequently, the WPEB has repeatedly recommended that the five per cent shark fin to body weight ratio has no clear scientific basis, and therefore sharks should be landed with their fins naturally attached (WPEB03, paragraph 42(3); WPEB04, paragraph 35; WPEB05, paragraph 52; WPEB06, paragraph 65). Specifically, “abandonment of the current measure would remove the need for deriving what would be an arbitrary fin to body weight ratio and enforcing it in the IOTC” (WPEB04, paragraph 35). Further, an “alternative measure of landing sharks with their fins attached could be expected, if fully implemented, to end the practice of finning and also facilitate the collection of data that would be highly beneficial in shark stock assessments” (WPEB04, paragraph 35).

The SC, noting potential operational difficulties (SC13, paragraph 56), endorsed the WPEB recommendation requiring that the trunks be landed with the fins attached, naturally or otherwise (SC11, paragraph 57(v); SC13, paragraph 55). The SC also agreed that all fins landed should be able to be matched to a carcass and, in situations where the fins have been removed from the body prior to landing, they should be stored in such a way that they can be cross-referenced to the carcass (SC11, paragraph 57(viii)).

In 2011, the WPEB07 noted (paragraph 153) that there is much variability in the fin to body weight ratio and that the 5% ratio measure currently used is not entirely satisfactory for all purposes. In particular, this measure does not specify whether it refers to dressed or round weight, the species of shark and type of fins retained. Discussions at the WPEB showed that there were different understandings on what was required.

WPEB07 also noted (paragraph 154) that the best way to reduce or avoid the practice of shark finning in the IOTC area, to encourage full utilisation, to ensure accurate catch statistics, and to facilitate the collection of biological information, would be to land all sharks with fins attached (which includes partially cut and folded). The majority of the WPEB recommended such action be achieved through the replacement of IOTC Resolution 05/05 (5% shark fin:body weight ratio).

5 The need for improved data on shark catches in the Indian Ocean

The need for better data on sharks caught in IOTC-managed fisheries has been recognised for many years. In 2007, the Commission acknowledged the difficulties associated with developing stock status indicators for shark species faced by the Working Party on Bycatch (WPBy, now WPEB). Members and international scientists were urged to collect and provide the relevant information as outlined in Resolution 05/05 (IOTC11, paragraph 30). Since 2006, the WPBy/WPEB, has continued to encourage members to submit all relevant data on bycatch, including sharks, to the IOTC Secretariat (2006: WPBy02, paragraph 52, 2007: WPEB03, paragraph 42(1), 2008: WPEB04, paragraph 5, 2009: WPEB05, paragraph 4 and 2010: WPEB06, paragraphs 10 and 12).

The SC, at its Twelfth session, "unanimously recognised that there was a need to collect more biological information on sharks and more detailed species composition information and agreed with the principle that shark fins should be matched to a specific carcass for such biological research, as agreed at SC11 (SC11, paragraph 27, 28)"(sic[1]) (SC12, paragraph 51). This recommendation has repeatedly been considered a high priority at SC meetings (SC09, paragraph 11(5); SC10, paragraphs 13(4) and 64; SC11, paragraphs 57(vi) and 58).

Irregularities associated with data collection and reporting of shark catches by IOTC Members may result in the IOTC holding incomplete shark bycatch databases (WPEB04, paragraph 5). The WPEB notes that the reported shark catches represent groups of species retained onboard (WPEB04, paragraph 5), and does not provide species level information. Misidentification of shark species affects the quality of the catch data available for IOTC *Executive Summaries for Shark* and limits assessment of the sustainability of shark catches and shark populations (WPEB04, paragraph 38). The WPEB noted that under Resolution 05/05, using fin to body weight ratios requires port sampling of pectoral fins to provide information on the number of sharks caught, but this only allows for identification at the level of the species group (WPEB04, paragraph 37). Overall the WPEB and SC considered that maintaining the current resolution (fin to body weight ratio), precludes the collection of essential information on species-level interactions with fishing fleets, which is crucial for accurate stock assessments for sharks (SC11, paragraph 57(iii) and WPEB04, paragraph 35).

A sub-group of the 2008 WPEB produced a list of technical measures regarding shark finning (SC11, paragraph 58, table 2; see Appendix II). In 2010, SC13 identified several steps to improve the certainty of fisheries statistics for sharks (see Appendix III). These recommendations would better inform the IOTC *Executive Summaries for Shark* and improve the scientific basis for the management of shark catches in the Indian Ocean.

In 2011, the WPEB noted (WPEB07, paragraph 159) that while Resolution 10/02 provides for data to be reported to IOTC on "the most commonly caught shark species and, where possible, to the less common shark species" there is no list defining the most common and less common species. Recognising the general lack of shark data being recorded and reported to the IOTC, the WPEB recommended (WPEB07, paragraph 161) that Resolution 10/02 be revised to include a list of elasmobranch species for which nominal catch data shall be reported and that the list of shark species to be recorded in logbooks for all gears also be modified (see Appendix IV).

[1] Paragraph 51 of SC12 meeting report refers to SC11 paragraphs 27 and 28. However, paragraphs 27 and 28 do not relate to the information contained in paragraph 51 of the SC12 report. We believe that the correct reference is to paragraphs 57 and 58 of the SC11 report.

6 Scientific basis for the prohibition of wire traces

There is substantial scientific evidence demonstrating the effectiveness of prohibiting wire traces as a shark bycatch mitigation method (Berkeley and Campos 1988, Ward et al. 2008, Vega and Licandeo 2009). These studies demonstrated that use of nylon monofilament traces in the vicinity of the baited hooks reduces catch rates for a range of shark species as a result of enhanced capacity for sharks to escape by biting through nylon traces (Vega and Licandeo 2009, Ingram et al. 2011); nylon traces can also reduce the soak time of hooked individuals and minimise handling at the side of the vessel, both of which will reduce mortality of sharks (Ward et al. 2008, Campana et al. 2009). This evidence has been reviewed previously at several of the IOTC WPEB, SC and Commission meetings.

The scientific justification for the prohibition of wire traces was first presented to the IOTC WPEB in July 2007 (IOTC-2007-WPEB-15). This was based on the study conducted in north-eastern Australia by Ward et al. (2008). At this WPEB meeting, scientific experts recognised that more bycatch was recorded on lines using wire traces than on those with monofilament nylon traces. This work validated Australia's decision to prohibit wire traces in order to reduce shark bycatch. The WPEB emphasised an urgent need to quantify the effects of fisheries on non-target species and overall on marine ecosystems (WPEB03, paragraph 52). The 2007 SC meeting endorsed the recommendations of the WPEB, urging members to develop mitigation measures to reduce adverse effects on non-target species and to develop mitigation measures and fishing gear to reduce shark bycatch (e.g. circle hooks, shark scaring bait and other devices) (WPEB03, paragraph 52; SC10 Appendix IX).

These recommendations were reiterated by the SC in 2009 and 2010. In 2009, the SC noted that the WPEB should explore mitigation methods for reducing shark bycatch on longlines, and specifically referred to the preferred use of monofilament trace over wire trace (SC12, paragraph 52). In 2010, the prohibition of wire trace was again recognised as an effective mitigation measure in the IOTC *Executive Summary for Oceanic Whitetip Sharks (Carcharinus longimanus)* (SC13, page 187).

In 2011, in relation to a paper (IOTC–2011–WPEB07–30) which presents preliminary information on the bycatch of blue and shortfin mako sharks in the EU-Portugal longline fleet in the Indian Ocean, the WPEB noted (WPEB07, paragraph 117) that transition from monofilament branchlines to wire leaders resulted in higher shark bycatch, and is probably related to a change of target species from swordfish to blue sharks.

7 Recommendations made by the IOTC WPEB and SC

The WPEB has made consistent recommendations regarding catch reporting, attachment of shark fins to their respective carcasses, increased bycatch prevention through prohibition of wire traces, and promotion of research, education and training, in order to promote the effective conservation and management of sharks in the Indian Ocean.

In 2007, the WPEB recommended that data reporting for sharks mirror those for tuna species, working towards providing a comprehensive assessment process and indicators for the status of sharks. Furthermore, the WPEB recommended that additional information on shark fin ratios be provided for consideration to the SC (WPEB03, paragraph 42(1-3)).

In 2008, the WPEB provided comprehensive advice to the SC in regards to:

- technical reasoning for adopting Resolution 05/05
- information on the lack of scientific basis for the five per cent fin to body weight ratio
- the inability for Resolution 05/05 to achieve its stated objectives
- further opinions from shark experts.

Overall, the advice noted that the fin to body weight ratio should be abandoned in favour of landing sharks with their fins naturally attached, in an effort to cease shark finning and facilitate the collection of data to underpin shark stock assessments (WPEB04, paragraph 35). This was further reinforced by the WPEB sessions in 2009, 2010 and 2011.

In addition, the 2009 and 2010 sessions of the WPEB recommended that a digital photo resource be developed for shark identification and that the status of shark stocks be assessed, to the extent possible, using information available from various fishery indicators (WPEB05, paragraph 52).

The SC has repeatedly endorsed the WPEB's recommendations and brought these recommendations before the Commission [SC10 Appendix IX; SC11, paragraph 57 (i-viii); SC12 Paragraphs 51, 198, 199 and 244(9); SC13, paragraphs 48, 49 (including Appendix III), 55, 57, 59 and 65]. The Commission has noted (IOTC13, paragraph 19) that: “there is no quantitative stock assessment or basic fishery indicators currently available for any of the sharks in the Indian Ocean therefore the stock status for all species is highly uncertain. In general, the life history characteristics of sharks; including that they are relatively long lived, typically take (at least) several years to mature, and have relativity few offspring, means that they are vulnerable to overfishing.” The Commission has also noted the recommendations made by the WPEB and SC, including the recommendation to have sharks landed with fins naturally attached (IOTC13, paragraph 21), but has failed to act on these recommendations.

8 Summary

Australia, with the support of other interested Members, intends to present a proposal at IOTC 16 that would amend both Resolution 05/05 *Concerning the conservation of sharks caught in association with fisheries managed by IOTC*, and Resolution 10/12 *On the conservation of thresher sharks (Family Alopiidae) caught in association with fisheries in the IOTC area of competence*. The proposal will seek to strengthen conservation and management arrangements for sharks caught in association with fisheries managed by the IOTC, in line with the recommendations of the WPEB and SC. The proposal would simplify compliance and monitoring arrangements, while providing mechanisms to ensure the long-term sustainability of shark populations in the Indian Ocean.

Australia recognises that sharks are important regional food sources that provide food security and economic development benefits throughout the countries of the Indian Ocean rim. As such, Australia's proposal seeks to implement a management approach that will deliver conservation benefits for all shark species, while reducing the compliance burden on developing States.

Noting the ongoing concerns outlined by WPEB and SC for the sustainability of sharks in the Indian Ocean, the proposal will seek to:

- require fins to be naturally attached (including partially cut and folded), or attached by other mechanisms to the trunk, until the first landing [or transhipment]

- prohibit the use of wire traces.

Australia is seeking comments and views from Members and co-operating non-contracting parties to guide the drafting of a new shark Resolution, and welcomes discussion on the proposed Resolution at the WPEB, SC and Commission meetings.

Appendix I. IUCN conservation status for pelagic sharks and rays

Threatened (EN: Endangered; VU: Vulnerable)

Species	Common name	Red List Category	Classification	Depth range (m)
Endangered				
Aetomylaeus vespertilio	Ornate eagle ray	EN	Semipelagic	110
Mobula mobular	Giant devilray	EN	Oceanic	surface–>200?
Sphyrna lewini	Scalloped hammerhead	EN	Semipelagic	surface–>275
Sphyrna mokarran	Great hammerhead	EN	Semipelagic	surface–>80
Vulnerable				
Rhincodon typus	Whale shark	VU	Oceanic	surface–>1,000
Odontaspis ferox	Smalltooth sand tiger	VU	Semipelagic	20–850
Alopias pelagicus	Pelagic thresher	VU	Oceanic	surface–>152
Alopias superciliosus	Bigeye thresher	VU	Oceanic	surface–723
Alopias vulpinus	Thresher shark	VU	Oceanic	surface–366
Cetorhinus maximus	Basking shark	VU	Semipelagic	surface–>1,250
Carcharodon carcharias	Great white	VU	Oceanic	surface–>1,000
Isurus oxyrinchus	Shortfin mako	VU	Oceanic	surface–>500
Isurus paucus	Longfin mako	VU	Oceanic	?
Lamna nasus	Porbeagle shark	VU	Oceanic	surface–>700
Galeorhinus galeus	Tope shark	VU	Semipelagic	1–800
Carcharhinus longimanus	Oceanic whitetip shark	VU	Oceanic	surface–>200
Carcharhinus obscurus	Dusky shark	VU	Semipelagic	surface–400
Carcharhinus plumbeus	Sandbar shark	VU	Semipelagic	surface–280
Carcharhinus signatus	Night shark	VU	Semipelagic	surface–600
Sphyrna zygaena	Smooth hammerhead	VU	Semipelagic	surface–>200

Near-threatened

Species	Common name	Classification	Depth range (m)
Chlamydoselachus anguineus	Frilled shark	Semipelagic	51–1,440
Hexanchus griseus	Bluntnose sixgill shark	Semipelagic	surface–2,000
Aetobatus narinari	Spotted eagle ray	Semipelagic	surface–60
Manta birostris	Manta	Oceanic	surface–>200?
Mobula japanica	Spinetail devilray	Oceanic	?
Pseudocarcharias kamoharai	Crocodile shark	Oceanic	surface–>590
Carcharhinus albimarginatus	Silvertip shark	Semipelagic	surface–>800
Carcharhinus brachyurus	Bronze whaler	Semipelagic	surface–100
Carcharhinus brevipinna	Spinner shark	Semipelagic	<5–>75
Carcharhinus falciformis	Silky shark	Oceanic	surface–>500
Carcharhinus galapagensis	Galapagos shark	Semipelagic	2–>180
Carcharhinus leucas	Bull shark	Semipelagic	surface–>152
Carcharhinus limbatus	Blacktip shark	Semipelagic	surface–30
Galeocerdo cuvier	Tiger shark	Semipelagic	surface–140
Prionace glauca	Blue shark	Oceanic	surface–350

Least concern

Species	Common name	Classification	Depth range (m)
Etmopterus gracilispinis	Broadband lanternshark	Semipelagic	70–1,000
Etmopterus pusillus	Smooth lanternshark	Semipelagic	surface–1,998?
Euprotomicrus bispinatus	Pygmy shark	Oceanic	surface–300
Heteroscymnoides marleyi	Longnose pygmy shark	Oceanic	45–502
Isistius brasiliensis	Cookiecutter shark	Oceanic	surface–1,000
Isistius plutodus	Largetooth cookiecutter shark	Oceanic	60–120
Squaliolus aliae	Smalleye pygmy shark	Oceanic	200–2,000
Squaliolus laticaudus	Spined pygmy shark	Oceanic	200–500
Pteroplatytrygon violacea	Pelagic stingray	Oceanic	surface–238
Myliobatis californicus	Bat ray	Semipelagic	surface–108
Mitsukurina owstoni	Goblin shark	Semipelagic	<30–>1,000
Lamna ditropis	Salmon shark	Oceanic	surface–>600

Appendix II

The SC11 meeting provided a summary of the list of technical measures concerning the shark fin to body weight issue, which was produced by a sub-working group at the 2008 meeting of the IOTC WPEB (SC11, paragraph 58, table 2).

Type of Measure (ranked by decreasing preference)	Pros	Cons	Notes
1- Land whole shark with fins attached to the body	Full information can be obtained and will enable robust estimates of catches by species, and a wide range of morphometric relationships can be derived	Possible increase of discards	Highly recommended for stock assessment and conservation measures If a vessel has no planned use for the shark bodies, this measure would require that storage space that would otherwise be used for target species would have to be used for sharks. Furthermore, given the presence of fins on the bodies, the stacking of the bodies is less efficacious and overall, fewer sharks can be stored.
2- Land shark with fins separated from carcasses but stored in a way that they can immediately be related to a given carcass	Full information can be obtained and will enable robust estimates of catches by species. Less precise morphometric relationships than in (1) can be expected	Possible increase of discards	Recommended for stock assessment and conservation measures One possibility (among others) is to have the complete set of fins for a given shark placed in a plastic bag, and attached to the torso This measure enables a more optimized use of the haul capacity and is easier to apply on vessels
3- Land fins and body trunks within required fin-to-body ratios all species combined (status quo)	none	Poor level of information obtained. No reliable estimates of total catch or catches by species are possible.	Not recommended by sharks specialist groups (including the IUCN Shark specialist group -IOTC-2008-WPEB-INF01 and the European Elasmobranch Association - IOTC-2008-WPEB-INF04) Cannot be used for stock assessment The 2% or 5% ratio used respectively for dressed and round weight do not reflect the variability among species cutting technique or fin set retained.

Appendix III

Below are the actions recommended by the 13th Session of the IOTC SC (2010) to improve the certainty of fisheries statistics held for sharks.

Data / information / work required	Fishery	Major fleets involved
Retained catches:		
Historical catch-and-effort information	Fresh-tuna and/or deep-freezing longliners	Taiwan,China, Indonesia, Japan, China, Seychelles, Malaysia, Oman, Philippines, South Korea and India.
	Longliners targeting swordfish	EU-Spain, Seychelles
	Artisanal fisheries with large catches of pelagic sharks	Sri Lanka, Pakistan, Iran, Indonesia, Yemen
Historical catch level estimates by species and year	Fresh-tuna and/or deep-freezing longliners	Taiwan,China, Indonesia, Japan, South Korea
	Purse seine	EC and the Seychelles (before 2003)
Logbook coverage set to produce acceptable levels of precision (CV to be initially set at less than 20%) in the catch-and-effort statistics for the main species of sharks.	All industrial fleets	
Research on identification of shark species from fins and processed body parts.	All fleets	
Discard levels:		
Implementing levels of observer coverage as requested by the Commission (*i.e.* 5% of the fishing events on Industrial fisheries and 5% of the fishing trips on artisanal fisheries).	All fleets	
Estimates of historical discard levels for sharks by species and year	All industrial fleets	
Size frequency data:		
Collecting and reporting size frequency information for the main shark species caught by their fisheries, including all historical data available	All industrial fleets, notably longline fleets	
Observers collecting size frequency data for main shark species, including discards	All industrial fleets	
Biological data:		
Collecting data that can be used to derive length-weight keys (where appropriate by season and sex), ratios of fin-to-body weight, non-standard measurements-fork length keys and processed weight-live weight keys.	All fleets	
Research required while fins are unloaded detached from carcasses:		
Identification of sharks through fins validated by using DNA techniques The use of shark fins to derive catch estimates in weight by species/species group and fishery. The use of shark fins to derive length frequencies by species.	All fleets	

Appendix IV

TABLE 2. List of the most commonly elasmobranch species caught

Common name	**Species**	**Code**
Manta and devil rays	Mobulidae	MAN
Whale shark	*Rhincodon typus*	RHN
Thresher sharks	Alopias spp.	THR
Mako sharks	Isurus spp.	MAK
Silky shark	*Carcharhinus falciformis*	FAL
Oceanic whitetip shark	*Carcharhinus longimanus*	OCS
Blue shark	*Prionace glauca*	BSH
Hammerhead shark	Sphyrnidae	SPY
Other Sharks and rays	–	SKH

TABLE 3. List of elasmobranchs species to be recorded in the logbook for longline, purse seine and gillnet fishing vessels

For longline
Blue Shark (*Prionace glauca*)
Mako Sharks (Isurus spp.)
Porbeagle Shark (*Lamna nasus*)
Other requiem sharks (Carcharhinus spp.)
Oceanic Whitetip Shark (*Carcharhinus longimanus*)
Hammerhead Sharks (Sphyrnidae)
Thresher Sharks (Alopias spp.)
Other sharks

For purse seine:
Oceanic Whitetip Shark (*Carcharhinus longimanus*)
Silky sharks (*Carcharhinus falciformis*)
Mantas and devils rays (Mobulidae)
Other sharks
Other rays

For gillnet:
Blue Shark (*Prionace glauca*)
Mako Sharks (Isurus spp.)
Other requiem sharks (Carcharhinus spp.)
Oceanic Whitetip Shark (*Carcharhinus longimanus*)
Hammerhead Sharks (Sphyrnidae)
Thresher Sharks (Alopias spp.)
Tiger shark (*Galeocerdo cuvier*)
Mantas and devils rays (Mobulidae)
Other sharks
Other rays

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IOTC meeting reports referred to in this paper are available from the IOTC website: www.iotc.org