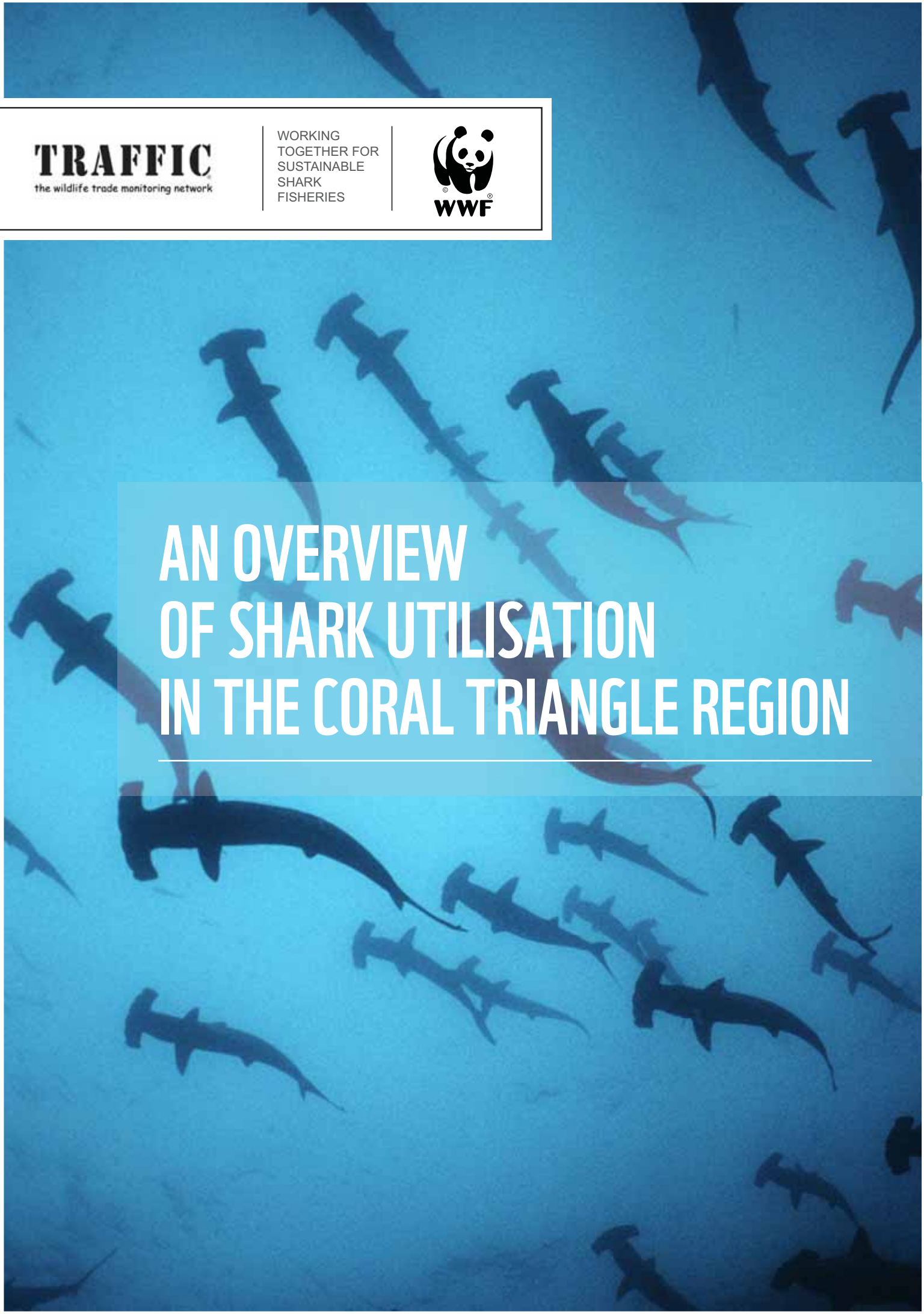

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WWF

AN OVERVIEW OF SHARK UTILISATION IN THE CORAL TRIANGLE REGION

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ACRONYMS

ASEAN	Association of Southeast Asian Nations
BFAR	Bureau of Fisheries and Aquatic Resources (the Philippines)
CCSBT	Commission for the Conservation of Southern Bluefin Tuna
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CMM	Conservation and Management Measure
CMS	Convention on Migratory Species of Wild Animals
CNP	Co-operating Non-Contracting party
COFI	Committee on Fisheries (of FAO)
CoP	Conference of the Parties (to CITES)
EEZ	Exclusive Economic Zone
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
IOTC	Indian Ocean Tuna Commission
IPOA-Sharks	International Plan of Action for the Conservation and Management of Sharks
IUU	Illegal, Unreported and Unregulated (fishing)
MoU	Memorandum of Understanding on the Conservation of Migratory Sharks (CMS)
nei	Not elsewhere included
NPOA-Sharks	National Plan of Action for the Conservation and Management of Sharks
PI-RPOA Sharks	Pacific Islands Regional Plan of Action for the Conservation and Management of Sharks
PNA	Parties to the Nauru Agreement
RFMO	Regional Fisheries Management Organization
SEAFDEC	Southeast Asian Fisheries Development Center
SAR	Special Administrative Region
SPC	Secretariat of the Pacific Community
USA	United States of America
WCPFC	Western and Central Pacific Fisheries Commission
UNCLOS	United Nations Convention on the Law of the Sea of 11 December 1982
UNFSA	United Nations Fish Stocks Agreement


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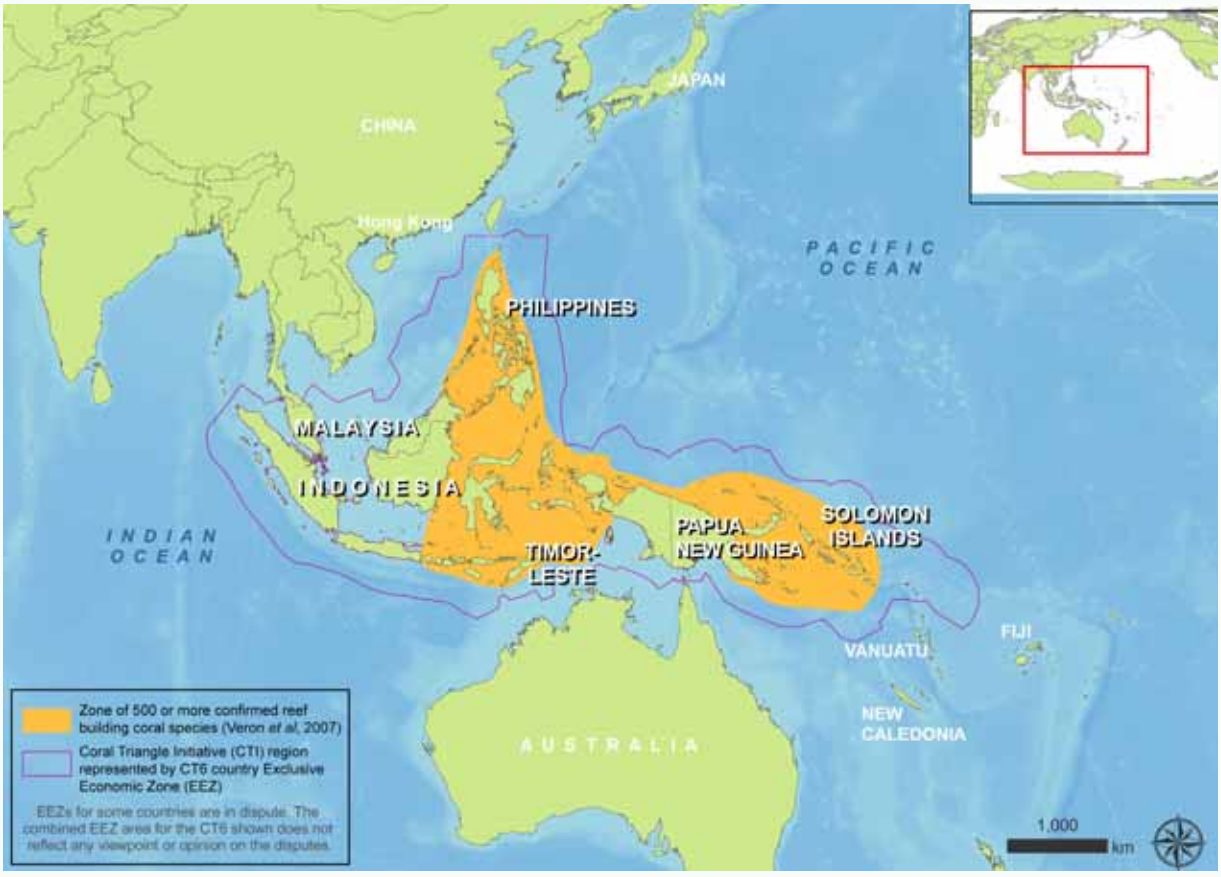
CONTENTS

INTRODUCTION

Sharks are particularly vulnerable to over-exploitation due to their biological characteristics of maturing late, having few young and being long-lived.

This vulnerability is exacerbated by strong demand for shark fins and a general deficit in management of shark catch. As a top-order predator, sharks are also thought to play a key role in many of the ecosystems in which they occur.

Action on sharks by the Food and Agriculture Organization of the United Nations (FAO), international treaties such as the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), regional fisheries management organizations (RFMOs) and shark catching countries and entities, has been prompted by increasing international concern for shark stocks due to a growing body of evidence that many shark species are threatened and continuing to decline due to unregulated fishing.



Map of the Coral Triangle region © Coral Geographic (Veron *et al*, unpublished data)

This overview of shark catch and trade is focused on the six Coral Triangle countries (Indonesia, Malaysia, Papua New Guinea (PNG), the Philippines, Solomon Islands and Timor Leste) and the neighbouring countries of Viet Nam and Fiji. Indonesia and Malaysia are within the top twenty catchers[1] of sharks globally from reported FAO data[2] . The analysis in this report has been conducted through a desktop study of available information and literature. The following aspects of shark fisheries in each of the eight countries were investigated.

- Shark catch (quantity and species taken)
- FAO catch data recorded by the FAO was analysed for the period 2000-2010 (FAO Fisheries Department, 2012)
- Shark trade (species and products, imports and exports re-exports). FAO trade data was compiled for the period 2000-2008 (FAO Fisheries Department, 2010)
- The nature of fisheries in which sharks are taken
- Shark utilisation, including domestic market and processing facilities
- Management of fisheries in which sharks are taken including legislative/regulatory instruments
- International engagement on shark management

Available information on each country has been presented in the form of a Country Profile. The availability of information varies considerably across the countries and a profile has not been produced for Timor Leste due to the limited availability of current information. Given the desktop nature of this project, it is important to note that this review of available information has relied largely on documents discoverable through internet searching. Further information and insights on management of sharks in the countries concerned may be available through direct contact with the management agencies concerned. It is important to note that this study did not cross check data from major importers with reported export data from the countries considered in this analysis. Notes on the nature of management obligations applying to the countries under review including obligations arising from participation in regional fisheries bodies and international conventions can be found in Annex 1. A full list of common and scientific names of shark species referred to in this report is provided in Annex 2.

[1] The designations of geographical entities in this publication, and the presentation of the material, do not imply the expression of any opinion whatsoever on the part of TRAFFIC or its supporting organizations concerning the legal status of any country, territory or area, or of its authorities, or concerning the delimitation of its frontiers or boundaries.

[2] Top twenty catchers in descending order of average catch from FAO capture production 2000-2010 are Indonesia, India, Spain, Taiwan, Argentina, Mexico, United States of America, Pakistan, Malaysia, Japan, France, Brazil, Thailand, New Zealand, Sri Lanka, Portugal, Nigeria, Iran (Islamic Rep. of), Korea, Republic of and United Kingdom. (FAO Fisheries Department, 2012).

Country Profile: Fiji

Shark catch[3]

Tonnage reported to FAO, % of global FAO catch and main species reported to FAO

Fiji reports its fisheries catch to FAO but does not identify sharks separately from other fish in those data.

Catch data from other sources and main species taken

The Fiji domestic tuna fishery lands and markets a number of non-tuna species, although shark trunks and other species are not commercially viable (e.g. lancet fish) and are typically discarded (Western and Central Pacific Fisheries Commission (WCPFC), 2010a). No shark catch data were reported to the WCPFC in Fiji's Annual report (Part 1) in 2010 although estimated catches of sharks (t) taken in the period 2006 to 2008 have previously been provided (WCPFC, 2009) and catches for 2011 were provided to WCPFC in 2012 (WCPFC (2012a):

	2006	**2007**	**2008**	**2011**
Blue Shark	705	240	597	374
Mako sharks	157	43	177	180
Oceanic Whitetip	169	164	54	92
Silky Shark	152	95	64	250
Other sharks and rays	73	39	92	43
Total	**1256**	**581**	**984**	**939**

The main species reported in observed longline shark catch from Fiji waters are Blue Shark (46%), Oceanic Whitetip (18%), Silky Shark (13%) and Pelagic Stingray *Dasyatis violacea* (10%). The main species reported in observed purse seine catch are Oceanic Whitetip (30%) and low levels of Silky Shark and hammerhead sharks *Sphyrna spp*. with the remainder of the shark catch not being identified by species (Lack and Meere, 2009).

Gilman *et al*. (2007) report that over five years for which observer data were available (1999, 2002-2005) sharks formed 3-10% of the catch per effort (no./100 hooks) and 8 to 25% of the weight of the catch per effort (kg/100 hooks) in Fiji's domestic longline fleet.

[3] In the Country Profiles, FAO shark catch refers to the average annual reported catch (tonnes) over the 2000-2010 period. The percentage of reported global catch refers to the same time period.

Juncker (2006) reports that in inshore areas, Hammerhead Sharks and Oceanic Whitetip Shark are quite common and a few species also venture into the fresh water, especially the larger rivers. Drop line fishing surveys carried out by the Secretariat of the Pacific Community (SPC) found that only two species were recorded as bycatch (Silvertip Shark *Carcharhinus albimarginatus* and Grey Reef Shark *C. amblyrhynchos*). Other species recorded are the Blacktip Shark *C. limbatus* and the Whitetip Reef Shark *Triaenodon obesus*, Lemon Shark *Negaprion brevirostris*, Tiger Shark *Galeocerdo cuvier* and the Bull Shark *Carcharhinus leucas* (Juncker, 2006).

Nature of shark fisheries

Sharks are taken in offshore fisheries, as bycatch in a substantial domestic longline fleet (97 vessels in 2009) and by US purse vessels operating in Fiji's waters under the Multilateral Treaty on Fisheries Between Certain Governments of the Pacific Island States and the Government of the United States of America (the US Treaty) (WCPFC, 2010a). Gilman *et al.* (2007) report that sharks taken in Fiji's pelagic tuna longline fishery are usually finned and the carcasses discarded into the ocean. Sharks are also taken as bycatch in domestic inshore fisheries. Only a few species are retained in the inshore fisheries (Juncker, 2006).

Shark Trade
Data reported to FAO

Fiji reports shark exports to FAO in two, non-species-specific categories: Sharks not elsewhere included (nei), fresh or chilled; and Sharks, nei, frozen. Small quantities of frozen shark products are also imported. These data show that shark exports averaged 164 t over the 2000-2008 period. Fiji reports production of unsalted fins averaging 134 t/year over the same period (FAO Fisheries Department, 2010).

Shark utilisation

Until recently, reef fish was readily available, thus shark was not considered an important food fish (shark is not consumed in many areas of Fiji due to traditional taboos on its use, however, it is readily accepted in the Rotuma and Rabi communities). With the increase in population and greater ease of exporting there have been moves to develop shark fisheries both to supply the local demand for fish and to earn foreign exchange (Juncker, 2006).

Domestic management

Management measures

No specific shark management measures are known to be in place in Fiji. Gilman *et al.* (2007) report that shark is not managed as a separate fishery in Fiji and there were no restrictions relating to catch, processing and handling of sharks and shark fins in place.

NPOA-Sharks

Fiji does not currently have an NPOA-Sharks. A Regional Plan of Action for Sharks (PI-RPOA Sharks) (Lack and Meere, 2009) was prepared as guidance for Pacific Island Countries and Territories in 2009 through the Forum Fisheries Association (FFA) and with funding from the FAO. Fiji is currently consulting with stakeholder groups to decide on the extent of management for inshore and offshore arrangements. Fiji is considering, as a possible option, the adoption of a shark sanctuary approach similar to that adopted by Palau and the Marshall Islands in the Pacific.

RFMOs and regional bodies

Membership

WCPFC and Forum Fisheries Association (FFA)

Implementation of shark measures

Under WCPFC CMM 2010-07 coastal States, such as Fiji, are permitted to apply 'alternative measures' within their own waters. To date Fiji's reporting of shark catch to the WCPFC has been intermittent and the measures applied to its domestic fleet with respect to shark conservation are unknown.

Gaps and deficiencies

Data and information

Management

Absence of any shark specific catch in FAO catch data. Intermittent reporting of shark catch to WCPFC, noting that such reporting is not mandatory.

The nature and extent of current shark management measures imposed by Fiji on its domestic longline fleet, including measures that are consistent with CMM 2010-07 is unknown.

Country Profile: Indonesia

Shark catch

Tonnage reported to FAO, % of global FAO catch and main species reported to FAO

Average annual reported shark catch 2000-2010 was 106 288 t (FAO Fisheries Department, 2012) representing 13.1% of reported global catch. According to FAO data, Indonesia is the major shark catching country in the world. Before 2005 all catch was reported to FAO in only two species group categories. Currently, one species and 10 species groups are reported. In 2010 Whitespotted Wedgefish (Giant Guitarfish) *Rhynchobatus djiddensis* comprises 3.7% of the catch, 'Requiem sharks not elsewhere included (nei)' around 30% and 'Stingrays, butterfly rays nei', 40%.

Catch data from other sources and main species taken

The main species taken are Whitespotted Whipray *Himantura gerrardi*, Cowtail Stingray *Pastinachus sephen*, Whitespotted Wedgefish, Silky Shark, Spottail Shark *Carcharhinus sorrah*, Blue Shark, Scalloped Hammerhead, Pelagic Thresher and Shortfin Mako (FAO, 2009).

Dharmadi *et al.* (2008) report the results of a survey conducted in the south of Indonesia between 2001 and 2004. During this period 57 species of sharks were identified from shark landings at four landing sites. The most common sharks in the landings were *Squalus spp.* (22%), Silky Shark (15%), Spinner Shark *Carcharhinus brevipinna* (13%) and Pelagic thresher (7%).

Commercial species of shark identified in Indonesia's NPOA-Sharks include: Spottail Shark, Tiger Shark, Shortfin Mako, Silky Shark, Scalloped Hammerhead, Crocodile Shark *Pseudocarcharias kamoharai*, Pelagic Thresher, Longfin Mako, Western Angel Shark *Squantina spp.*, Bowmouth Guitarfish *Rhina ancylostoma*, Gummy Shark *Mustelus antarcticus*, Bigeye Thresher, Spinner Shark, dogfish *Squalidae spp.*, Spinetail *Mobula Mobula*

japanica, Giant Shovelnose Ray *Glaucostegus typus* and Cowtail Ray (Ministry of Marine Affairs and Fisheries, 2010). The NPOA does not identify the Whitespotted Wedgefish as one of the commercial species, despite this being the single species identified in catch data reported to the FAO.

White and Cavanagh (2007) report the capture and finning of whale sharks at Kedonganan in southern Bali. It is noted that the slow-swimming nature of this species makes it particularly prone to being caught by artisanal fishers and that "it is highly likely that whale sharks are landed, either opportunistically or directly targeted at numerous other artisanal fish landing sites throughout the Indonesian archipelago. The increasing fishery for large mobulid rays, especially *Mobula tarapacana, M. japanica* and *Manta birostris*, in this region may also result in whale sharks being encountered more often by artisanal fishers due to their similar habitats and feeding preferences. Although estimating the total number caught on an annual basis within Indonesia would be very difficult, if not impossible, it is likely that significant numbers are caught each year and that more surveys are required to determine the true extent of such landings".

Nature of shark fisheries

Vieira and Tull (2005) report that Indonesia's shark and ray fishery has two sectors: the large scale or industrial sector and the small-scale or artisanal sector, with the artisanal sector believed to be the most significant contributor to the total shark and ray catch. It is likely that, given the vessels used by artisanal fleets are less likely to have insulated fish holds or refrigeration, there is a strong incentive for shark finning.

Sharks are taken as target species using gill and tangle nets, longlines and harpoons and as by bycatch by tuna longlines, trawls, seine nets, trammel nets, hand lines and other bottom gear. Sharks are an important source of livelihood for many communities (FAO, 2009). In Raja Ampat archipelago about 100 vessels (about 7 m) target sharks for fins with small sharks landed for domestic consumption and larger shark carcasses discarded. These subsistence or traditional fishing vessels are not required to have fishing permits (Varkey *et al.*, 2010).

Fowler *et al.* (2005) report that:

- a target shark fishery exists throughout much of Indonesia using longlines, although gillnets are also used;
- a fishery in eastern Indonesia, using large-mesh gillnets, targets Whitespotted Wedgefish for its valuable fins;
- a deepwater longline fishery targets *Centrophorus spp., Greeneye Spurdog Squalus mitsikurii,* Kitefin Shark *Dalatis licha* and *Hexanchus spp*. mostly for squalene-rich liver oils;
- target trawl fisheries for rays species including *Dasyatis spp*. and Eagle Ray *Aetomylaeus maculata* operate in the west of the country;
- elasmobranchs are commonly taken as bycatch in fisheries including trawl fisheries for penaeid prawns and demersal fish, pelagic longline fisheries for tunas and hook-and-line fisheries for reef fish; and
- freshwater elasmobranchs also occur in Indonesia and the Freshwater Sawfish is known to occur in some areas.

Shark products located on board an Indonesian fishing vessel apprehended in 2012 in Australia's northern waters

Illegal, unreported and unregulated (IUU) fishing by Indonesian vessels in northern Australian waters has been common over the last decade with shark taken illegally routinely finned (Lack and Sant, 2008). However, there has been a marked reduction in IUU fishing in northern Australian waters in recent years, including IUU fishing by Indonesian vessels. In the 2006 calendar year, a total of 365 foreign vessels were apprehended in Australia's northern waters. However, between July 2008 and June 2012 only 76 Indonesian and PNG vessels were apprehended. Of these, 60 Indonesian vessels were targeting shark. Most incursions into the Australian Fishing Zone (AFZ) now occur at the outer extremities of the maritime boundary with periodic opportunistic shallow forays into Australian waters. (G. Lovelock, Australian Fisheries Management Authority *in litt*. to G. Sant, TRAFFIC, 31 August 2012).

Shark Trade

Data reported to FAO

Between 2000 and 2008 Indonesia reported shark exports to FAO in three categories: Shark fins, dried, unsalted; Sharks nei frozen; Sharks, rays, skates, fresh or chilled, nei (FAO Fisheries Department, 2010). Over that period, exports of fins averaged over 1400 t/year, of frozen shark

and over 750 t/year and of fresh chilled shark around 80 t/year. Indonesia also imports dried unsalted shark fins (around 160 t/year) and frozen shark products (around 60 t/year).

Indonesia reports production of dried, unsalted shark fins which appears to be predominantly exported. Production of Sharks nei, frozen, increased noticeably from 2007 from an average of less than nearly 500 t per year between 2000 and 2006, to nearly 8000 t/year in 2007 and 2008. The increase in exports of frozen shark product reflected in the FAO over this time is not commensurate with the increase in production. This suggests that either exports are under-reported to FAO or that domestic consumption of sharks has increased significantly.

Other trade data and information

According to FAO (2009) the main shark export is dried shark fin from species including guitarfish and shovelnose rays. Exports are predominantly to Japan, China Hong Kong SAR, Singapore, China, Malaysia and Taiwan. Surabaya (East Java) is the centre for shark fin exports. Other products such as skins, gill rakers and cartilage are included in other export categories and shark oil is recorded under fish oil. Shark fillets are exported to Singapore through Belitung Island. Other shark products such as salted and dried meat are usually traded locally or exported mainly to Bangladesh and Sri Lanka, however these export are not recorded separately.

Shark utilisation

Most parts of the sharks are utilized (fin, skin, meat, bones, stomach, liver, teeth) and generally sold through brokers/ traders at auction for domestic sale or export (Watts, 2003). Some fin traders in Indonesia process shark fins before exporting (Watts, 2003) although Dharmadi *et al.* (2008) report that this is unusual.

Dharmadi *et al.* (2008) report that in southern Indonesia shark flesh is generally salted or dried and sent to other markets in Jakarta and West Java. Shark skins, fins and oil are also marketed with fins dried prior to export. They report that fins landed in Bali comprise Oceanic Whitetip Shark, thresher sharks, Blacktip Shark *Carcharhinus tilstoni* and Blue Shark.

Domestic management

Management measures

The growth in shark and ray fisheries in Indonesia has outstripped effective management. There are few, if any, management strategies aimed at protecting shark resources (FAO, 2009). The only regulation and law enforcement related to shark fisheries and product is for sawfish (SK Mentan No. 716/KPTS/Um/10/1980 and Peraturan Pemerintah No. 7 Tahun, 1999) but the implementation of the regulations was only applied for monitoring and banning the rostrum trade rather than to other parts of the body due to the lack of ability to identify the species (FAO, 2009).

Vieira and Tull (2005) note that the predominance of the artisanal sector in shark catch poses difficulties for management since imposing catch restrictions on impoverished artisanal fishing communities has potentially serious impacts on the incomes and well-being of these fishers, their families and communities. An understanding of these impacts is therefore required.

It is reported that there is considerable illegal fishing in Indonesian waters by Thai trawlers and it has been suggested that institutional arrangements in Indonesia are not capable of dealing with this issue and in fact that there may be some corruption on the part of those charged with enforcement (Heazle and Butcher, 2007). The extent to which this illegal fishing activity affects shark populations is unknown.

NPOA

Indonesia adopted an NPOA-Sharks in November 2010 (Ministry of Marine Affairs and Fisheries, 2010). The Plan identifies key issues for shark and ray management in Indonesia and broad strategies to address these. Those responsible for implementing the strategies are identified.

RFMOs and regional bodies

Membership

Commission for the Conservation of Southern Bluefin Tuna (CCSBT), Indian Ocean Tuna Commission (IOTC), WCPFC (CNP), Southeast Asian Fisheries Development Center (SEAFDEC), Association of Southeast Asian Nations (ASEAN)

Implementation of shark measures

There is no indication that Indonesia requires its vessels to comply with the fin:carcass ratio required by the IOTC and the WCPFC.

Indonesia is one of the major fleets involved in taking sharks in the IOTC area (IOTC, 2009). Indonesia, as required by IOTC Resolution 05/05, reports shark catch to IOTC with reported catch between 2001 and 2008 averaging 8500 t/year, but this average increased to nearly 16 500 t/year in 2006-2008. Reporting against resolution 10/02, which requires more detailed catch and effort data on 'the most commonly caught' shark species taken in surface fisheries, longline fisheries and coastal fisheries, is yet to be tested. Indonesia did not comment on implementation of Resolution 10/02 in its 2011 Annual Report to the IOTC. In relation to Resolution 10/12 on Thresher Shark, it commented that, according to logbooks, sharks (presumably thresher sharks) are not taken as bycatch in its tuna longline fishery. Herrerra *et al.* (2010) report that Indonesia had not provided any data on nominal catch or catch and effort of sharks taken in its purse seine fleet or on catch and effort of sharks taken in its longline fleet in the Indian Ocean to the IOTC. It had only partially provided data on nominal catch of sharks taken by its longline fleet.

Reporting of shark catch to CCSBT is not mandatory and Indonesia had not reported any shark catch to CCSBT up until 2009. Indonesia does not report any information on shark catch in WCPFC Part 1 Annual Reports to the WCPFC or in the aggregated catch and effort log sheet data for longline fleets provided to the Commission (Clarke and Harley, 2010). It is not mandatory to report shark catch to the WCPFC.

Gaps and deficiencies

Data and information

Greater species level identification of catch in data reported to FAO is required.

Management

The nature and extent of domestic shark management measures imposed by Indonesia, including measures consistent with WCPFC CMM 2010-07 and IOTC Resolution 05/05 is unknown.

Country Profile: Malaysia

Shark catch

Tonnage reported to FAO, % of global FAO catch and main species reported to FAO

Average annual reported shark catch 2000-2010 was 23 808 t (2.9% of global reported catch) (FAO, 2012). Malaysia reports shark catch to FAO in two categories of which 'Rays, stingrays mantas nei' comprise 67% and 'Sharks, rays, skates etc nei' 33%.

Catch data from other sources and main species taken

SEAFDEC (2006) reports that the ten most commonly taken shark species in Malaysia (in order) are: Spadenose Shark *Scoliodon laticaudus*, Brownbanded Bamboo Shark *Chiloscyllium punctatum*, Spottail Shark, Indonesian Bamboo Shark *Chiloscyllium hasselt*, Blackspot Shark *Carcharhinus seali*, Scalloped Hammerhead, Milk Shark *Rhizaprionodon acutus*, Graceful Shark *Carcharhinus amblyrhnchoides*, Sicklefin Weasel Shark *Hemigaleus microstoma*, Grey Bamboo Shark *Chiloscyllium griseum*. Based on landing data collected from 2003 to 2004, the most dominant species of sharks found in Malaysia are from the longtailed carpet sharks Family *Hemiscyllidae* and requiem sharks *Carcharhinidae*. The most common rays are whiptail stingrays Family *Dasyatidae* (Department of Fisheries, Malaysia, 2006).

Nature of shark fisheries

Sharks are taken mainly by trawl and gillnet fisheries with small quantities taken in longline, purse seine and other fisheries. The sharks and rays landings that constitute a part of the demersal fishery occur throughout the Malaysian fisheries waters, from the coasts to the edges of its exclusive economic zone (EEZ). The landings contribute only a minor portion, less than 2.2%, of total marine landings. Sharks are not targeted by fishers but are caught together with other commercially important species. In 2001, sharks caught by trawls accounted for 60.0% of the total shark landings followed by drift nets (26.0%) and hooks and lines (13.0%). Other fishing gears include portable traps, stationary gears, barrier nets, purse seines and other seines (Department of Fisheries Malaysia, 2006).

Fowler *et al*. (2005) report that:

- Elasmobranch catches in Malaysia are dominated by batoids taken as bycatch in trawl fisheries. They cite research that found that 95% of the elasmobranchs were taken by trawling and that 60% of the catch was batoids.
- Ray catches are higher off Peninsular Malaysia than Sabah, whereas shark catches are higher off Sabah than Sarawak.
- There is little information on species composition of the catch in any fisheries.
- Freshwater elasmobranchs inhabit many of Malaysia's rivers, including Freshwater Sawfish, and populations of these species have been reduced due to increased fishing and habitat degradation.

Sea Resources Management Sdn Bhd (2008) conducted a case study of IUU fishing in the east coast area of Peninsular Malaysia as part of a broader APEC study of IUU fishing in the Asia Pacific. The observations on sharks contained in the case study are noted below.

They report that "Malaysia's official position on shark-fin fishing is that it does not exist in Malaysia. However, whether or not a shark/ray fishery officially exists is unclear. For example, one research officer at the Southeast Asian Fisheries Development Centre (SEAFDEC), was quoted to say that, —we don't have a shark fishery per se and we definitely do not practice shark finning.

However, DOF Fisheries Statistics report a category of fish landings called Yu, meaning shark, where 8,299 MT in 2004 and 9,165 MT in 2005 were recorded to have been landed in Malaysia. Landings of rays are also recorded in the official data (e.g. 16,754 MT in 2004 and 15,929 MT in 2005 were recorded).

In the context of increasing shark/ray landings (i.e. 10,792 MT in 1982 to 27,948 MT in 2003 and then 25,094 MT in 2005), and a declining number of licensed fishing boats from 30,390 vessels in 1981 to 22,041 vessels in 2005 (for Peninsular Malaysia only), the belief that Malaysia does not have a shark/ray fishery appears incorrect. In 2005, 35% (some 8,856 MT) of this fishery occurred in Peninsular Malaysia. Therefore, given that the reported

landings of shark and rays have increased significantly in the context of a decreasing fishing fleet, there would appear to be evidence that these fish are desirable, target species. Fishing licences for Malaysian vessels do not restrict the species that can be caught. The licence usually only restricts the location where fishing can be done (the fishing zone and class of vessel) and the gear type used."

Shark Trade

Data reported to FAO

Between 2000 and 2008 Malaysia reported shark exports to FAO in four categories: Shark fins, dried, salted, etc; Shark fins, prepared or preserved; Shark fins, salted and in brine but not dried or smoked; and Sharks nei, frozen (FAO 2010). Total shark exports over that period averaged around 170 t/year of which around 145 t/year was comprised of fins. Malaysia is, however, a net importer of shark fin products. Between 2000 and 2008 fins imports averaged around 485 t/year.

Malaysia's trade data does not differentiate any shark species.

Shark utilisation

Sharks are retained and sold into local markets. Larger sharks are sold without fins. Fins are processed as dried whole fin (from the larger higher grade fins) and as dried or wet loose fin (from smaller lower grade fins). Shark fins are mostly exported to Hong Kong and Singapore (Department of Fisheries Malaysia, 2006).

Sharks are mostly utilized as fresh meat, although some are processed as salted fish. A small number of shark's jaws and teeth are sold as rare souvenir items to enthusiasts. Cartilage and some other discarded parts of the fish are used as bait for fish and crab traps. Small sharks, as well as those that are non-edible or unsuitable for bait are sold to fish mill factories for fertilizers. Rays are mostly consumed fresh (cooked or smoked) and salted. Both meat and fins from species such as Silky Shark, Blacktip Shark, Hardnose Shark *Carcharhinus macloti*, Spottail Shark and Spadenose Shark are in great demand and the prices of these species are increasing. Other species are also popular locally amongst Malaysian Chinese for their fins and meat, especially Blacktip Reef Shark *Carcharhinus melanopterus*, Blackspot Shark, Scalloped Hammerhead,

Domestic management

Management measures

Great Hammerhead, and Smooth Hammerhead. Fins are normally extracted from very small sharks from families *Carcharhinidae, Hemiscyllidae* and *Hemigalidae* of less than 1 m in size. Fresh fins and their processed items may be easily found at several wet markets especially in Kuantan, Kota Kinabalu and Sandakan (Department of Fisheries Malaysia, 2006).

The Fisheries (Control of Endangered Species of Fish) Regulation 1999 lists whale shark as an endangered marine animal and prohibits a person to fish, disturb, harass, catch, kill, possess, sell, buy, export or transport the species without written permission. Sanctions apply (Barriera, 2008).

The Department of Fisheries Malaysia (2006) reports that:

- Under the Fisheries Act 1985, the Minister of Agriculture is empowered to make regulations for the proper management of specific marine fisheries resources. However, there is no specific regulation pertaining to the management of sharks and rays except for Whale Shark, which is listed under the Fisheries (Control of Endangered Species of Fish) Regulations 1999. There is no regulation pertaining to the management of freshwater sharks and rays, which is under the jurisdiction of the States.
- More regulations need to be formulated to protect rare species such as Pale Whipray *Himantura signifer* found in Pahang, and Kinabatangan river shark (*Glyphis spp.*) and Giant Stingray *Himantura chaophraya* in Sabah.
- Under the Fisheries (Control of Endangered Species of Fish) Regulations 1999, Whale Shark and seven species of Sawfish (*Pristidae*) are species listed as endangered marine animals in Malaysia. (Fischer *et al.* 2012). The regulation stipulates that no person shall fish or, disturb, harass, catch, kill, take, possess, sell, buy, export or transport any endangered species except with the written permission from Director- General of Fisheries Malaysia. Any person contravenes the regulations can be fined up to RM 20,000 (US$ 5229) or a term of imprisonment not exceeding two years or both.

Fowler *et al.* (2005) note that recreational landings of six shark species (Brownbanded Bamboo Shark, Grey Bamboo Shark, Zebra Shark *Stegostoma fasciatium*, Zebra Bullhead Shark *Heterodontus zebra*, Coral Catshark *Atelomycteru marmoratus* and Whale Shark) are prohibited in Malaysia. Recent media reports suggest that the Malaysian State of Sabah is planning to make shark finning illegal (Brake, 2011) due to a decline in shark populations.
Malaysia states sharks are fully utilized (Fischer *et al.* 2012), but it does not appear to be regulated for.

NPOA-Sharks

An NPOA-Sharks was implemented in 2006 (Department of Fisheries, Malaysia, 2006).

RFMOs and regional bodies

Membership

IOTC, SEAFDEC, ASEAN

Implementation of shark measures

The IOTC Scientific Committee identified the need for Malaysia to collect catch and effort information for shark species from its longline tuna fleet and to report this information to the Commission. Herrerra *et al.* (2010) report that Malaysia partially meets the data requirement for nominal catch and catch and effort for sharks taken in its longline fleet and for nominal catch in its purse seine fleet. However it does not provide data on catch and effort for sharks taken in its purse seine fleet. It was not possible to determine whether Malaysia applies the 5% fin-to-carcass ratio required by IOTC.

Gaps and deficiencies

Data and information

No species identification in catch data reported to FAO and failure to meet catch reporting requirements of the IOTC.
No species breakdown in trade data provided to FAO.

Implementation of shark measures

No management in place for shark species, apart from some protection for Whale Shark. It is unclear whether Malaysia applies the 5% fin:carcass ratio or equivalent measures in its domestic waters.

Country Profile:

Papua New Guinea

Shark catch

Tonnage reported to FAO, % of global FAO catch and main species reported to FAO

PNG does not report shark catch to FAO.

Catch data from other sources and main species taken

The main species reported in observed longline shark catch from PNG waters are Silky Shark (72%), Grey Reef Shark (5%) and Oceanic Whitetip Shark (4%). Silky Shark comprises 85% of the observed shark purse seine catch (Lack and Meere, 2009. In its target longline fishery Silky Shark is the dominant species comprising 71.52% of the catch by number, followed by blue shark, 11.30%. Around 12.1% were other shark species including Blacktipped Reef Shark, Blacktip Shark, Galapagos Shark, Grey Reef Shark, Hammerhead Shark, Oceanic Whitetip, Silvertip Shark and Tiger Shark (WCPFC, 2011).

In 2008, PNG advised the WCPFC that its export data indicated that 1724 t of shark product was exported in 2007. PNG acknowledged that this figure was more than twice the information from the log sheet landings data from its shark fishery. The potential reasons for this were identified as either gross misreporting or that that there are a lot of shark products from fisheries other than the shark fishery (WCPFC, 2008).

Juncker (2006) reports that, as well as the oceanic shark species identified above, coastal species, such as Silvertip Shark, are also taken in significant numbers, along with a range of other species such as Blacktip Shark, hammerhead species, Common Thresher Shark, mako sharks, Tiger shark and Crocodile Shark and some pelagic rays. The fins and meat of most species are marketable, but species of low value, e.g. Blue Shark, and may not be retained.

Nature of shark fisheries

In 2010 a total of 256 vessels were active in PNG waters. Thirty-two were longline and handline and 195 purse seine

vessels. Of the latter, 9 were PNG flagged, 39 were PNG chartered and 176 were foreign vessels operating under access agreements (WCPFC, 2011).

PNG has a target shark longline fishery and vessels in this fishery operate only in domestic waters. In addition, sharks are taken as bycatch in PNG's domestic tuna longline fishery. In recent years this annual bycatch has ranged from 42 t in 2006 to a peak of 134 t in 2010 (WCPFC, 2011). Juncker (2006) reports that:

- small quantities of shark were caught by artisanal fisheries prior to 1980;
- Taiwanese gillnetters operated a shark fishery in the Gulf of Papua and 1980s and 1990s; and
- mako sharks are important to sport fishing in PNG.

MRAG (2005a, 2005b) estimated that unreported catch of shark by licensed longliners to be around 2500 t per year and illegal catch of sharks to be around 6500 t/year.

Shark Trade

Data reported to FAO

Between 2000 and 2008 PNG reported shark exports to FAO in three categories: Shark fins, dried, salted, etc; Sharks nei, fresh or chilled; and Sharks nei, frozen (FAO Fisheries Department, 2010). Over this period, reported shark exports averaged 34 t.

Other trade data and information

While PNG does not provide catch data in its target shark fishery to the WCPFC it reports exports of frozen shark meat and frozen shark fins but excludes dried shark fins (WCPFC (2010b)). In addition it indicates that shark products are mostly exported to Taiwan.

The export data provided to WCPFC differs significantly to that reported to FAO. For the period 2004 to 2008, the data provided to the WCPFC indicates that an average of 1682 t of frozen shark product was exported. This compares to an average 6 t reported in the FAO trade data. Similarly, exports of frozen fins averaged 137 t over the same period according to data provided to the WCPFC yet no exports of frozen fins are reported to FAO. No WCPFC Part 1 Annual Report has been provided to the WCPFC in 2012.

Shark utilisation

Juncker (2006) reports that most shark meat and fins have traditionally been exported to Taiwan. He reports that an increasing amount of the shark meat is processed locally, for domestic consumption.

Domestic management

Management measures

PNG has a Shark Management Plan in place for its target shark longline fishery. The Plan limits the number of vessels to nine, hooks per day to 1200 hooks/vessel, and the total allowable catch to 2000 t (dressed weight) per year. Observer coverage is set at 20% of fishing days on active vessels. In 2010 8 vessels were active in this fishery, taking 64,924 sharks. This was higher than the 2006-2009 average but below the highest catch of more than 68,000 sharks in 2006 (WCPFC, 2011).

Longliners not authorized under the Shark Management Plan, but operating under the Tuna Fishery Management Plan, cannot target sharks, cannot use wire leaders and do not have an export licence for sharks (Lack and Meere, 2009). The Plan limits to the number of vessels to 100, limits them to setting a maximum of 1200 hooks/set/day and to a total combined annual catch of 10 000t/year of Yellowfin Tuna *Thunnus albacares* and Bigeye Tuna *Thunnus obesus*. In 2009, only 20 vessels were active in this fishery (WCPFC, 2010b).

PNG runs an intensive port sampling program in the main unloading and transshipment ports around the country. An estimated 20-25% by weight of the unloading and transshipments is sampled (WCPFC, 2010b).

As a member of the Parties to the Nauru Agreement (PNA), PNG will prohibit, from 1 January 2011, any foreign purse seine vessels fishing in its waters to fish for tuna associated with Whale Shark.

NPOA-Sharks

PNG does not have an NPOA-Sharks. The PI-RPOA Sharks (Lack and Meere, 2009) was prepared as guidance for Pacific Island Countries and Territories in 2009 through the FFA and with funding from the FAO. However there are no indications that any of the Plan's recommendations have been adopted by PNG.

RFMOs and regional bodies

Membership

WCPFC, FFA and PNA

Implementation of shark measures

At WCPFC in 2010 PNG advised that "it has a shark fishery that makes use of the entire shark, and has had

a management plan in place for the last 10 years. Data is supplied to SPC" (WCPFC, 2010b). Under WCPFC CMM 2010-07 coastal States, such as PNG, are permitted to apply 'alternative measures' within their own waters. It is unclear whether PNG applies the 5% fin:carcass ratio, or equivalent measures, to its domestic vessels as required by the WCPFC.

Gaps and deficiencies

Data and information

Absence of shark-specific catch to FAO. Significant discrepancies and inconsistencies in the export data reported to the WCPFC and that reported to FAO.

Implementation of shark measures

The discrepancies identified by PNG in 2008 between catch and trade data suggest that enforcement of the catch limits under the Shark Management Plan and/or management of the shark bycatch in the tuna longline fleet is lacking. However, since PNG has not reported its shark trade in recent reports to WCPFC (noting that there is no requirement to do so) it is unclear whether these discrepancies persist.

Country Profile: The Philippines

Shark catch

Tonnage reported to FAO, % of global FAO catch and main species reported to FAO

Average annual reported shark catch 2000-2010 was 5277 t (0.65% of global reported catch) (FAO Fisheries Department, 2012).

Fifty percent of the Philippines' shark catch is reported to FAO as Rays, Stingrays, mantas nei and 50% as Sharks, rays, skates etc nei. Only one species, Shortfin Mako, is identified separately and it represents less than 0.01% of the catch.

Catch data from other sources and main species taken

There are no shark catch production data reported explicitly in the annual 'Fisheries Profile' produced by the Department of Agriculture's Bureau of Fisheries and Aquatic Resources (BFAR) and sharks are not listed separately in the shark catch or trade data published on BFAR's website.

SEAFDEC (2006) reports that the ten most commonly taken shark species in the Philippines (in order) are: Whitetip Reef Shark, Spurdog *Squalus megalops*; rays *Rhinobatus* spp., Brownbanded Bamboo Shark, Giant Guitarfish; Blacktip Shark; Sharptooth Lemon Shark *Negaprion acutidens*; Pelagic Thresher, Tiger Shark and Silvertip Shark.

Over the 1998-2001 period WWF-Philippines conducted a species inventory of sharks based on market and fishery site landings. More than 500 specimens ranging from shark teeth, jaws, claspers, heads or whole bodies of animals were collected from markets and landing sites in at least ten provinces in northern Mindanao, Visayas, Luzon and Palawan. The collection yielded about 83 species of sharks and shark-relatives belonging to 24 families. The exercise was designed to provide the baseline information needed for the effective conservation and management of sharks (Anon., 2001).

Nature of shark fisheries

There is little recent information available on the nature of fisheries in which sharks are taken in the Philippines. FAO (2004) cites reports of large-scale exploitation of the dogfish shark (family Squalidae). This fishery began in the late 1960s in response to the demand for squalene, however it became an example of a 'boom and bust' fishery. Fowler *et al.* (2005) report that demersal longlines are used to catch *Centrophorus* spp., various *Squalus* spp., Pygmy Ribbontail Catshark *Eridacnis radcliffei* and the Silver *Chimaera Chimaera phantasma* for liver oil, which is exported to Japan. Fisheries also exist for species of mobulid rays, which are vulnerable to over-exploitation.

Shark Trade

Data reported to FAO

Between 2000 and 2008 the Philippines reported shark exports to the FAO in only two categories: Shark fins, dried, salted etc (averaging 36 t/year) and Shark liver oil/ (19 t/year). In previous years it has reported exports of frozen dogfish, fresh/chilled sharks and sharks, dried, salted or in brine (FAO Fisheries Department, 2010). In volume terms the Philippines is a net importer of shark products with imports of Sharks nei, frozen averaging around 230 t/year over 2000-2008 and considerably higher, at around 500 t/year, between 2005 and 2008.

Shark utilisation

Information on domestic shark utilisation was unavailable. The trade data provided above are indicative of the shark products produced for export.

Domestic management

Management measures

The Whale Shark is one of two protected species in the Philippines and is listed as vulnerable in the IUCN Red List and Appendix II of CITES. Whale sharks and manta rays are protected by DA-FAO 193 S. 1998 which bans the "taking or catching, selling, purchasing and possession, transporting and exporting of whale sharks and manta rays". Whale shark aggregation sites have been identified as priority conservation areas. There is no study on population estimates of any species of sharks in the Philippines (Anon., 2011).

NPOA-Sharks

In its latest report to the IOTC on implementation of management measures, the Philippines indicated that it had adopted a NPOA-Sharks. However, it has not been possible to locate a copy of the Plan. The document does not appear on the FAO website where NPOAs of other FAO members are listed, nor is there any reference to the document on BFAR's web site.

RFMOs and regional bodies

Membership

WCPFC, IOTC, SEAFDEC, ASEAN

Implementation of shark measures

The Philippines does not report shark data to the WCPFC in its Annual Report Part 1 to the WCPFC. The National Stock Assessment Program has continued to collect port sampling data in major tuna landing sites (e.g. species composition, length frequency and vessel catch and effort information). Increased port sampling coverage will be realized through the West Pacific East Asia Oceanic Fisheries Management Project which started in 2011 (WCPFC, 2010c).

In its latest report to the IOTC on implementation of management measures, the Philippines reported that in respect of Resolution 10/02 on mandatory reporting "All data except size data mandated to be submitted to the IOTC Secretariat by this resolution is collected by logbooks. Vessels authorized to fish in the IOTC Area are required to keep daily logbooks by the rules. This is covered by Fisheries Administrative Order No. 198 Series of 2000. Size data is gathered in the Observer program." (IOTC, 2011). This suggests that the shark data required under this resolution is being provided by the Philippines. However, Herrera *et al*. (2010) report that the Philippines had not

provided any data on nominal catch, catch and effort and size frequency of sharks taken in its longline fleet.

In respect of the Resolution 10/12 on thresher sharks the Philippines indicated only that it had adopted an NPOA-Sharks.

Gaps and deficiencies

Data and information

There is essentially no species based reporting in catch data provided to the FAO.

Management

There is not a good understanding of the fisheries in which sharks are taken in the Philippines. There is a need to confirm whether an NPOA-Sharks has been adopted and, if so, to examine the document.

Country Profile: Solomon Islands

Shark catch

Tonnage reported to FAO, % of global FAO catch and main species reported to FAO

Average annual reported shark catch 2000-2010 was 9.5 t (0.0012% of global reported catch) (FAO Fisheries Department, 2012).

Catch data from other sources and main species taken

The main species reported in observed longline shark catch from Solomon Island waters are Blue Shark (26%), Silky Shark (23%), Pelagic Stingray (19%), Oceanic Whitetip (9%) and Shortfin Mako (8%). Silky Shark comprises 84% of the sharks taken in observed purse seine catch (Lack and Meere, 2009).

Nature of shark fisheries

In 2011 a total of 482 fishing vessels (including US Treaty and FSM Arrangement vessels) were licensed to fish in the Solomon Islands EEZ. These included 202 purse seine, 256 longline, and 24 pole and line vessels. In 2010, 13 longline vessels had been identified as shark longline vessels however these licences were not renewed in 2011 following a decision by the Ministry of Fisheries and marine Resources to halt all commercial fishing targeting sharks. (WCPFC, 2012b).

Juncker (2006) reports that sharks are caught by subsistence and small-scale artisanal fishers in some areas

	of the Solomon Islands, generally as a bycatch of fishing for deep-water bottom fish or of tuna purse-seining.
Shark Trade *Data reported to FAO*	The Solomon Islands reports small and intermittent exports of dried, salted shark fins. Exports of 2 and 3 t were reported in 2001 and 2008 respectively (FAO 2010).
Shark utilisation	Juncker (2006) reports that subsistence fishers eat the flesh of the shark and the shark fin is sold for export. Shark worship has traditionally been common in the Solomon Islands and still continues on some islands. Local Gilbertese communities hunt shark for domestic consumption especially in the Wagina area in the Western Province.
Domestic management *Management measures*	No specific shark management measures are known to be in place in the Solomon Islands. The only known regulation is licensing of shark fin exporters (McCoy, 2006).
NPOA-Sharks	The Solomon Islands does not have a NPOA-Sharks. The PI-RPOA Sharks (Lack and Meere, 2009) was prepared as guidance for Pacific Island Countries and Territories in 2009 through the FFA and with funding from the FAO. However there are no indications that any of the Plan's recommendations have been adopted by the Solomon Islands.
RFMOs and regional bodies *Membership*	WCPFC, FFA and PNA
Implementation of shark measures	The Solomon Islands reported to the WCPFC in its Annual Report Part 1 in 2012 it was not allowing for targeting of sharks. It is unclear what measures the Solomon Islands takes to ensure that it is in compliance with CMM 2010-07. As a member of the PNA, the Solomon Islands has prohibited, from 1 January 2011, any foreign purse seine vessels fishing in its waters to fish for tuna associated with whale sharks.
Gaps and deficiencies *Data and information*	There is no species breakdown in the catch data provided to FAO. While there is an increasing understanding of the species taken offshore fisheries, there remains little information on the species breakdown of shark catch in coastal fisheries.
Management	There is not a good understanding of the nature of fisheries in which sharks are taken in the Solomon Islands. There do not appear to be any shark-specific management measures in place.

Country Profile: Viet Nam

Shark catch

Tonnage reported to FAO, % of global FAO catch and main species reported to FAO

Viet Nam reports its fisheries catch to FAO but does not identify sharks separately in those data.

Catch data from other sources and main species taken

In its first Annual Report (Part 1) to the WCPFC, Viet Nam indicated that a number of species of sharks are taken in its domestic longline fishery for tuna. The species includes Pelagic Thresher Shark, Whitecheek Shark *Carcharhinus dussumieri,* Silky Shark, Blacktip Shark, Scalloped Hammerhead, Great White Shark, Blue Shark, Crocodile Shark and a range of stingrays and devil ray species. Over the period 2000 to 2005 Blue Shark comprised up to 24% of the annual catch of the longline fishery and pelagic thresher up to 21%. Devil rays were also prominent in the catch, comprising up to 13% of annual catch (WCPFC, 2010d). No update was provided to WCPFC on shark catches in its most recent (2012) Annual Report (Part 1). Shark species were also recorded in the gillnet fishery, which predominantly takes Skipjack tuna *Katsuwonus pelamis*, including Pelagic Thresher, Blackspot Shark, Smooth Freshwater Stingray *Dasyatis garouaensis*, Pygmy Devilray, *Mobula eregoodootenke*, Spinetail Mobula and Whale Shark. Devil rays were again prominent in the catch (WCPFC, 2010e).

Long (2006) reports that in four surveys undertaken in two ports (Phan Thiet and Vung Tau) in 2003/04, 13 species of sharks were identified as being taken. Pelagic Thresher Shark, Bronze Whaler *Carcharhinus obscurus*, Silky Shark, Blacktip Shark, Spotless Smooth Hound *Mustelus griseus*, Grey Bamboo Shark, Whitespotted Bamboo Shark *Chiloscyllium plagisoum*, Zebra Shark, Zebra Bullhead Shark, Sharpnose Sevengill Shark *Heptranchias perlo*, Coral Catshark and Scalloped Hammerhead.

A research survey, reported in Long (2006), conducted between 2001 and 2004 identified 39 species including:

- 8 species of sharks (of five families) and 15 species of rays of (five families) in the Tonkin Gulf;
- 11 species of shark (7 families) and 13 species of rays (5 families) in the Southeast Area; and

8 species of shark (4 families) and 8 species of rays (3 families) in the Southwest area.

Nature of shark fisheries

SEAFDEC (2006), reports that sharks are targeted by longlines and taken as bycatch in trawls and gillnets. At that time sharks constituted approximately 21.5% of the total longline catch and around 1% or less of trawl and gillnet catches. Long (2006) reports that around 75% of the elasmobranch catch in longlines is sharks and the remainder rays.

Long (2006) reported that there were no statistics in Viet Nam on the total catch of cartilaginous fishes. However, he noted that shark fisheries started developing after 1980 and reached a peak at the end of that decade. Fishing was driven by the increasing demand for shark fin for export and domestic consumption as well as increased demand for other shark products such as skin, shark cartilage and shark liver oil. Shark fisheries by hook and line, and longline developed in Quang Binh, Binh /Thuan and Vung Tau, however declining catches have seen those fleets diversify to, or specialize in, tuna fishing.

Viet Nam's coastal fisheries are showing signs of overfishing and in order to encourage fishers to operate in waters further offshore the Vietnamese government is offering subsidies of around US$3500 a year for fishermen buying new boats fitted with an engine larger than 90hp (World Fishing, 2010).

Fowler *et al.* (2005) report that little information on elasmobranch populations of fisheries in Viet Nam is available and suggest that loss of coastal habitat may be a threat to these populations. They note that several freshwater species of endangered batoids occur in rivers in the country, but their status in Viet Nam is unknown.

Shark Trade

Data reported to FAO

Between 2000 and 2008 Viet Nam has reported shark exports in two categories: sharks nei, fresh chilled (an average of <2 t /year) and Sharks nei, frozen (an average of

around 63 t/year). According to the data reported to FAO (FAO 2010), Viet Nam is a net importer of shark products in volume terms with imports of Shark, nei, frozen averaging around 400 t in the 2000-2008 period. Imports of this product increased to around 2400 t and 1100 t in 2007 and 2008 respectively. Viet Nam does not report any re-exports of shark products.

Shark utilisation

All parts of the shark are reported to be utilised. Fresh and dried meat is sold on the domestic market and fins, stomachs, skin, bone and liver are exported (SEAFDEC, 2006).

Long (2006) reports that sharks are processed and traded as follows:
Fresh shark: retained whole in trawlers and gill net boats until landed. Fins of sharks of more than 6-7kg are then removed and smaller sharks sold whole.
Dried sharks: seen on offshore long line boats as dried fish meat, dried skin and dried bone
Liver: cut into small pieces then processed into oil and contained in plastic cans.
Stomach: used as food
Fins: preferred product for export

Domestic management

Management measures

There are no shark-specific management measures known to be in place in Viet Nam.

NPOA-Sharks

There have been reports (Cavanagh et al., 2008 and SEAFDEC, 2006) that Viet Nam has been developing an NPOA but the current status of the Plan is unknown. SEAFDEC (2006) reported that lack of funding was hindering progress.

RFMOs and regional bodies

Membership

WCPFC (CNP), SEAFDEC, ASEAN

Implementation of shark measures

Viet Nam became a CNP of WCPFC for 2010 and 2011 because of the need for cooperation between with the Commission to achieve compatibility of fisheries management and conservation and on the understanding that CNP status would relate only to the acquisition and exchange of fishery information and data and that Viet Nam has no participatory rights for fishing for highly

migratory fish stocks in the high seas of the Convention Area. Viet Nam reported shark catch taken in it's gillnet and longline fisheries to the WCPFC in 2010 but not in 2011 or 2012.

Gaps and deficiencies

Data and information

While there is some data available on the shark species taken in the longline fishery, the latest data available is for 2004 and there are no data on the actual catch level, only proportions of catch. Further the species breakdown and extent of shark catches in other coastal fisheries is unknown.

Management

There is a lack of information on any shark specific management measures in place in Viet Nam. The potential for Government-subsidized increases in offshore fishing poses a potential threat to shark species and management action to ensure, in the first instance, that species specific catch data is reported is a priority.

SHARK UTILISATION AND RESPONSIBLE MANAGEMENT IN THE CORAL TRIANGLE

WWF and TRAFFIC consider that the responsible utilisation of shark resources requires responsible management, trade and consumption. Each of these elements requires adequate governance and monitoring to provide confidence that traded shark products are from sustainable sources. The links between these elements and the nature of the required initiatives are described in the flow diagram in Figure 1. The findings of this review have been considered in this context so as to ascertain the extent to which the various components required to deliver responsible management exist in each of the countries.

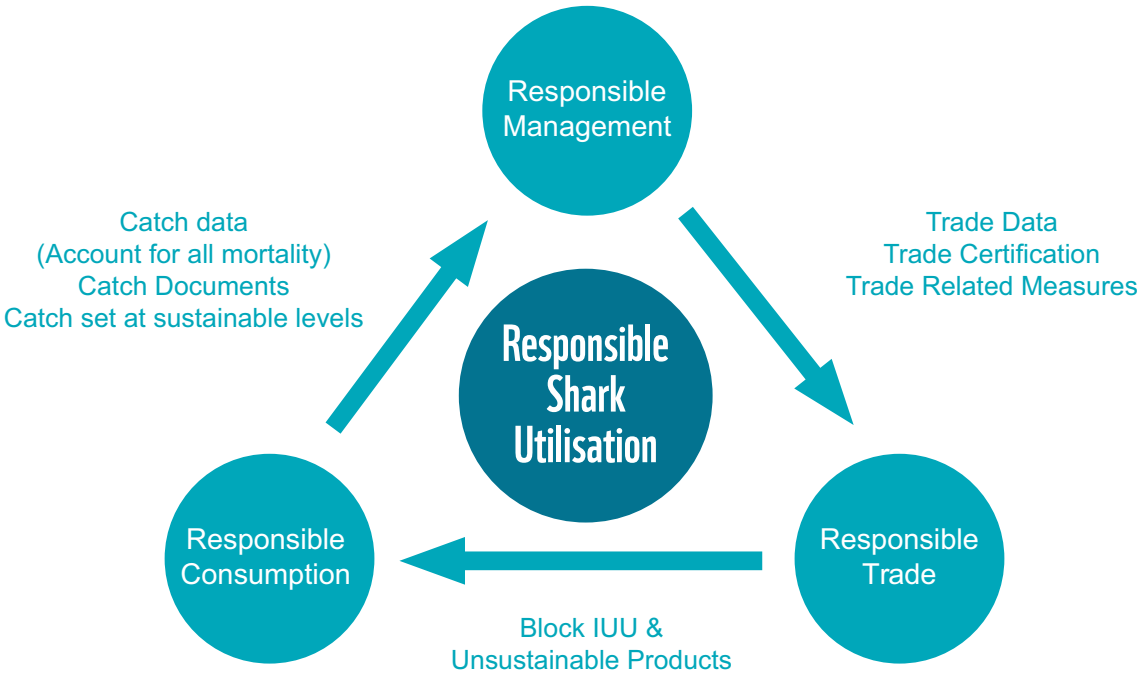


Figure 1. Responsible Shark Utilisation (Lack and Sant, 2009)

A summary of the key characteristics of shark fisheries, catch and management across the Coral Triangle countries, drawn from the Country Profiles, is provided in Tables 1 and 2. This review of shark fisheries, catch, trade and management in countries in and around the Coral Triangle has identified some key gaps in our understanding of these issues. It is possible that, in some cases these gaps can be filled by further, direct investigation with the relevant countries, but there is a strong

possibility these gaps reflect real deficiencies in data collection and analysis and actual lack of management of sharks. The key issues arising from the analysis can be summarised as follows:

- general failure to report shark catch to FAO in shark specific categories;
- lack of species identification in shark catch data reported to FAO;
- lack of species identification in shark trade data;
- general absence of specific management measures for sharks, despite sharks being targeted in a number of countries and bycatch of sharks, particularly rays in some cases, comprising large proportions of total catch in many other fisheries;
- little evidence of measures being implemented at the national level to ensure compliance with reporting and management obligations to RFMOs; and
- little evidence of acknowledgement of the need to address issues associated with lack of data and management of sharks with only two of the eight countries being confirmed as having an NPOA-Sharks.

There is a need for a concerted effort to ensure that shark utilization in the region is sustainable

In the context of our model of responsible shark utilisation (Figure 1) these findings demonstrate that few of the elements required for responsible shark utilisation are present in the eight countries examined. This confirms the need for a concerted effort to ensure that shark utilisation in the region is sustainable.

The problems identified above are common to many shark catching countries, including many of the top 20 shark catching countries (see Lack and Sant, 2011). While these problems remain largely unresolved there are examples of positive initiatives to deal with them (see Box 1). These initiatives range from improved data collection and research to bans on the take and/or trade in some species of sharks. These are just some of the many management and trade-related measures available. These were explored in more detail in a joint CITES/FAO workshop in 2010 (see FAO, 2012). There is therefore, both experience and advice available to guide Coral Triangle countries in the efforts to address shark management.

Box 1: Examples of Positive Responses to Shark Management Issues

1. Western and Central Pacific Fisheries Commission (WCPFC)
   a. Conducted an ERA for sharks to identify the most vulnerable species
   b. Identified key shark species for management purposes
   c. Has begun stock assessments for these species as a basis for species specific management (see http://www.wcpfc.int/doc/SC8-Report)
2. Forum Fisheries Agency
   a. Has prepared a Pacific Islands Regional Plan of Action for Sharks to guide responses to shark management issues (see http://www.ffa.int/sharks)
3. Some countries (e.g Palau, The Maldives, Honduras, The Bahamas, Tokelau, The Marshall Islands) have implemented shark sanctuaries in an effort to minimise the impact of tuna fishing, in particular, on sharks and to maximise the tourist potential available from maintaining shark populations
4. Eleven Southeast Asian countries have developed a regional plan of action to combat illegal, unreported and unregulated fishing including that of sharks (see http://www.afma.gov.au/managing-our-fisheries/compliance-activities/illegal-foreign-fishing/rpoa-iuu/)
5. Some countries (e.g. Australia, Nicaragua, Panama, Taiwan, United States) have introduced measures to require that sharks be landed with fins attached while others require shark landings to comply with a fin to carcass ratio (e.g. New Zealand, Samoa, South Korea)
6. Some countries have regulated the type of gear that can be used and prohibit the use of wire leaders on long lines (e.g. Australia, Marshall Islands, Tonga), making it easier for hooked sharks to escape
7. The potential for sustainable target shark fisheries has been demonstrated by the Marine Stewardship Council certification of The British Columbia and the US Atlantic Spiny Dogfish fisheries
8. Some countries (e.g. Marshall Islands) and some jurisdictions (e.g. Hawaii, Northern Mariana Islands, Guam, California, Washington) have placed trade bans on shark and shark products including fins
9. Some countries have developed specific mitigation guides to minimise the risk posed to shark by specific gear types (see http://www.daff.gov.au/brs/fisheries-marine/publications/chondrichthyan_guide_for_fisheries_managers_a_practical_guide_for_mitigatingchondrichthyan_bycatch)
10. Some countries have banned the retention of specific shark species e.g Taiwan banned the retention of whale sharks in 2008

Table 1: Management and data reporting environment for sharks in the Coral Triangle

Country			Party			
	UNCLOS[1]	UNFSA[2]	RFMO	FAO/ COFI[3]	CITES	CMS[4]/ Shark MoU
Fiji	R	R	WCPFC	✓/X	A	A
Indonesia	R[6]	R	CCSBT, IOTC, WCPFC (CNP)[8]	✓/✓	A7	A7
Malaysia	R	X	IOTC	✓/✓	A	A
Philippines	R	S[9]	WCPFC, IOTC, CCSBT (CNP)	✓/✓	R	R
PNG	R	R	WCPFC	✓/X	A	A
Solomon Islands	R	A	WCPFC	✓/X	A	A
Timor Leste	X	X		✓/X	X	X
Viet Nam	R	X	WCPFC (CNP)	✓/✓	A	A

[1] UNCLOS: United Nations Convention on the Law of the Sea of 11 December 1982
[2] UNFSA: Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (United Nations Fish Stocks Agreement (UNFSA)
[3] COFI: Committee on Fisheries of the FAO
[4] CMS: Convention on Migratory Species
[5] NPOA-Sharks: National Plan of Action for the Conservation and Management of Sharks
[6] R: Ratified
[7] A: Acceded
[8] CNP: Co-operating non-contracting Party
[9] S: Signatory
[10] Philippines reported to IOTC (IOTC, 2012) that the Philippines has adopted a NPOA-Sharks and that there is pending legislation with the Congress of the Republic of the Philippines on a measure on sharks. However, the NPOA is not accessible from the FAO website and the authors of this report have not been able to view a copy of the NPOA.

Reports to FAO			Reported FAO shark catch 2010	Rank as shark catcher (2000-2010)	NPOA Sharks[5]
Fish Catch	Shark catch	Shark Trade	(t)		
Yes	No	Yes			No
Yes	Yes	Yes	94,318	1	Yes (2010)
Yes	Yes	Yes	20,563	9	Yes (2006)
Yes	Yes	Yes	5,513	30	Unclear[10]
Yes	No	Yes			No
Yes	Yes	Yes	10	130	No
Yes	No	No			No
Yes	No	Yes			No

Table 2: Summary of key characteristics of shark fisheries in Coral Triangle countries

Country	Fiji	Indonesia	Malaysia
Reported FAO shark catch 2010 (t)	-	94,318	20,563
Rank as shark catcher (2000-2010)	-	1	9
Nature of shark fisheries (target/ bycatch, main methods)	Bycatch Longline Purse seine	Target in gill and tangle nets, longlines and harpoon Bycatch in longline, trawls and other bottom gear)	Bycatch and probably target Trawl, Gillnet Hook and line
Main species taken[1]	Blue Shark Mako sharks Oceanic Whitetip Pelagic Stingray Silky Shark	Blue Shark, Cowtail Stingray Pelagic Thresher Scalloped Hammerhead, Shortfin Mako, Silky Shark Spinner Shark, Spottail Shark Squalus spp., Whitespotted Wedgefish, Whitespotted Whipray	Blackspot Shark Brownbanded Bamboo Shark, Graceful Shark Grey Bamboo Shark Indonesian Bamboo Shark, Milk Shark Scalloped Hammerhead Sicklefin Weasel Shark Spadenose Shark Spottail Shark
Main shark products	Fins	Fins, Flesh, Oil, Skins	Fins, Flesh
Key gaps, deficiencies and uncertainties	Failure to report shark specific catch to FAO Apparent lack of management	Inadequate species identification in catch and trade Failure of management to keep up with growth of shark fisheries	No species identification in catch or trade data Failure to meet IOTC reporting requirements. Apparent lack of management

[1]'Main species' are listed in alphabetical order, rather than in order of significance, since in most cases insufficient information is available to identify species composition definitively.

PNG	Philippines	Solomon Islands	Viet Nam
-	5,513	10	-
-	30	130	-
Target longline Bycatch longline	Target	Bycatch Longline Purse seine	Target in longline Bycatch in trawl and gill nets
Blacktip Shark Common Thresher Crocodile Sharks Grey Reef Shark Hammerhead spp. Mako sharks Oceanic Whitetip Pelagic rays Silky Shark Silvertip Shark	*Centrophorus spp.* Mobulid rays Pygmy Ribbontail Catshark Silver Chimaera Sqalidae spp.	Blue Shark Oceanic Whitetip Pelagic Stingray Shortfin Mako Silky Shark	Blackspot Shark Blacktip Shark, Blue Shark, Crocodile Shark Great White Shark Pelagic Thresher Pygmy Devilray Scalloped Hammerhead Silky Shark, Smooth Freshwater, Stingray, Spinetail Mobula, Whale Shark, Whitecheek Shark
Meat, Fins	Fins, Oil, Flesh	Flesh, Fins	Flesh, Fins, Stomachs, Skin, Bone, Liver
Failure to report shark specific catch to FAO Discrepancies between catch and trade data may be indicative of poor enforcement of management measures	Inadequate species identification in catch and trade Poor understanding of shark fisheries. Uncertainty about the Philippines' NPOA-Sharks	Inadequate species identification in catch Poor understanding of the nature and extent of shark fisheries, especially coastal fisheries Apparent lack of shark-specific management	Failure to report shark specific catch to FAO General lack of knowledge on species composition of catch Apparent lack of management

RECOMMENDATIONS

As noted above, the information contained in this report cannot be regarded as comprehensive and it is likely that, even with further investigation, significant gaps in our understanding of these issues will remain.

In these circumstances it is difficult to make recommendations on specific management actions, since these need to be informed by a sound understanding of the nature of the fisheries in which sharks are taken, the species breakdown of shark catch and the level and relative composition of shark catch by species.

However, lack of data, and/or lack of specificity of data, on both catch and trade is a common theme across the region. In addition, this review has identified significant gaps in the countries' implementation of the catch/trade reporting and management obligations arising from the regional bodies and international conventions of which they are members. Therefore it is possible to identify some overarching recommendations to address the common issues identified by this review and to establish a basis for more effective longer-term management of sharks in the region. It is recommended that efforts focus on:

1. improving data collection and reporting;

- It is important to note that failure to identify shark species in catch or trade data reported to FAO is unlikely to be simply a choice that a country makes in reporting. It is much more likely to reflect the fact that the data collection processes in place simply do not allow such reporting.

  The appropriate solution is therefore to be found at the data collection level rather than the reporting level.

  Further, the nature of that solution will vary across artisanal and industrial fleets. The former, for example may require estimates based on periodic sampling of catch or landings, whereas the latter may lend itself to log sheets, observer coverage etc.

2. ensuring that the actions agreed to in WCPFC, IOTC, FAO, CITES and CMS are implemented; and

3. developing a rudimentary shark assessment report. In data-poor situations a risk-based approach to management can be a cost-effective mechanism for ensuring the best targeting of available resources. In this context, it is recommended that these assessments comprise the following six steps.

- collect and analyse any additional information on shark fisheries and catch identifying any existing data collection programs and previous one-off projects that may have provided information on the nature and level of shark catch;
- conduct a comprehensive analysis of trade flows of shark products from each of the countries so as to contribute to ground truthing of catch data or, in the absence of such data, to provide an indication of the likely levels of shark catch;
- develop sampling methods appropriate to the nature of the fishery (i.e. artisanal or industrial) and tailored to the situation in each country, to fill the key remaining data gaps;
- focus action on target shark fisheries for specific shark species or groups of species since the information collected to date suggests that there are many target shark fisheries across the countries and that these are, with few exceptions, unregulated and unmonitored. These fisheries are driven by demand for fins, meat, squalene and, in some cases, for skin;
- engage a small group of shark scientists familiar with ecological risk assessment (ERA) methodology to conduct a base level risk assessment of the shark species affected by fishing in each country, informed by:
    - the information collated in this report and supplemented by the sampling in Step 2,
    - any analysis conducted by the South East Asia regional group of the IUCN Shark Specialist Group,
      existing biological information collated for other national and regional ERAs,
    - literature available on the relative vulnerability of shark species; and
- identify the shark species at highest risk in each country to prioritise action at the species level.

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ANNEX 1: NOTES ON MANAGEMENT MEASURES

The management measures applied will vary according to domestic fisheries management arrangements and the implementation of obligations under international or regional organizations. For the relevant countries, these international obligations may arise as a result of management measures adopted by:

- the Parties to the Nauru Agreement (PNA);
- the Western and Central Pacific Fisheries Commission (WCPFC);
- the Commission for the Conservation of Southern Bluefin Tuna (CCSBT);
- the Indian Ocean Tuna Commission (IOTC);
- the Parties to CITES; and/or
- the Parties to the Convention on Migratory Species of Wild Animals (CMS).

A summary of key aspects of the governance and data reporting environment in which shark fisheries operate in each of the eight countries is provided in Table 1. An overview of the measures in place in each of the above regional organizations and conventions is provided below as a platform for the assessment of implementation/compliance with these measures provided in the Country Profiles.

PNA

The PNA, a group of eight Pacific island countries (Federated States of Micronesia, Kiribati, Marshall Islands, Nauru, Palau, PNG, the Solomon Islands and Tuvalu) has banned the setting of purse seine nets on Whale Sharks *Rhincodon typus* and has pushed, unsuccessfully, for a WCPFC ban at the regional level.

RFMOs

The WCPFC and the IOTC each has some form of binding shark conservation and management measure in place for sharks. Relevant measures include:

WCPFC:

- *Conservation and Management Measure (CMM) for Sharks* (CMM 2010-07);
- WCPFC *Conservation and Management Measure for Oceanic Whitetip Shark* (CMM 2011-04)

IOTC:

- Resolution 05/05 *Concerning the Conservation of Sharks Caught in Association with Fisheries Managed by IOTC;*
- Resolution 10/02 *Mandatory Statistical Requirements for IOTC Members and Cooperating Non-Contracting Parties;*
- Resolution 12/05 *On establishing a programme for transhipment by large-scale fishing vessels ;*
- Resolution 12/03 *On Catch and Effort Recordings by Fishing Vessels in the IOTC Area of Competence*. The Resolution, amongst other requirements, incorporates specific requirements for providing shark catch data for a number of shark species; and
- *Resolution 12/09 On the Conservation of Thresher Sharks (Family Alopiidae) Caught in Association with Fisheries in the IOTC Area of Competence (Appendix XXIII). (*This Resolution introduced amendments to Resolution 10/12 allowing observers to collect biological samples (vertebrae, tissues, reproductive tracts, stomachs) from thresher sharks that are dead at haulback).

CCSBT has adopted a non-binding recommendation that members adhere to the requirements of the WCPFC and the IOTC when their vessels are operating in the relevant waters of those Commissions and report back to the CCSBT Compliance Committee on their adherence to this. In summary, the measures adopted for sharks across the WCPFC and the IOTC, and by default the CCSBT[1], include:

- retention of all parts of any retained sharks, except head, guts and skin, to the first point of landing;
- controls on shark finning that require that the weight of fins at the first point of landing or transshipment does not exceed 5% of the weight of shark carcasses on board (mandatory in the WCPFC and the IOTC, voluntary in CCSBT);
- prohibiting the retention, transshipment, landing or trading of fins in contravention of the finning controls (mandatory in the WCPFC and the IOTC, voluntary in CCSBT);
- prohibiting retaining Oceanic Whitetip Shark(WCPFC CMM 2011-04);
- reporting data on shark catch
    - in the WCPFC, Parties are asked to provide catch of key species (Blue Shark *Prionace glauca* Silky Shark *Carcharhinus falciformis*, Oceanic Whitetip shark *C. longimanus*, mako sharks (Shortfin Mako *Isurus oxyrinchus* and Longfin Mako *Isurus paucus*, thresher sharks (Biegeye Thresher *Alopias superciliosus*, Pelagic Thresher *A. pelagicus* and Common Thresher *A. vulpinus*), Porbeagle Shark *Lamna nasus* and hammerhead sharks (Great Hammerhead *Sphyrna mokarran*, Scalloped Hammerhead *S. lewini* and Smooth Hammerhead *S. zygaena*);
    - in the IOTC, Parties are required to submit estimates of the total annual (nominal) catch data (by species and gear) and catch and effort data by gear for the most commonly caught shark species and, where possible, to the less common shark species.
- encouraging release of live sharks taken as bycatch; and
- encouraging members to implement the International Plan of Action for the Conservation and Management of Sharks (IPOA-Sharks) through development of an NPOA-Sharks.

The IOTC also prohibits retention, transshipment, landing, sorting, selling or offering for sale any part or whole carcass of all species of the family Alopiidae and requires members to release unharmed, to the extent practicable, all species of that family.

An attempt has been made in the Country Profiles to assess the extent to which the countries have implemented these measures. However, it remains unclear, in many cases, whether domestic regulation/legislation has been adopted to implement these measures on their fleets or the extent to which complementary measures are applied in national waters. The relevant RFMOs do not conduct a comprehensive assessment of the extent to which their Parties implement RFMO measures. As a result, the assessment here is opportunistic rather than comprehensive and is drawn largely from incidental references to particular members in reports of RFMO compliance committees and statements made by the members themselves to the RFMOs or to national authorities. The extent of compliance or non-compliance depicted here is not, therefore, conclusive.

CITES

The Parties to CITES adopted a Resolution in 1994 regarding shark conservation and management. Since that time there have been many Decisions of the Conference of the Parties (CoP) regarding sharks and the agreement of a current Resolution, Resolution Conf. 12.6 (Rev. CoP15). Since 1994, the now 175 Parties to CITES have noted that COFI members were encouraged to have an NPOA-Sharks by 2001, that there was a significant lack of progress in implementing the IPOA-Sharks and that insufficient progress has been made in achieving shark management through the implementation of the IPOA-Sharks. Specifically, CITES Parties urged "FAO's COFI and RFMOs to strengthen their efforts to undertake the research, training, data collection, data analysis and shark management plan development outlined by FAO as necessary to implement the IPOA-Sharks" (CITES Resolution Conf. 12.6 (Rev, CoP15). In addition, the Parties to CITES have supported the creation of a Memorandum of Understanding (MoU) between CITES and the FAO.

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[1] Details of the measures in place can be found at the following websites: http://www.iotc.org/files/proceedings/misc/ComReportsTexts/resolutions_E.pdf ; http://www.wcpfc.int/doc/cmm-2010-07/conservation-and-management-measure-sharks ; and http://www.ccsbt.org/docs/pdf/meeting_reports/ccsbt_15/report_of_CCSBT15.pdf (Attachment 16).

A number of sharks have been included in the Appendices of CITES (Whale Shark, Sawfish *Pristidae* spp[2], Great White Shark *Carcharodon carcharias* and Basking Shark *Cetorhinus maximus*) and other shark species continue to be proposed at meetings of the CoP with four shark proposals at the most recent CoP in 2010. While these proposals received the majority of votes they did not receive the required two-thirds majority to be successful.

According to a number of CITES decisions:

- parties should report progress in identifying endangered shark species that require consideration for inclusion in the Appendices, if their management and conservation status does not improve (paragraph (b) of Decision 14.104[3]);
- if landing and exporting products from shark species of concern identified by the Animals Committee (see Annex CoP15 Doc. 53[4]), Parties should report on the fisheries, environmental and international trade management measures adopted, levels of landings and exports, and the status of these stocks and fisheries [paragraph c) of Decision 14.108]; and CoP15 Doc. 53,[5]; and
- shark fishing and trading entities, particularly the major fishing or trading entities (Indonesia, the European Community, India, Spain, Taiwan, Mexico, Argentina, the USA, Thailand, Pakistan, Japan, Malaysia, France, Brazil, Sri Lanka, the Islamic Republic of Iran, New Zealand, the UK, Nigeria and Portugal) are strongly encouraged to identify opportunities to: improve, in cooperation with FAO and relevant fishery management bodies, the monitoring and reporting of catch, bycatch, discards, market and international trade data, at the species level where possible and to establish systems to provide verification of catch information [paragraph c) of Decision 14.115].

In addition, there having been many recommendations to the CITES Parties to adopt such things as better data reporting, trade codes and other shark measures, since the 1994 Resolution, there has been a limited response since these are also non-binding (CITES Animals Committee, 2004). Despite a number of requests to the Parties for reports on their implementation of CITES recommendations on sharks, Parties have provided little information. Hence it is not possible to provide any meaningful assessment of the extent to which CITES' recommendations on sharks have been implemented.

CMS

In 2009, the members to the CMS agreed an MoU on the Conservation of Migratory Sharks that came into effect in March 2010. The MoU applies to species listed in the CMS Appendices, which currently includes the Whale Shark, Basking Shark, Great White Shark, Longfin Mako, Shortfin Mako, Porbeagle, the northern hemisphere population of the Spiny Dogfish *Squalus acanthias* and the Giant Manta Ray. The MoU aims to improve the conservation status of these migratory sharks through concerted and coordinated action, including compliance and enforcement efforts, on the part of the States that exercise jurisdiction over the range of these populations, and States whose flag vessels are engaged outside national jurisdictional limits in activities that may affect these populations. A conservation plan, which will form an annex to the MoU, is currently in draft form and is yet to be agreed by a meeting of the signatories. The MoU is non-binding and aimed at increasing international coordination to ensure action is taken to protect migratory sharks.

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[2] Pristidae spp. Are included in Appendix I of CITES except for Pristis microdon which is in Appendix II and annotated to specify that its inclusion in Appendix II is "For the exclusive purpose of allowing international trade in live animals to appropriate and acceptable aquaria for primarily conservation purposes." See http://www.cites.org/eng/app/appendices.shtml

[3] Decisions 14.104, 108 and 115 are available at http://www.cites.org/eng/dec/valid14/14_101-117.shtml

[4] Available at http://www.cites.org/eng/cop/15/doc/E15-53.pdf

[5] Ibid

ANNEX 2: SCIENTIFIC AND COMMON NAMES OF SHARK SPECIES

Common name	Scientific name
Eagle Ray	*Aetomylaeus maculata*
Pelagic Thresher	*Alopias pelagicus*
Bigeye Thresher	*Alopias superciliosus*
Common Thresher Shark	*Alopias vulpinus*
Coral Catshark	*Atelomycterus marmoratus*
Silvertip Shark	*Carcharhinus albimarginatus*
Graceful Shark	*Carcharhinus amblyrhynchoides*
Grey reef Shark	*Carcharhinus amblyrhynchos*
Bronze Whaler	*Carcharhinus brachyurus*
Spinner Shark	*Carcharhinus brevipinna*
Whitecheek shark	*Carcharhinus dussumieri*
Silky Shark	*Carcharhinus falciformis*
Bull Shark	*Carcharhinus leucas*
Blacktip Shark	*Carcharhinus limbatus*
Oceanic Whitetip Shark	*Carcharhinus longimanus*
Hardnose Shark	*Carcharhinus macloti*
Blacktip Reef Shark	*Carcharhinus melanopterus*
Blackspot shark	*Carcharhinus sealei*
Blacktip Shark	*Carcharhinus tilstoni*
Spottail Shark	*Carcharhinus sorrah*
Great White Shark	*Carcharodon carcharias*
Gulper sharks	*Centrophorus* spp.
Basking Shark	*Cetorhinus maximus*
Grey Bamboo Shark	*Chiloscyllium griseum*
Indonesian Bamboo Shark	*Chiloscyllium hasselt*
Whitespotted Bamboo Shark	*Chiloscyllium plagisoum*
Brownbanded Bamboo Shark	*Chiloscyllium punctatum*
Silver Chimaera	*Chimaera phantasma*
Kitefin Shark	*Dalatias licha*
Pelagic Stingray	*Dasyatis violacea*
Smooth Freshwater Stingray	*Dasyatis garouaensis*
Pygmy Ribbontail Catshark	*Eridacnis radcliffei*
Tiger Shark	*Galeocerdo cuvier*
Giant Shovelnose Ray	*Glaucostegus typus*
River sharks	*Glyphis* spp.
Blackspotted Catshark	*Halaelurus buergeri*
Sicklefin Weasel Shark	*Hemigaleus microstoma*
Sharpnose Sevengill Shark	*Heptranchias perlo*

Common name	Scientific name
Zebra Bullhead Shark	*Heterodontus zebra*
Hexanchids	*Hexanchus* spp.
Giant Stingray	*Himantura chaophraya*
Whitespotted Whipray	*Himantura gerrardi*
Pale Whipray	*Himantura signifer*
Shortfin Mako	*Isurus oxyrinchus*
Longfin Mako	*Isurus paucus*
Porbeagle Shark	*Lamna nasus*
Giant Manta Ray	*Manta birostris*
Pygmy Devilray	*Mobula eregoodootenke*
Spinetail Mobula	*Mobula japanica*
Box Ray	*Mobula tarapacana*
Gummy Shark	*Mustelus antarcticus*
Spotless Smooth Hound	*Mustelus griseus*
Sharptooth Lemon Shark	*Negaprion acutidens*
Lemon Shark	*Negaprion brevirostris*
Blue Shark	*Prionace glauca*
Cowtail Stingray	*Pastinachus sephen*
Sawfish	Pristidae spp
Crocodile Shark	*Pseudocarcharias kamoharai*
Bowmouth Guitarfish	*Rhina ancylostoma*
Whale Shark	*Rhincodon typus*
Milk Shark	*Rhizoprionodon acutus*
Whitespotted wedgefish (Giant Guitarfish)	*Rhynchobatus australiae/djiddensis*
Rays	*Rhinobatus* spp.
Spadenose Shark	*Scoliodon laticaudus,*
Scalloped Hammerhead	*Sphyrna lewini*
Great Hammerhead	*Sphyrna mokarran*
Hammerhead sharks	*Sphyrna* spp.
Smooth Hammerhead	*Sphyrna zygaena*
Dogfish	Squalidae spp
Spiny Dogfish	*Squalus acanthias*
Spurdog	*Squalus megalops*
Spurdogs	*Squalus* spp.
Greeneye Spurdog	*Squalus mitsikurii*
Western Angel Shark	Squantina spp.
Zebra Shark	*Stegostoma fasciatum*
Whitetip Reef Shark	*Triaenodon obesus*

The Coral Triangle in numbers

US$ 1 Billion

Annual tuna trade from Indonesia, Papua New Guinea, Philippines. Solomon Islands, and Fiji

+120 Million

People directly dependent on the Coral Triangle's marine natural resources

6M+ Square KM

Total area of the Coral Triangle

37%

of known reef fish species

76%

of known coral reef species on the planet

6 of 7

of the world's marine turtle species

US$ 810 Million

Annual regional trade in live reed food fish in Asia-Pacific

WWF

Why we are here

To stop the degradation of the planet's natural environment and to build a future in which humans live in harmony with nature.

www.panda.org/coraltriangle