Responses to Notification to the Parties No 2018/041

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Notification 2018/041 Request for new information on shark and ray conservation and management activities, including legislation

Australia is pleased to provide the following response to Notification 2018/041 'Request for new information on shark and ray conservation and management activities, including legislation'. This document is an update of the information submitted in 2017 in response to Notification 2017/031.

The Australian Government is committed to the sustainable use of fisheries resources and the conservation of marine ecosystems and biodiversity. In particular, we are committed to the conservation of shark species in Australian waters and on the high seas.

The Australian Government manages some fisheries directly, others are managed by state and territory governments. The Australian Government also regulates the export of commercially harvested marine species. Australia cooperates internationally to protect sharks by implementing our Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) obligations, and by working with regional fisheries management organisations on the management of internationally straddling and highly migratory stocks.

For more information on Australia's fisheries management and international cooperation see the Australian Government Department of the Environment and Energy's fisheries webpages at http://www.environment.gov.au/marine/fisheries.

a) scientific information concerning sharks and rays, such as the results of stock assessments, management and conservation efforts, and research activities

National environment legislation requires that an independent assessment of all exporting fisheries and all Australian Government managed fisheries is undertaken. These assessments ensure that, over time, fisheries are managed in an ecologically sustainable way.

The Marine Biodiversity Hub of the National Environmental Science Program has a current research theme of 'Improving the management of threatened and migratory species'. Information on this theme can be accessed at: https://www.nespmarine.edu.au/theme/improving-management-threatened-and-migratory-species. Research activities currently being undertaken under this theme by the Marine Biodiversity Hub are:

- Northern Australian hotspots for the recovery of threatened euryhaline species (Project A1)
- A national assessment of the status of White Sharks (Project A3)
- Defining the connectivity of Australia's hammerhead sharks (Project A5)
- A close-kin mark-recapture estimate of the population size and trend of east coast Grey Nurse Shark (Project A9)
- Shark action plan (Project A11)

A project undertaken by the Marine Biodiversity Hub on establishing the status of Australia's hammerhead sharks is due to be delivered in December 2018. The project is examining the current state of knowledge on hammerhead sharks in Australia waters to define what is currently known and identify data and knowledge gaps. The project is using tagging and genetic sampling (informing close kin-mark recapture analysis) to see how hammerhead shark populations are connected and to provide a robust contemporary estimate of population size and trend.

The Marine Biodiversity Hub in February 2018 completed a national assessment of the status of white sharks. This project produced the first robust estimates of white shark populations in Australian waters

using a unique application of electronic tagging and tracking, collection and archival of tissue samples and a combined genetic and statistical technique (close-kin mark recapture).

Published research, including that on sharks and rays, arising from this current and the preceding programme of the Marine Biodiversity Hub of the National Environmental Science Program can be found at:

https://www.nespmarine.edu.au/documents-publications and
https://www.nespmarine.edu.au/reports

b) examples of non-detriment findings; information and methods providing guidance for the making of national or regional non-detriment findings

National non-detriment findings

All specimens of CITES species exported from Australia for commercial purposes must be sourced from a harvest or propagation program approved by Minister for the Environment (or delegate) under the EPBC Act. The EPBC Act sets out step-by-step the sustainability considerations for approval of harvest for export. Having this requirement embedded in national legislation provides for consistent regulation of export trade, embeds the qualities of the non-detriment findings in the legislative process, and sets out clear expectations for exporters. The CITES Scientific Authority of Australia can therefore make non-detriment findings based on the legislative process.

Most non-detriment findings take the form of a sustainability assessment of the individual harvest or propagation program against legislative requirements. The EPBC Act sets out various program types based on the scale of harvest or management arrangements. Once the program is approved, the operator may then harvest and apply for export permits for their specimens within the boundaries defined by the approved program. Australia's response to Notification 2017/019 published as an annex to AC29 Doc. 10 / PC23 Doc. 11.1 provides more detail on these arrangements.

Some non-detriment findings also take the form of a public published report on the sustainability of trade in a particular taxon. This is the case for the shark species listed at CoP16, and the freshwater sawfish:

- Australia has previously provided to the CITES Secretariat the *Non-detriment finding for the export of shark species listed on CITES and harvested from Australian waters*, published in 2014 and available at http://www.environment.gov.au/biodiversity/wildlife-trade/publications/non-detriment-finding-five-shark-species. Australia's non-detriment finding for the five listed shark species is based on many sources of information including current and available information on each species' range, population structure, status and stock assessments in Australian waters; an analysis of Australian commercial fisheries interacting with the listed species, including an assessment of existing management measures; and consideration of regional and global management measures, threats, stocks and harvests. Australia also published the *Scientific information for the development of this non-detriment finding* (http://www.environment.gov.au/system/files/resources/39c06695-8436-49c2-b24f-c647b4672ca2/files/cites-listed-sharks.pdf) and *Advice on CITES Appendix II shark listings* (http://www.environment.gov.au/system/files/resources/39c06695-8436-49c2-b24f-c647b4672ca2/files/cites-appendix-ii-shark-listing-advice.pdf). Australia has supported the exchange of information on the NDF development process by making the Australian NDF for the harvest and export of hammerhead sharks available through the CITES shark and ray portal at: https://cites.org/prog/shark

- Australia has also made public the non-detriment finding for the freshwater sawfish *Pristis microdon* (*Pristis pristis*) developed in 2011 which is available at http://www.environment.gov.au/biodiversity/wildlife-trade/publications/non-detriment-finding-freshwater-sawfish-pristis-microdon . This non-detriment finding was reviewed in 2017 and remains in place.

Regional work on non-detriment findings

Australia held two Oceania regional workshops in late 2013 and early 2014 to support the implementation of the hammerhead shark listings. These workshops focussed on the principles of making scientifically robust NDFs, including data collection requirements.

Based on the outcomes of these workshops and the scientific analysis supporting NDFs in Australia, the Australian CITES Scientific Authority and the James Cook University have developed a methodology for regional data collection and a framework for undertaking an NDF, including the production of a regional NDF finding template for scalloped, great and smooth hammerhead sharks and giant and reef manta rays. Reports and outcomes of these workshops are provided to CITES Parties through the CITES shark and ray portal at https://cites.org/prog/shark.

Development of non-detriment findings for shark and ray species was discussed at the Oceania CITES Regional Workshop, to be held in Fiji from 29 May to 2 June 2017.

c) challenges faced by Parties in implementing the new listings

Traceability and species identification are generally challenging in the implementation of any new CITES listing of commercially significant marine species. For example, it can be challenging for border authorities to distinguish between the fins of CITES listed, and non-CITES listed species.

d) progress made to address such challenges

The Australian CITES Management, Scientific and Enforcement authorities are working with border authorities to ensure they have training and access to species identification guides, and with industry to continually improve robust traceability mechanisms. Australia also has legislation that allows border authorities to seize wildlife products at the border if they suspect the item may have originated from a regulated species, which allows for further investigation and species identification by experts, if required.

e) status of the development, adoption or implementation of National Plans of Action for Sharks, and information on national or regional regulatory measures concerning the management or conservation of sharks and rays

Status of National Plan of Action

Australia developed its first National Plan of Action for the Conservation and Management of Sharks (Shark-plan 1) in 2004. Shark-plan 1 detailed actions to encourage the effective and sustainable management of Australia's shark populations. The plan provided guidance to fisheries and conservation managers and the public to improve the conservation and management of shark species. Notably, the plan met Australia's commitment as a member of the United Nations Food and Agriculture Organization, to the International Plan of Action for the Conservation and Management of Sharks (IPOA-Sharks).

Australia's second National Plan of Action for the Conservation and Management of Sharks (Shark-plan 2) was released in July 2012 following a review of Shark-plan 1. Shark-plan 2 is also based on the objective and aims of IPOA-Sharks and provides an updated assessment of conservation and management issues concerning sharks in Australian waters. Shark-plan 2 can be viewed at http://www.agriculture.gov.au/fisheries/environment/sharks/sharkplan-2.

As part of Shark-plan 2, an operational strategy was developed that identifies thirty eight management actions for Australia's jurisdictions to pursue in order to advance the objectives of the plan. Shark-plan 2 is currently being reviewed to assess performance and inform future directions.

National regulatory measures

Australia's national environment law, the *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), requires the Australian Government to assess the environmental performance of many fisheries (including those that take sharks) and ensure these fisheries are ecologically sustainable.

An independent assessment of all export and all Australian Government managed fisheries is required. These assessments ensure that, over time, fisheries are managed in an ecologically sustainable way. The assessments are conducted against the 2nd edition of the Guidelines for the Ecologically Sustainable Management of Fisheries (the Guidelines). The Guidelines outline specific principles and objectives designed to ensure a strategic and transparent way of evaluating the ecological sustainability of fishery management arrangements. Guidelines for the Ecologically Sustainable Management of Fisheries

The assessment process is designed to incorporate a flow of communication between fishery managers and the Australian Government Department of the Environment and Energy, in order to facilitate the best outcome for the fishery. Assessment is based on the merits of the combination of management measures in place and fishery specific issues.

Shark finning

The practice of shark finning, where the fins are removed and the body of the shark is discarded at sea, is not allowed in fisheries managed by the Australian Government. Similar measures are in place in fisheries managed by the state and territory governments. While there are fishing operations in Australia that supply the market with fin and other shark products, they are required to operate consistent with national, state or territory laws.

All foods imported into Australia must comply with national quarantine and food regulations. Shark fin that complies with quarantine import conditions can be brought into Australia. In addition, products derived from shark species protected under CITES are subject to strict import and export protocols.

f) information on trade in sharks and rays, and other available relevant data and information

Silky sharks

Silky sharks are protected under the EPBC Act, and cannot be legally exported from Australia.

Thresher sharks:

There is a minor take of thresher sharks in Australian Government managed waters. Consistent with CITES requirements, a non-detriment finding will need to be made before any export will be permitted once the listing comes into effect.

Mobula rays:

No export has been recorded. Mobula rays are protected under the EPBC Act, and cannot be legally exported from Australia.

Hammerhead sharks

International trade data for the three hammerhead species from September 2014 (the date of listing) to March 2017 indicates that exported hammerhead product was almost entirely made up of fins of scalloped, great and smooth hammerhead shark. A small number (12 specimens) of live scalloped hammerhead shark were exported from Australia to the United Arab Emirates during this period.

The quantity of great hammerhead fin exported has shown an increasing trend (141.04 kg in 2014/15, 550.05kg in 2015/16 and 721.04kg in 2016/17). Exports of smooth hammerhead fin occurred in 2015/16 (65.67kg) and 2016/17 (5.55kg). Exports of scalloped hammerhead fin are only recorded as occurring in 2016/17 (141.41kg). The harvested amount falls well below the limits set under the 2014 Australian hammerhead shark NDF.

Non-CITES Shark species

Most species of sharks not listed on CITES do not require international wildlife trade permits for export from Australia. Most product from Australian fisheries, except for CITES listed species and species protected under the EPBC Act, are exempt from export permit requirements.

g) legislation concerning the conservation and management of sharks and rays

National

The Australian Government has responsibilities for biodiversity conservation through the EPBC Act - the Australian Government's national environmental legislation. The international movement of wildlife and wildlife products is regulated under the EPBC Act. The EPBC Act gives effect to CITES requirements domestically. The Environment Minister must establish a list of CITES species, which enables domestic application of CITES requirements. Under certain circumstances, the Minister may grant permits for the export and import of species on this list.

The EPBC Act provides that the Minister must not issue a permit for the export or import of a CITES specimen unless satisfied that the action or actions specified in the permit will not be detrimental to, or contribute to trade which is detrimental to:

i) the survival of any taxon[1] to which the specimen belongs; or

ii) the recovery in nature of any taxon to which the specimen belongs; or

iii) any relevant ecosystem (for example, detriment to habitat or biodiversity).

[1] Under section 528 of the EPBC Act, Taxon "means any taxonomic category (for example, a species or a genus), and includes a particular population".

NDFs inform the Minister's consideration of this matter in his decision regarding whether to declare fisheries as approved wildlife trade operations and also to inform individual decisions on whether to grant export permits for CITES listed species harvested within approved Australian fisheries. Any Australian managed fishery where CITES listed species are caught and exported requires a wildlife trade operation to be in place before the catch takes place. A wildlife trade operation is considered to be an 'approved source'.

The EPBC Act provides a legal framework to protect and manage nationally and internationally important fauna, flora, ecological communities and heritage places - defined in the EPBC Act as matters of national environmental significance. Under the EPBC Act, an action that has, will have, or is likely to have a significant impact on a matter of national environmental significance requires approval from the Australian Government Minister for the Environment. Species listed in either Appendix of the Convention on Migratory Species are listed as migratory species under the EPBC Act and are matters of environmental significance, unless a Reservation is taken. Species listed in the 'critically endangered', 'endangered' and 'vulnerable' threatened categories under the EPBC Act are also matters of national environmental significance.

Thirteen species of sharks and rays are currently listed as 'threatened' under the EPBC Act. Of these, nine are listed in either the vulnerable, endangered or critically endangered categories and are therefore matters of national environmental significance (see Table 1). (The remaining four species are listed as 'conservation dependent' see further below). All of the threatened species have approved Conservation Advices outlining priority conservation actions and seven of these species have recovery plans in force under the EPBC Act (see Table 1).

Sixteen species of sharks and rays are currently listed under the EPBC Act as 'migratory'. Some of these are also listed as threatened (see Table 1).

In total, twenty species of sharks and rays are treated as matters of national environmental significance under the EPBC Act.

Four species of shark are listed as 'conservation dependent' under the EPBC Act. Species listed in the conservation dependent category of threatened species are not matters of national environmental significance for the purposes of Part 3 - requirements for environmental approvals of the EPBC Act. Conservation dependent species must be the focus of fisheries management arrangements implemented under law which provide for "management actions necessary to stop the decline, and support the recovery of the species so that its chances of long term survival in nature are maximised". Management plans which provide for such management arrangements for the four conservation dependent species can be accessed at http://www.environment.gov.au/biodiversity/threatened/species/pubs/85267-listing-advice-15032018.pdf..

The Australian Government *Fisheries Management Act 1991* allows for plans of management to be made for each Australian government managed fishery. Each individual management plan prescribes the marine species that may or may not be taken lawfully and any mitigation measures that must be used whilst carrying out fishing operations.

States/Territories

Fisheries that fall under Queensland jurisdiction are managed under the Queensland *Fisheries Act 1994*, the Queensland Fisheries Regulation 2008 and the respective management plans for some

fisheries. The Queensland *Nature Conservation Act 1992* provides for the legislative protection of flora and fauna that are threatened within Queensland. Currently none of the CITES listed species of sharks and rays are listed as threatened species form a major component of any Queensland managed fishery.

Fisheries that fall under Northern Territory jurisdiction are managed under the Northern Territory *Fisheries Act 1988*, the Northern Territory Fisheries Regulations 1995 and the respective management plans for some fisheries. The *Territory Parks and Wildlife Conservation Act 2000* provides for the legislative protection of flora and fauna that are threatened within the Northern Territory. Currently none of the CITES listed species of sharks and rays are listed as threatened species in the Northern Territory.

Fisheries that fall under Western Australian jurisdiction are managed under the Western Australian *Fish Resources Management Act 1994*, the Western Australian Fish Resources Management Regulations 1995 and the respective management plans for some fisheries. The Western Australian *Fish Resources Management Act 1994* also provides for the legislative protection of listed threatened species within Western Currently none of the CITES listed species of sharks and rays are listed as threatened species in Western Australia.

Fisheries that fall under New South Wales jurisdiction are managed under the New South Wales *Fisheries Management Act 1994*, the New South Wales Fisheries Management (General) Regulation 2010 and the respective management strategies for some fisheries. The New South Wales *Fisheries Management Act 1994* also provides for the legislative protection of listed threatened species within New South Wales. Currently, *Sphyrna lewini* is listed as endangered and *S. mokarran* is listed as vulnerable in New South Wales.

Fisheries that fall under Victorian jurisdiction are managed under the Victorian *Fisheries Act 1995*, the Victorian Fisheries Regulation 2009 and the respective management plans for some fisheries. The Victorian *Wildlife Act 1975*, the Victorian *Flora and Fauna Guarantee Act 1988* and the Victorian *Fisheries Act 1995* provide for the legislative protection of listed threatened species within Victoria Currently none of the CITES listed species of sharks and rays are listed as threatened species in Victoria.

Fisheries that fall under South Australian jurisdiction are managed under the South Australian *Fisheries Management Act 2007*, the South Australian Fisheries Management (General) Regulations 2017 and the respective management plans for some fisheries. The South Australian *National Parks and Wildlife Act 1972* also provides for the legislative protection of listed threatened species within South Australia. Currently none of the CITES listed species of sharks and rays are listed as threatened species in South Australia.

Fisheries that fall under Tasmanian jurisdiction are managed under the Tasmanian *Living Marine Resources Management Act 1995*, the Tasmanian Fisheries (General and Fees) Regulations 2006 and the respective rules and management plans for some fisheries. The Tasmanian *Living Marine Resources Management Act 1995* provides for the legislative protection of listed threatened species within Tasmania. Currently none of the CITES listed species of sharks and rays are listed as threatened species in Tasmania.

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Table 1. Sharks and rays listed under the EPBC Act

	EPBC Act Status	
Species	**Threatened Category**	**Listed Migratory**
Carcharias taurus (grey nurse shark (east coast population))	Critically Endangered	
Carcharias taurus (grey nurse shark (west coast population))	Vulnerable	
Rhincodon typus (whale shark)	Vulnerable	√
Carcharodon carcharias (white shark)	Vulnerable	√
Pristis zijsron (green sawfish)	Vulnerable	√
Pristis pristis (largetooth sawfish)	Vulnerable	√
Pristis clavata (dwarf sawfish)	Vulnerable	√
Glyphis garricki (northern river shark)	Endangered	
Glyphis glyphis (speartooth shark)	Critically Endangered	
*Zearaja maugeana (*Maugean skate)	Endangered	
Manta birostris (giant manta ray)	-	√
Manta alfredi (reef manta ray)	-	√
Lamna nasus (porbeagle)	-	√
Isurus oxyrinchus (shortfin mako)	-	√
Isurus paucus (longfin mako)	-	√
Cetorhinus maximus (basking shark)	-	√
Anoxypristis cuspidata (narrow sawfish)	-	√
Carcharhinus falciformis (silky shark)	-	√
Mobula eregoodootenkee (pygmy devilray (Mobula ray))	-	√
Mobula japanica (Japanese devilray (Mobula ray))	-	√
Mobula thurstoni (bentfin devilray (Mobula ray))	-	√
Centrophorus harrissoni (Harrisson's dogfish)	Conservation Dependent	
Centrophorus zeehaani (southern dogfish)	Conservation Dependent	
Galeorhinus galeus (school shark)	Conservation Dependent	
Sphyrna lewini (scalloped hammerhead shark)	Conservation Dependent	

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BELIZE FISHERIES DEPARTMENT

MINISTRY OF AGRICULTURE, FISHERIES, FORESTRY, THE ENVIRONMENT, SUSTAINABLE DEVELOPMENT & IMMIGRATION

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Belize Response to CITES Notification to Parties No. 2018/041
Belize City, Belize. May 4, 2018.

SUMMARY OF SHARKS AND RAYS CONSERVATION AND MANAGEMENT ACTIVITES

1. **Scientific information concerning sharks and rays such as the results of stock assessments, management and conservation efforts and research activities**

Stock assessments of sharks and rays have not been done in Belize. The main management of Sharks is done primarily by regulations established in Statutory Instrument (No. 78 of 2011) which include closed fishing season (no person shall take, buy, sell, possess, or export shark meat or fins) during the period 1st August to 31st October in any year. There is a prohibition on shark finning. A person who intends to take sharks, or buy, sell, possess, or export shark meat or shark fins (other than those prohibited including Nurse shark - *Ginglymostoma cirratum*, Whale shark – *Rhincodon typus*) is required to apply for and to obtain a shark fishing license or a shark meat and fins export permit. If a shark fishing license is issued the person must comply with and supply the following information [relating to the season which ended] to the Fisheries Administrator by the end of August of each year:

The name of shark species, number of sharks, fishing location of sharks caught; date when the shark was caught; weight (in pounds) of shark meat of each shark by species and by date; that there is no wanton waste; that the shark meat and fins are landed and utilized; that the shark meat and fins landed shall not exceed 5% of the wet meat weight; that the shark is landed at authorized landing ports only; that the fins are at least partially attached to the carcass prior to inspection by the proper authority at the landing port; that the fishing of sharks is done using only circular fishing hook and fishing net with a mesh size of at least 6 inches; that fishing for sharks is done within the declared areas of extraction so long as the person remains within the declared quota and any other conditions which the Fisheries Administrator deems appropriate.

A person who exports shark meat and fins must supply the following information to the Fisheries Administrator prior to the date of exportation: (a) name of shark species, number of sharks, fishing location of sharks caught; (b) date when the shark was caught; (c) weight (in pounds) of shark meat of each shark by species; (d) number and weight of shark fins and (e) the name of the fisherman from whom the shark meat and fins were purchased;

The Fisheries Administrator shall immediately revoke a license for the exportation of shark meat and shark fins where the holder of the license fails to furnish the information required and shall not grant a renewal to the holder of a license who fails to furnish the information pursuant to sub-regulation. A person who fails to comply with any of the conditions of a shark fishing license or a permit to export the meat or fins

of a shark commits an offence and is liable on summary conviction to a fine of not less than $100.00 nor more than $500.00 or to imprisonment of 6 months or to both.

Shark fishing is strictly prohibited in the coastal network of marine protected areas including all world heritage sites and other marine reserves and fish spawning aggregation sites of Belize.

Shark research activities in Belize has included both fishery-dependent and fishery-independent data collection. The Fisheries Department in collaboration with researchers from Florida International University (FIU) have been collecting catch and biological data from landings at the main landing sites. There is collection of anal fins from landed sharks (anal fins are small, secondary fins that have a low commercial value) as part of a pilot program implemented in 2016-2018 where shark fishermen voluntarily submitted anal fins from their landings to the Fisheries Department. Since many anal fins are visually identifiable and their size is proportional to the shark's body size, these efforts enabled reconstruction of the species and size composition of their catch. These parameters are feeding into initial assessments of these species and, possibly, non-detriment findings for CITES listed sharks.

MarAlliance, a non-governmental organization, in Belize has also been collecting over the last 5 years fishery-independent shark species, biological, abundance and distribution data in a few fishing areas of Belize. This raw and aggregated data sets are submitted in their annual reports to the Fisheries Department.

2. **Examples of non-detriment findings**;

The Belize Department of Fisheries held a non-detriment finding workshop for CITES listed sharks on October 2-3, 2017 in Belize City. Representatives from the government, industry, environmental NGO, and research sectors attended and outlined the steps needed to develop NDFs for great hammerhead, scalloped hammerhead, and silky sharks. Critical information gaps were identified. Attendees agreed upon an outline on how to proceed through the auspices of the National Shark Working Group. It is anticipated this process will be completed in 2018.

3. **Challenges faced by Parties in implementing the listings of sharks and rays adopted at CoP17, and progress made to address such challenges;**

The primary challenge identified in implementing listings for scalloped and great hammerheads are: (1) the lack of time series data that would enable determination of population trends, (2) the inability of fishers to avoid catching these species or release them alive when conducting shark fishing operations using gillnets or longlines, (3) general lack of biological and catch information on these two species in Belize.

4. **Status of the development, adoption or implementation of National Plans of Action for Sharks, and information on national or regional regulatory measures concerning the management or conservation of sharks and rays;**

Belize has finalized its National Plan for Action for Sharks. The plan was developed by the National Shark Working Group, which is composed of representatives from the government, industry, environmental NGO, and research sectors. The plan will be released by the end of May 2018. Belize is seeking support for implementation of its NPOA-Sharks.

5. **Information on trade in sharks and rays, including any issues regarding the reporting of trade in CITES- listed species in annual reports**

The Fisheries Department in conjunction with Florida International University (Dr. Demian Chapman) have developed an approach to collect information on the species and size composition of the fishery, including CITES listed species. Licensed shark fishermen are required to collect and dry the anal fin (Figure 1) from all sharks they land. The dried anal fin is then stored and submitted to Fisheries Officers (during occasional landing sites visits) or when the fishermen visit the Fisheries Department to renew their license.

Anal fins have been identified to the species level using DNA barcoding and it has been discovered that the anal fins of many of the species in the fishery, including great and scalloped hammerheads, are morphologically distinctive. This enables robust visual identification by a trained analyst using a morphological key. In this manner we have been able to identify the species composition of the shark fishery. We are now investigating the relationship between body size and anal fin size of key species, which will enable us to reconstruct the size composition of the catch. Once this is completed we are aiming to assess fishery effects on these populations using length-based assessment methods (e.g. Froese, R. 2004. Fish and Fisheries 5:86-91, Punt, A. E., F. Hurtado-Ferro, and A. R. Whitten. 2014. Fisheries Research 158:124-134).

Our experience with this approach has been positive and we suggest that it could be broadly employed by Parties to gather information on landings and trade of sharks.

Figure 1: (Top) Position of anal fin on a shark. (Bottom) examples of sun-dried anal fins submitted by shark fishermen. The top fin is derived from a great hammerhead and exhibits a diagnostic falcate shape.

6. **Legislation concerning the conservation and management of sharks and rays.**

Belize has prepared draft legislation for full protection for all Batoids, including CITES-listed sawfish and mantas. Batoids are not commercially targeted in Belize and are usually released alive if incidentally captured. It is expected that a new Fisheries Act (that includes provisions for full protection for Batoids) will be passed into law by the end of 2018.

The Endangered Species Import and Export Management Office of the People's Republic of China

Ref: 2018-AL-006

May 9th, 2018

To:
Mr. David Morgan
CITES Secretariat
Geneva, Switzerland
Fax: +41-(0)22-797-34-17
Email: info@cites.org

Subject: New information on shark and ray conservation and management activities, including legislation

Dear Mr. David Morgan,

First of all, I would like to extend my gratitude for your continuous support to the implementation of CITES in China.

According to Notification No. 2018/041, Parties are requested for report their new information on shark and ray conservation and management activities, including legislation by 11 May 2018. We hope the following information from China will be helpful.

Work Done

1. China authority held the CoP17 newly-listed sharks and rays implementation symposium to convey the new decisions and requirements of CoP17 to related departments, and to further discuss the effective implementation.

2. Formulated and issued "the list of animals and its products prohibited or restricted to be traded" on basis of the renewed CITES appendix II, all sharks and rays in appendix II were included in this list.

3. And a training course had been held to improve the implementation capacity of administration and industry, the training content included species identification in trade and the industry management.

4. Published the newly-listed species poster and held promotional exhibition to popularize newly-listed shark and rays conservation and regulatory policy, to promote the public awareness and to encourage rational legal utilization on aquatic resources.

5. Carried out the verification work on products stock obtained before the convention between October and November 2017. Total 29000 kg newly-listed shark products including fin, leather and cartilage had been verified on site, no Manta product had

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including fin, leather and cartilage had been verified on site, no Manta product had been applied. The verified stock had been registered and would be regulated for trade.

Work in plan

1. China authority would regulate the related products when imported, exported and introduced from the sea according to the new decision of CoP17.But until now no application for importing and exporting of such products has been received.

2. China authority has been concentrated on the connection between the CITES appendix species and newly revised Wildlife Protection Law, and would formulate supporting regulations to regulate domestic markets.

3. China authority would study and develop National Plan of Action on Sharks.

Examples of non-detriment findings

So far, China has no application of the related products for import, export or introduce from the sea, so there were no examples yet of non-detriment findings.

Thank you again for your great support.

Sincerely yours,

Mr. Meng Xianlin
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COLOMBIA´S REPORT ON ACTIVITIES FOR THE ELABORATION OF NON DETRIMENTAL FINDINGS

This document presents the relation of the activities that have been carried out in relation to the management and conservation of Sharks in the framework of national Non Detrimental Findings.

1. **Non Detrimental Findings (NDF) for Colombia**

   By means of joint efforts between the Ministry of Environment and the Institute on Marine Research (INVEMAR) a workshop was carried out for the development of a proposal for NDF in Colombia (September 2016) of Sharks listed in Appendix II of CITES. As a result, a preliminary proposal was developed for the species *Sphyrna lewini (*Hammer shark). This proposal was assessed by the CITES Management Authority and is in process of having adjustments made by the CITES Scientific Authorities of Colombia.

2. **Participation in international workshops and capacity building activities:**

   - Workshop on Methodologies and Risk Evaluation for Marine Species Included in Appendix II of CITES in Guatemala in June 2017. In this event, the participants re-evaluated the presentation of the actual state of national NDF, and as a result there were some adjustments made for the presentation of the NDF for the species *Sphyrna lewini* (Hammer shark).

   - Regional CITES Workshop for the advancement of the implementation of measures for sharks and rays included in Appendix II of CITES in November 2017. Conclusions an d recommendations of this event:

     - ✓ Invites the countries to continue to establish measure for the management, conservation and regulation of commerce of sharks and rays in the framework of CITES.
     - ✓ Recommends CITES to offer support to the Parties to strengthen capacities in the realization of NDF.
     - ✓ Recommends the Parties to strengthen control and vigilance entities and improve channels for inter-institutional communication.
     - ✓ Invites the Parties to improve regional channels of communication.
     - ✓ Invites CITES to work on methodologies that are simpler for the realization of NDF and that they require less information.

   - **In the framework of the Permanent Commission of the South Pacific:** During 2017, alongside the Fisheries National Authority, there was active participation in virtual meetings of the Scientific Committee for the Regional Action Plan for Sharks, Raya and Chimeras. The in-person meeting took place in Peru in July 2017, where the participants worked on topics related to the implementation of decisions in the framework of CITES,

especially the challenges in the realization of NDF when there is little to no information or data on the species of Sharks listed in Appendix II.

3. **Progress son the advancement of complementary activities.**

- Communication channels have been strengthened as well as work spaces (such as follow-up committees) for the development of activities that allow the implementation of decisions the framework of shark resources.

- Continuous work on the unfolding of tax codes for shark resources with special emphasis on species listed in Appendix II of CITES, with the purpose of having the tools for better traceability of exports and imports of products and sub-products of sharks and rays in Colombia. From this effort, there is the unfolding of tax codes specific to species included in COP16 of 2013, which are already included in what was established in the national Decree 2153 from December 26 of 2916, By which the Customs Duty and other dispositions, where there is specification on codes for different presentations of meat (fresh, frozen, salted) and codes for their fins.

EUROPEAN COMMISSION
DIRECTORATE-GENERAL ENVIRONMENT

Directorate F - Global Sustainable Development
ENV.F.3 - Multilateral Environmental Cooperation

Brussels,
ENV.F3

CITES Secretariat
International Environment House
Chemin des Anémones
CH-1219 Châtelaine
Geneva
Switzerland
Email:info@cites.org

Subject: **Reply to CITES Notification 2018/041 – Request for new information on shark and ray conservation and management activities, including legislation**

In response to CITES Notification 2018/041 of 24 April 2018, please find below and enclosed information submitted by the European Union (EU), Germany, Estonia, France, The Netherlands, Slovenia and Sweden.

In the **EU** the conservation and management of sharks falls under the remit of the Common Fisheries Policy (CFP) (http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32013R1380). An EU Plan of Action (EUPOA) was adopted in 2009 aiming at broadening the knowledge both on shark fisheries and on shark species and their role in the ecosystem, ensuring that directed fisheries for shark are sustainable and that by-catches of shark resulting from other fisheries are properly regulated, and encouraging a coherent approach between the internal and external EU fishery policy for sharks.

The EU is promoting and implementing science based conservation and management of marine biological resources, including sharks, both in EU and non-EU waters, in line with the CFP principles. The conservation and management of shark species are addressed through a number of policy tools, including the retention ban for certain species, strict fins-attached policy, Total Available Catches (TAC) & quotas, technical measures, etc. The most relevant are the EU regulations assigning the annual fishing "quotas" in EU waters and for EU vessels which also provide for the prohibition to fish for and land species that are listed in these regulations:

- *Council Regulation (EU) 2016/2285* of 12 December 2016 fixing for 2017 and 2018 the fishing opportunities for Union fishing vessels for certain deep-sea fish stocks and amending Council Regulation (EU) 2016/72 – http://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX:32016R2285;

- *Council Regulation (EU) 2018/120* of 23 January 2018 fixing for 2018 the fishing opportunities for certain fish stocks and groups of fish stocks, applicable in Union waters and, for Union fishing vessels, in certain non-Union waters – http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1526399716104&uri=CELEX:32018R0120;

- *Council Regulation (EC) 1185/2003 amended by Regulation (EU) 605/2013* providing for a finning ban and a shark fins naturally attached policy (FNAP).

Stock assessments and cooperation with Regional Fisheries Management Organisations (RFMOs)

The EU is among the most active and vocal advocates of the conservation and management of sharks, in relevant international fora and in particular in RFMOs which are key organisations for addressing the challenges faced by these species. The EU is active also in other fora with an interest in the conservation of marine species, such as the Convention on Migratory Species (CMS) and the Memorandum of Understanding on the Conservation of Migratory Sharks (Sharks MoU).

EU support to CITES implementation for marine species

The EU decided to provide financial support to the CITES Secretariat for the implementation of CITES for marine species, for an amount of €900 000 for the period 2017-2020. This builds on a 2013-2016 EU-funded programme and aims to build capacity of developing countries and promote synergies on concrete projects between CITES, the FAO and RFMOs.

***

In **Sweden**, some cartilaginous fish species – piked dogfish (*Squalus acanthias*), common skate (*Dipturus batis*), basking shark (*Cetorhinus maximus*), small-spotted catshark (*Scyliorhinus caniculus*), porbeagle (*Lamna nasus*) and thornback skate (*Raja clavata*) – are nationally protected. Fishing is not permitted and if fishes are unintentionally caught they need to be directly released to the sea. In combination with the EU legislation, fishing on these cartilaginous fish species is not allowed in Swedish waters. All of the above, except small spotted catshark, are also listed by OSPAR in Region II and Sweden has signed recommendations for these species. Sweden is thus obliged to implement measures in order to conserve and protect them. Sweden has also signed the MoU Sharks under the CMS.

Eleven species of sharks, rays and skates were nationally red listed in 2015, which means that nearly all cartilaginous fish species that occur in Swedish waters are threatened . To protect those species more efficiently, more knowledge is needed on population status, reproduction and ecology for all species of sharks, rays and skates present in our waters. The Swedish Agency for Marine and Water Management is currently developing a knowledge-building program of measures, to address existing knowledge gaps and obtain better information on possible management measures.

In cooperation with the Swedish Species Information Centre, The Swedish Agency for Marine and Water Management has produced an identification guide for sharks, rays and

skates in Swedish waters, with the aim to encourage increased reporting by fishermen and fishery inspectors and to inform on the status of the threatened species.

When it comes to international trade from and to the EU, Sweden believes that for cartilaginous fish species a closer look on how trade is reported might be interesting.

***

Estonia has not issued CITES permits or certificates for shark and ray species. There have been some confiscations (on the border and in the internal market) of cosmetics and medicinals containing *Elasmobranchii, Selachomorpha* species. Estonia does not have special legislation, Action Plans, guidance, scientific information etc. conserning sharks and rays.

***

Germany supported a training on developing and implementing non-detriment findings (NDFs) for hammerhead and silky sharks on the basis of the Sharks NDF Guidance developed by Germany. The training took place in the framework of a workshop on hammerhead and silky sharks in June 2017 in Colombo, Sri Lanka.

***

The information provided in 2017 by **The Netherlands** and **Slovenia** and included in AC29 Doc. 23, Annex 1 (Rev. 1) should be considered valid also for the purposes of the 30th meeting of the Animals Committee, with one addition regarding The Netherlands:

6.e. *Status of the development, adoption or implementation of National Plans of Action for Sharks, and information on national or regional regulatory measures concerning the management or conservation of sharks and rays*

- For the waters under Dutch sovereignty within the European Union, the Netherlands continues working to improve the status of sharks and rays within the framework of the European Common Fisheries Policy and the Marine Strategy Framework Directive.

E. Maire

Emmanuelle Maire
Head of Unit

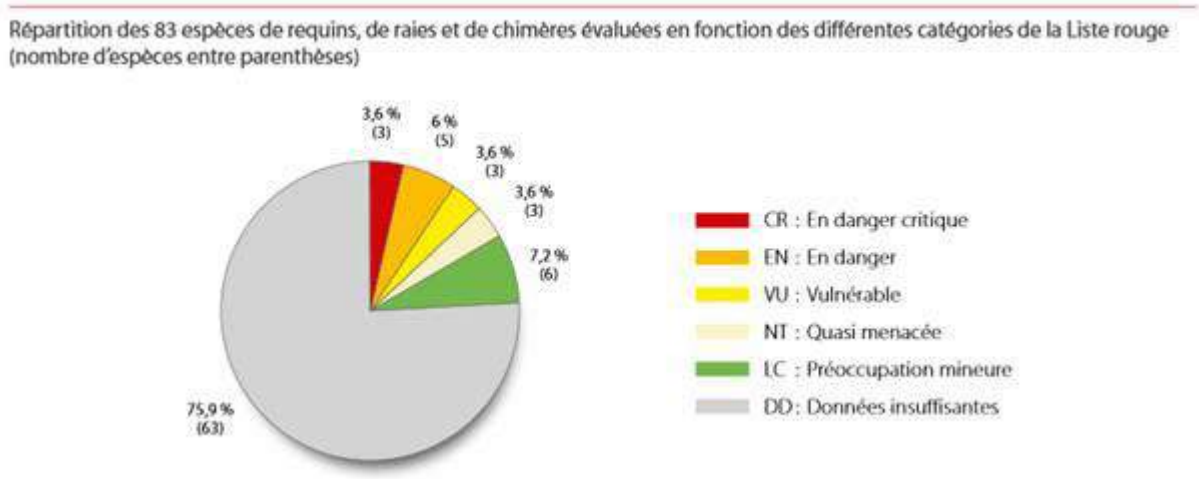
Encl.: reply from France

Cc: EU Member States' CITES Management and Scientific Authorities

CITES Notification 2018/041 (sharks & rays)
FRANCE

a) Scientific information concerning sharks and rays, such as the results of stock assessments, management and conservation efforts, and research activities;

A red list for sharks and rays in France was developed by IUCN, in collaboration with the French Scientific authority in 2013 (https://inpn.mnhn.fr/docs/LR_FCE/Dossier_presse_Liste_rouge_Requins-et-raies_de_metropole_17_dec_2013.pdf). This is the first and only red list for these species in France. Most of the species (76%) are categorised as Data Deficient.



In addition, the following French scientific projects are carried out:

- CATaup project, focusing on *Lamna nasus* in the Gascogne Gulf and the Celtic sea, which should be completed in 2019;
- some studies in French Polynesia and in La Réunion, which do not focus on CITES species.

e) Status of the development, adoption or implementation of National Plans of Action for Sharks, and information on national or regional regulatory measures concerning the management or conservation of sharks and rays;

France implements the EU-POA-Shark Plan, and will take part into the Caribbean R-POA-Shark Plan.

g) Legislation concerning the conservation and management of sharks and rays

France implements EU legislation on the subject.
Regarding French Polynesia, all shark species are strictly protected, and fishing as well as commercial and non-commercial uses are prohibited. The same goes in New Caledonia for all Elasmobranchii species.

MINISTRY OF ENVIRONMENT AND FORESTRY
DIRECTORATE GENERAL OF NATURAL RESOURCES AND ECOSYSTEM CONSERVATION
DIRECTORATE OF BIODIVERSITY CONSERVATION
7th Floor, Block VII, Manggala Wanabakti Building
Jalan Gatot Subroto, Jakarta 10270, Telp. 021-5720227 – Fax. 5720227

8 May 2018

Our Ref: S. 538/KKH/PKINT/KSA.2/5/2018

To : Secretary General CITES
Email : info@cites.org

Subject : Information on shark and ray conservation and management activities, including information from Indonesia

Dear Sir/Madam,

Pursuant to your notification dated 24 April 2018 regarding Request for new information on shark and ray conservation and management activities including legislation, please find attached information in response to your notification.

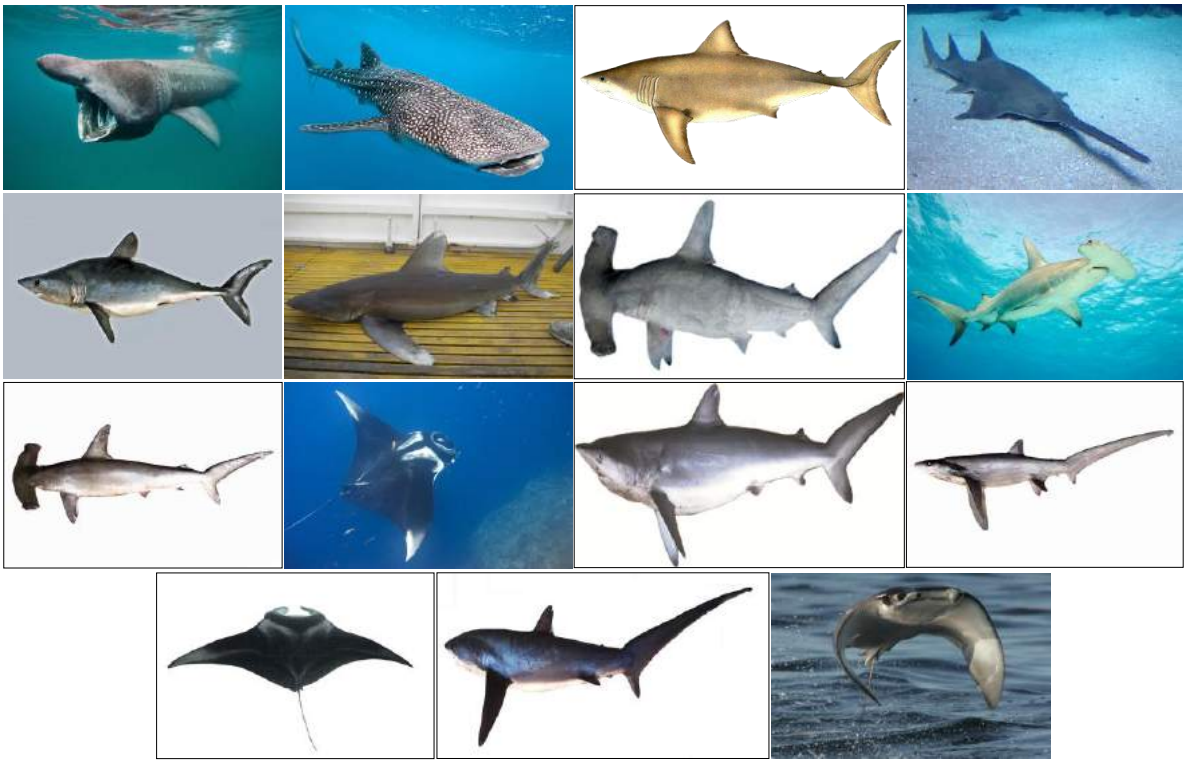
Thank you for your kind attention.

Yours sincerely,

Bambang Dahono Adji
Director of Biodiversity Conservation
Email: macites@menlhk.go.id, subditkonvensi.kkh@gmail.com, rksari@gmail.com, agnugroho@gmail.com, sr.ratna@gmail.com

cc.:
Director General of Natural Resources and Ecosystem Conservation, Indonesia

THE FEEDBACK REGARDING THE NOTIFICATION NO. 2018/041 RELEASED BY CITES SECRETARIAT ON APRIL 24TH, 2018
CONCERNING
REQUEST FOR NEW INFORMATION ON SHARK AND RAY CONSERVATION AND MANAGEMENT ACTIVITIES, INCLUDING LEGISLATION



Prepared By:

Directorat of Conservation and Marine Biodiversity
Directorat General of Marine Spatial Management
Ministry of Marine Affairs and Fisheries

Title	:	Shark and Ray Conservation and Management Activities: Indonesian Context
Objective	:	This document outlines the feedback regarding the Notification No. 2018/041 released by CITES Secretariat on April 24th, 2018 concerning "Request for new information on shark and ray conservation and management activities, including legislation"
Submitted to	:	Directorate of Biodiversity Conservation, Ministry of Environment and Forestry
Prepared by	:	Directorate of Conservation and Marine Biodiversity, Ministry of Marine Affairs and Fisheries

1) The Government of Indonesia as a Party of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), has adopted Decisions 17.209 to 17.216 on Sharks and Rays (Elasmobranchii) at the 17th Conference of the Parties. According to the Notification No. 2017/031 released by the CITES Secretariat on 11th April 2017, the Government of Indonesia and other Parties are invited to provide information on shark and ray conservation and management activities include the following:
   a) scientific information concerning sharks and rays, such as the results of stock assessments, management and conservation efforts, and research activities;
   b) examples of non-detriment findings; information and methods providing guidance for the making of national or regional non-detriment findings;
   c) challenges faced by parties in implementing the new listings;
   d) progress made to address such challenges;
   e) status of the development, adoption or implementation of National Plans of Action for Sharks, and information on national or regional regulatory measures concerning the management or conservation of sharks and rays;
   f) information on trade in sharks and rays, and other available relevant data and information; and
   g) legislation concerning the conservation and management of sharks and rays.
2) Ministry of Marine Affairs and Fisheries (MMAF) and Indonesian Institute of Sciences (Lembaga Ilmu Pengetahuan Indonesia or LIPI) would like to inform the progress and actions made by Indonesia for sharks and rays conservation and management.

Shark and Ray Conservation and Management Activities: Indonesian Context

Government of Indonesia would like to extend our sincere gratitude and appreciation and continue to support the work of CITES Secretariat and Animal Committee by providing new information on shark and ray conservation and management activities, including legislation, and make the responses available to the Animals Committee for its consideration in Twenty-ninth meeting which will be held in Geneva, Switzerland on July 18th-22nd, 2017.

No.	Item	Remarks
1.	Scientific information concerning sharks and rays, such as the results of stock assessments, management and conservation efforts, and research activities	The Government of Indonesian supported by other Partners have conducted research and assessment on sharks and rays. These research programs were conducted to find management and conservation alternatives for sharks and rays in Indonesia. There are some publications related to sharks and rays research that have been conducted in Indonesia, such as: 1. Characteristics of chondrichthyan diversity in Western Indonesia (Adrim & Fahmi, 2007); 2. Elasmobranch diversity of Kalimantan Waters (Fahmi & Adrim, 2007); 3. Length frequency distribution, body length relationship, clasper length and sex ratio of silky shark (*C. falciformis*) (Dharmadi *et al*., 2007); 4. The contrubution of rays in the danish seine fisheries operating at the Java Sea (Fahmi *et al.,* 2008); 5. Biological aspects of Bluespotted stingray (*Dasyatis* cf. *kuhlii*) caught in the Java sea. (Dharmadi, 2008); 6. Biodiversity of ray caught in the Indian Ocean. (Dharmadi & Fahmi. 2008). 7. Elasmobranchs in Southern Indonesian fisheries: the fisheries, the status of the stocks and management options (Blaber *et al.,* 2009); 8. *Hemitriakish indroyonoi* sp. Nov., a new species of houndshark from Indonesia (Carcharhiniformes : Triakidae). (White, T.B & Dharmadi. 2009).

No.	Item	Remarks
		9. Biologycal aspect, useful, and conservation status of freshwater stingray. (*Himantura oxyrhyncha*). (Dharmadi, 2009) 10. Biodiversity of sharks and rays in South-eastern Indonesia (Dharmadi et al., 2009). 11. Shark and rays in Indonesia (Fahmi, 2010); 12. Shark caught by tuna gillnet in the Indian Ocean .(Dharmadi et al., 2010). 13. New species of shark and ray. (Dharmadi., 2010). 14. Aspect of maturation and reproduction in hexanchiform and squaliform sharks. (White, W.T & Dharmadi. 2010). 15. Performance of shark and ray fisheries in the Java Sea (Dharmadi & K. Malik. 2010). 16. Abundance index and biological aspect of Javanise devilray (*Mobula japanica)* (Dharmadi et al., 2010). 17. Identification of vulnerable species and biological aspects of shark from Indian Ocean (Dharmadi, Fahmi, et al., 2010). 18. Fisheries and biological aspects of Stingray, *Mobula japanica* caught from south of Java (Dharmadi *et al*., 2011); 19. Biological Aspects of Thresher shark (*Alopias pelagicus*) from Indian Ocean. (Dharmadi et al., 2012). 20. Some Indonesian endemic elasmobranch and their conservation status (Fahmi & Dharmadi. 2012). 21. Shark longline fisheries of Tanjung Luar, East Lombok. (Dharmadi, et al., 2013). 22. The elasmobranch nursery area of Jakarta Bay (Fahmi, 2012); 23. Biology of silky shark *Carcharinus falciformis* (Carcharinidae) in the eastern Indian Ocean, including an approach to estimating age when timing of parturition is not well defined (Hall *et al.,* 2012); 24. Review of shark fishery status and its conservation measures in Indonesia (Directorate of Conservation and Marine Biodiversity, 2013);

No.	Item	Remarks
		25. Species composition and aspects of the biology of Orectolobiformes from Indonesian waters. (Dharmadi, et al., 2014). 26. First confirmed recorded of the white shark Carcharodon carcharias (Lamniformes:Lamnidae) form Indonesia. (Fahmi & Dharmadi.2014). 27. Biological Aspects, Stock and Conservation Status of Giant ,0ceanic Manta Ray,Manta birostris in the Indian Ocean. (Dharmadi & Fahmi, 2014) 28. Fisheries management and conservation of sharks in Indonesia (Dharmadi et al., 2015); 29. Assessing Indonesian manta and devil ray populations through historical landings and fishing community interviews (Lewis *et al.,* 2015); 30. Pelagic shark fisheries of Indonesia's Eastern Indian Ocean Fisheries Management Region (Fahmi & Dharmadi, 2015); 31. Growth, mortality and exploitation estimates of silky shark (*Carcharinus falciformis*) landed in Banyuwangi, East Java (Damora & Yuneni, 2015); 32. Species and total catch of sharks of Southern Central Java waters (Setiawan & Nugroho, 2015); 33. Diversity of shark species landed in TPI Bom Kalianda, South Lampung (Parluhutan & Imaniar, 2015); 34. Shark enumeration in Muncar Fishing Port, Banyuwangi (Harlyan *et al*., 2015); 35. Species composition, length distribution and sex ratio of sharks landed in East Java, Bali, NTB, NTT (Nurcahyo *et al*., 2015); 36. Size distribution and sex ratio of silky shark (*Carcharinus falciformis*) in the Southern Nusa Tenggara Barat Waters (Chodrijah & Faizah, 2015); 37. Population parameters as catch indicator status scalloped hammerhead shark (*Sphyrna lewini*) in Java and Borneo Waters (Muslih *et al.,* 2015); 38. Shark species monitoring in Lampung, Banten, Jakarta, West Java, and Central Java

No.	Item	Remarks
		(Parluhutan & Irnawati, 2015); 39. Bycatch shark recording in nusantara fishing port Brondong (Fuad *et al.*, 2015); 40. Some biological aspects of mobulid rays in tuna fisheries in South of Java Indian Ocean (Novianto *et al.*, 2015); 41. Temporal distribution of reef manta (*Manta alfredi*) in the waters of Karang Makassar, Komodo National Park, East Nusa Tenggara (Ichsan *et al.*, 2015); 42. Shark emergence analysis through baited remote underwater video (BRUV) method (Hastuti, 2015); 43. Identification of whale shark (*Rhyncodon typus*) in Talisayan waters, Berau District, East Kalimantan Province (Yusma *et al.*, 2015); 44. The occurrences of whale shark (*Rhyncodon typus*) in coastal Probolinggo, East Java (Noviyanti *et al.*, 2015); 45. Shark and ray supply chains in NTB (West of Nusa Tenggara) and NTT (East of Nusa Tenggara) (Prabuning *et al.*, 2015); 46. Shark consumption level in Jakarta, Surabaya and Makasar (Ariyogagautama *et al.*, 2015); 47. Tracking the shark trade in Banggai Islands Central Sulawesi (Zamrud *et al.*, 2015); 48. The challenges of blue economy implementation in East Lombok: review of the use and protection of sharks and rays (Suryawati & Triyanti *et al.*, 2015); 49. Law strengthening on the protection of shark and ray for sustainable fisheries in Indonesia (Aldilah & Sunyowati, 2015); 50. Level of chance spotted of shark and manta in Labuan Bajo and Gili Matra for management support information (Prabuning *et al.*, 2015); 51. Fish management model for hammerheads (*Sphyrna* spp) in Nusantara Lamongan Fishing Ports, East Java (Rudianto & Asmufi, 2015); 52. Age, growth and maturnity of the pelagic thresher *Alopias pelagicus* and the scalloped

No.	Item	Remarks
		hammerhead *Sphyrna lewini* (Drew *et al*., 2015); 53. Atelomycterus erdmanni, a new species of catshark (Scyliorhinidae: Carcharhiniformes) from Indonesia (Fahmi, 2015) 54. Catch composition and some biological aspects of shark in Western Sumatera Waters of Indonesia (Dharmadi *et al.,* 2016); 55. Population parameters of scalloped hammerhead shark (*Sphyrna lewini* Griffith & Smith, 1834) caught from southern Nusa Tenggara waters (Sentosa *et al.,* 2016); 56. Legal aspect of shark and ray conservation to ensure the sustainable ecosystem in Indonesia (Aditya & Al-Fatih, 2016); 57. Multiple cryptic species in the blue-spotted maskray (Myliobatoidei: Dasyatidae: Neotrygon spp.): An update (Borsa et al., 2016); 58. Catch and Relatif Abundance of sharks landed at at Tanjungluar, East Lombok (Sentosa and Dharmadi. 2017); 59. Population parameters of silky shark (*Carcharhinus falciformis*) in the South off West Nusa Tenggara waters (Chodrijah *et al*, 2017). 60. Socio-Economics Assessment of Shark & Rays Fisher in Tanjung Luar (Lestari et al, 2017) Furthermore, the Government of Indonesia (GoI) continue to conduct research activities in order to obtain information related to socio-economic condition related to sharks and rays fisheries in selected locations with high production and landing data and other relevant topics in order to provide more inputs in generating policies and to improve the quality of data produced. Thus, the Government of Indonesia believes that research programs are crucial and essential to be focused on interdisciplinary aspects for effective decision-making to manage and conserve sharks and rays. In 2017 national report we listed 38 published research activities and the number have progressed up to 59 research

No.	Item	Remarks
		activities. Recently on March 2018, we have also conducted national symposium on sharks and rays that collected research papers currently on progress to be published. Based on the research results, we obtained scientific information related to: **<u>Distribution</u>** Indonesian waters have a high diversity of sharks and rays, with at least 118 species belonging to 25 families found throughout the vast archipelago (Dharmadi *et al*., 2015). Most species of elasmobranchs commonly occur on the continental or insular shelves and rays are more commonly found sharks. In Indonesia, elasmobranchs are commonly caught in many areas such as the western part of Indonesia (the Indian Ocean-west Sumatera, the Java Sea, Karimata Strait, South China Sea, Malacca Strait and Macassar Strait), in the eastern Indonesia (the Indian Ocean-south of Java to Nusa Tenggara, West Pacific Ocean, Banda Sea and Timor Sea), and also in Sulawesi Sea, Flores Sea, Arafura Sea, Bali Sea, Molucca Sea and Seram Sea (Fahmi 2010). **<u>Stock assessment</u>** ***Sphyrna lewini*** The scalloped hammerhead sharks, *Sphyrna lewini* are commonly caught in Indonesian waters, both in western and eastern Indonesia. Most of sharks caught from western Indonesia (Sumatera, Java and Kalimantan) were still immatures. A study conducted in Sumatera from 2002 to 2004 showed that *Sphyrna lewini* caught mostly in size between 49 and 75 cm TL (Fahmi & Sumadhiharga, 2007), later studies in Lampung (Sumatera) and Java Sea also revealed the similar results, with the most dominant catch were immatures. Most *Sphyrna lewini* caught in Lampung were in size between 47 and 62 cm TL (Parluhutan & Imaniar, 2015) while those caught from the Java Sea were between 85 and 93 cm TL (Muslih *et al*., 2015). On the other hand, *Sphyrna lewini* caught from the

No.	Item	Remarks
		Indian Ocean (eastern Indonesia) were commonly caught in larger size between 108 and 308 cm in previous study (Fahmi & Sumadhiharga, 2007) and between 81 and 320 cm in later study with the average size between 177 and 211 cm TL (Sentosa *et al.*, 2016). The size at first of maturity on *S. lewini* in previous studies in western and eastern Indonesia were between 140 and 175 cm for males (White *et al.*, 2006; Fahmi & Sumadhiharga, 2007). Later studies on this species caught from the Java Sea (western Indonesia), showed that *S. lewini* attained the first maturity at the size of 142 cm (males) and 164 cm (females) (Muslih *et al.*, 2015). The age and growth study of *Sphyrna lewini* showed that the model of best fit for males and females was the three-parameter Gompertz ($L\infty$ = 2598 mm L_T, k= 0.15) and the two-parameter Gompertz ($L\infty$ = 2896 mm L_T, k= 0.16). Age at maturity was calculated to be 8.9 and 13.2 years for males and females, respectively. This species exhibit slow rates of growth and late age at maturity (Drew *et al.*, 2015). Scalloped hammerhead populations are segregated by sex and size, with Australian populations dominated by juveniles and small adult males, while Indonesian and Papua New Guinea populations included large adult females (Chin *et al.*, 2017). ***Carcharinus falciformis*** Silky shark (*Carcharhinus falciformis*) is one of the family Carcharhinidae that commonly caught in the Indian Ocean. In western Indonesia, 50% of the catch were recorded at size less than 150 cm in total length (TL), both males and females (Fahmi & Sumadhiharga, 2007). Whiles in eastern Indonesia, female silky sharks were commonly

No.	Item	Remarks
		caught at size between 120 and 230 cm, and males were 130 - 210 cm, with relatively equal in the proportion (Dharmadi *et al.*, 2007). Later study at the same area in eastern Indonesia showed that the average length of *C. falciformis* caught at size 183.06 cm TL with modes between 190 and 200 cm TL, and having unbalanced sex ratio with the number of females were greater than males. Most female sharks (81.5%) caught were in immature size (Chodrijah & Faizah, 2015). The age and growth studies on *Carcharinus falciformis* had been conducted at few areas in Indonesia. . The growth coefficient (k), and the asymptotic length (L∞) of this species collected from fish landing sites in eastern Indonesia were 0.066 $year^{-1}$ and 299 cm for the curve fitted to the combined data for females and males (Hall *et al.*, 2012).Whike those collected from Banyuwangi, has the von Bertalanffy's growth parameters: growth rate (K), asymptotic length (L∞), and age at L_0 (t_0) were 0.34 yr^{-1}, 370.05 cm and -0.24 yr for females; and 0.20 yr^{-1}, 319.0 cm and -0.44 yr for males. Total mortality rate (Z), natural mortality rate (M), and fishing mortality rate (F) were 1.18 yr^{-1}, 0.41 yr^{-1} and 0.77 yr^{-1} for females and 0.74 yr^{-1}, 0.33 yr^{-1}, and 0.41 yr^{-1} for males (Damora & Yuneni, 2015). The total length range for silky shark (Carcharhinus falciformis) were caught in the waters of the Indian Ocean landed in Tanjungluar between 65-300 cm TL (female) and 74-315 cmTL (male). An average length of 187, 66 cmTL (female) and 195 cm TL (male). Based on Von Bertalanffy growth parameters consists of length infinity (L∞), growth rate (K) and theoretical age of fish at zero length (t_0) with 331.28 cmTL, 0.42 / year and -0.20 years, respectively. Von Bertalanffy growth curve equation for silky shark was Lt = 331.28 $[1-e^{-0.42(t+0.20)}]$. Parameters for silky shark mortality including total mortality rate (Z), the natural mortality rate (M) and the fishing mortality rate (F) calculated to 2.79 / year, 0:49 / year and 2.30 / year, respectively. The exploitation rate (E) of silky shark of 0.82 indicates the exploitation of this species tends to be high (Chodrijah et al, 2018)

No.	Item	Remarks
		The length and age of 50% population (L_{T50} and A_{50}) of *C. falciformis* attained maturity were 2156 mm and 15 years for females and 2076 mm and 13 years for males (Hall *et al.*, 2012). Male attained its first maturity at about 183 cm TL (White *et al.*, 2006; Fahmi & Sumadhiharga, 2007). ***Alopias pelagicus*** The age and growth estimates for *Alopias pelagicus* were using the three-parameter logistic ($L\infty$ = 3169 mm L_T, k = 0.2) and the two-parameter von Bertalanffy models ($L\infty$ = 3281 mm L_T, k = 0.12). Age at maturity was calculated to be 10.4 and 13.2 years for males and females, respectively. This species exhibits slow rates of growth and late age at maturity (Drew *et al.*, 2015). ***Mobula japanica*** Japanese Devilray (*Mobula japanica*) is one of the Mobulid species that commonly caught from the South of Java. According to a study in Cilacap (South of Java), there were three size cohorts of *M. japanica* that commonly caught during this study with the body width modes of 120, 170 and 230 cm body width (BW), respectively, with the highest number was in the size class of 200 - 260 cm BW. At least, there The sex ratio of this species in this study was unballance between males and females. The catch per unit effort (CPUE) calculations were varied between 6,6 kg/day in October and 22,6 kg/day in July. In general, most of mobulas were caught under their maturity stages (Dharmadi *et al.*, 2011). **<u>Management and Conservation</u>** GoI issued many regulations and policies to implement management and conservation of

No.	Item	Remarks
		sharks and rays, such as: a. In 2009, 11 fisheries management zones were established through the gazetting of a regulation on regional fisheries, facilitating management by the Ministry of Marine Affairs and Fisheries. b. Minimising bycatch through fishing gear modification, i.e: Electronic shield system that have been implemented in Flores Timur; 2) Use of LED in fishing gears : have been tested in Muncar, East Java c. Improving bycatch handling for ETP species include it sharks as standar competency d. in observer on board Control on sharks and rays trade by implementing recommendation requirement e. Enacting some legal and policy instruments (National Plan of Action for Conservation and Management of Sharks and Rays 2016-2020), national regulations supporting conservation of elasmobranchs, specific regulations for management of shark bycatch in tuna fisheries). The complete list is in the table 2 of Dharmadi *et al.*, 2015. Dharmadi *et al.*, (2015) noted that there are two important prerequisites that require urgent attention in order to pave the way for truly effective elasmobranch management in indonesia: (i) improved fisheries data collection; and (ii) improved coordination between agencies and other stakeholders responsible for, or interested in, shark management and conservation. Furthermore, Dharmadi *et al.*, (2015) offer the following recommendations on options for improving sustainable management of shark fisheries in Indonesia, consisting of: a. Prohibition of finning b. Introduction of size limits c. Regulation of gear types d. Limiting catch volumes

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		e. Setting quotas f. Protecting critical habitat such as nursery grounds g. Protecting threatened sharks
2.	Examples of non-detriment findings; information and methods providing guidance for the making of national or regional non-detriment findings	Indonesia has undertaken broad national consultations regarding non-detriment findings. Two national workshops have been conducted to discuss the non-detriment findings for CITES Appendix II sharks and rays. Workshops were conducted on March 29-30, 2017 in Serang, Banten and April 20-21, 2017 in Jakarta. The Government of Indonesia has agreed on the proposed format of the NDF template to be used by Indonesia in developing national NDFs for CITES-listed species (e.g. sharks and rays). The formal guidelines for developing NDFs adopted by the Government of Indonesia is based on the: Mundy-Taylor, V., Crook. V., Foster, S., Fowler, S., Sant, G. and Rice, J. (2014). CITES Non-Detriment Findings Guidance for Shark Species (2nd, Revised Version). A Framework to assist Authorities in making Non-detriment Findings (NDFs) for species listed in CITES Appendix II. Report prepared for the Germany Federal Agency for Nature Conservation (Bundesamt für Naturschutz, BfN). Indonesia has completed finalizing the NDFs for hammerhead shark (*Sphyrna* spp.). Following development of NDFs for hammerhead shark, the Government of Indonesia through the Ministry of Marine Affairs and Fisheries and its partner will develop NDFs for oceanic whitetip shark (*Carcharhinus longimanus*), silky shark (*Carcharhinus falciformis*), mobula ray or devil ray (*Mobula* spp.) and thresher shark (*Alopias* spp.) through a series of broad national consultations. Furthermore, the Government of Indonesia continues to monitor the sustainability of trade of these species. Any assistance to strengthen the capacity and knowledge of the Government of Indonesia regarding the NDFs development is greatly appreciated to improve the conservation and management measures as well as

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		compliance mechanism on international trade of endangered species of wild fauna and flora. Indonesia (Indonesia Science Institute) also developing guidance on NDF for other species of sharks.
3.	Challenges faced by Parties in implementing the new listings	Several chalenges facing by Indonesia in implementing the new listing, remain the same in 2017, however several new progress has been made, such as: a. The Government of Indonesia is experiencing socio-economic pressure at local and national level related to the shark and ray trade considering that Indonesia has the highest shark landings as well as one of the major shark fin exporters (Dent & Clarke 2015). Therefore, any policies related to sharks and rays conservation and management need to consider the socio economic pressure. b. Insufficient data still become obstacle for the government in making policy related to sharks and rays conservation and management. Monitoring and data collection are necessary considering that Indonesia has 1/3 of shark population in the world which distributed in fast and remote area. c. Sharks and rays have various derivative products that require further identification with advance method such as DNA testing to determine the listed species which is quite costly and time consuming. d. National data production for sharks and rays are not recorded in specific species, but in larger group (Carcharhinidae, Sphyrnidae, Alopiidae, see in the fisheries statistic). Thus, limits the accuracy of species-based data for creating NDFs for new listing species. e. Information on critical habitat (nursery and mating areas) of sharks and rays are limited.
4.	Progress made to address such challenges	a. Indonesia have initiated to develop alternative livelihood for ex sharks & rays

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		fishermen wishing to migrate to other aconomic ativities. For example in Lombok West Nusa Tenggara, we have facilitated some fishermen to run ecotourism activities. With our partner Misool Foundation, we have successfully stop the manta hunting activities in Lamakera and been working with the ex-manta traditional hunter for alternative livelihood projects. In addition, we also run technical assistance and capacity building for fisherman in 68 Fish Processing Plants (UPI). b. GoI has been working closely with various partners such as universities, research agencies, and Non-Governmental Organizations to improve data collection and assessment related to population status, distribution, population trend, harvest, and other biological and ecological factors, trade information. Observer onboard as well as enumerators capacity development programs have been conducted to support data collection program. Recently, we have conducted national symposium on sharks and rays c. Collaboration between the Government of Indonesia and partners, such as Eijkman Institute, University of Udayana, and Bogor Agricultural University for DNA testing to strengthen domestic and international trade monitorings as well as product traceability. d. The SOP on National Standardized Data Collection is now available (final draft). The SOP highlights that sharks and rays data collection shall be conducted up to species level. e. Critical habitats have been identified in several locations, namely Lunyuk (Sumbawa-West Nusa Tenggara) and Aceh Jaya (Aceh). Both areas have been incorporated under local MPA management. Indonesia is currently implementing its National Plan of Action for Conservation and Management of Sharks and Rays 2016-2020. This plan is reviewed annually by applying precautionary approach with support from all stakeholders. Furthermore, Indonesia took

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		actions include the following: - Enacting Ministerial Decree No.18/2013 concerning fully protection of whale shark (*Rhincodon typus*) in Indonesian water territory. - Enacting Ministerial Decree No.4/2014 concerning fully protection of manta rays (*Manta birostris* and *Manta alfredi*) in Indonesian water territory; - Enacting Ministerial Regulation No.5/2018 concerning export prohibition of hammerhead shark (*Sphyrna* spp.) and oceanic whitetip shark (*Carcharhinus longimanus*). This Ministerial Regulation has been extended until December 31st, 2018.
5.	Status of the development, adoption or implementation of National Plans of Action for Sharks, and information on national or regional regulatory measures concerning the management or conservation of sharks and rays	Indonesia also finalized its sharks and rays National Plan of Action after undertaking broad national consultations with related stakeholders. The National Plan of Action for Conservation and Management of Sharks and Rays is being implemented from 2016 to 2020. Under the plan the government has committed to: - Improve the production and trade data collection and management. - Reduce by catch of shark from fishing activities. Guideline for shark handling has been produced and tested. - Develop and improve methods to avoid by catch of sharks and rays (particularly where retention, landing, and sale of these species is prohibited under Convention of Migratory Species or Regional Fisheries Management Organizations requirements) and reduce their mortality, including by exploring gear selectivity and improved techniques for catch release scheme. - Conduct research and stock assessment. - Establish National Working Group on Sharks and Rays Conservation and Management

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		Program strategies in National Plan of Action have been implemented, include the following: 1. Developing new regulations related to sharks and rays conservation and management; 2. Improving capacity of human resources in the Ministry of Marine Affairs and Fisheries for conservation and management of sharks and rays; 3. Strengthening law enforcement to combat illegal trade of sharks and rays. 4. Conducting research and stock assessment. 5. Developing alternative livelihoods 6. Public awareness program 7. Developing technique on bycacth mitigation. 8. Setting up catch quota for Hammerhead sharks 9. Improving data collection on shark and rays
6.	Information on trade in sharks and rays, and other available relevant data and information	Shark and ray product traded from Indonesia consist of live shark, whole shark, fins, meat, bone and oil liver. China, Hong Kong, Japan, Malaysia, Philippines, Singapore, Thailand were the main importing countries of shark and ray product from Indonesia. In particular, total export of shark product to these countries in 2014 was 594,113 kg. In contrast to the previous year, the total export in 2015 was 26,132 kg. Furthermore, the total export in 2016 was increased and reached 522,730 kg. In 2017 the exports have improve significantly to 8.316.935,39 kg. The figure not only implies that sharks and rays have remarkable economic contribution but also emphasises that there are progress in sharks and rays data recording, particularly on international trades. The Government of Indonesia, through Fish Quarantine Agency, will continue the commitment to monitor the domestic and international trade of sharks and rays in order to improve conservation and management of these species as well as law enforcement regarding this matter.

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7.	Legislation concerning the conservation and management of sharks and rays	The Government of Indonesia supports the legislation program for international trade of endangered species of wild fauna and flora. In implementing conservation and management of sharks and rays, Indonesia is currently enacting Laws and their implementing regulations include the following: 1. *Act No. 5/1990 concerning Conservation of Living Resources and Their Ecosystems* This Law is considering that the Indonesia's living resources and their ecosystems including sharks and rays and their ecosystems, which are bestowed by God Almighty and have an important role for human life, need to be managed and utilized sustainably, harmoniously and in line with, as well as in a balanced way for the welfare of present and future generations of human beings in general and Indonesians in particular. Furthermore, animals are classified into protected and unprotected. Protected animal species are classified into endangered species and rare species. Provisions of this Law concerning the conservation and management of sharks and rays are any persons are prohibited to catch, injure, kill, keep, poses, care for, transport, and trade in a protected animal in live condition including protected sharks and rays. Furthermore, any persons are prohibited to keep, posses, care for, transport and trade in a protected animal in dead condition including protected sharks and rays. In addition, any persons are prohibited to trade, keep or poses skin, bodies or other parts of a protected animal including protected sharks and rays or goods made of parts of the animal including sharks and rays, or transfer from one place in Indonesia to another, within or outside Indonesia. 2. *Act No.31/2004 jo Law No.45/2009 about Fisheries* This Law is considering that in the framework of implementation of national development based on the Archipelago Concept, cultivation of fish resources has to be implemented optimally based on justice and even distribution in the utilization thereof

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		by giving of priority to the expansion of work opportunities and improvement of standard of living of fishermen, fish breeders and/or parties related to fishery activities and conservation of fish resources and the environment thereof. Article 7 Paragraph (1) stated that in order to manage fish resources, Minister sets a minimum size or weight of fish that can be caught in marine conservation areas and also regulates protected fish species. Furthermore, this Law highlighted that conservation of fish resources, including sharks and rays, is efforts to protect, preserve and utilize fish resources, including the ecosystems, types and genetics to ensure the existence, availability and continuity by maintaining and increasing of quality of value and variety of fish resources. 3. *Government Regulation No 7/1999 Concerning Preservation of Wild Flora and Fauna* Government Regulation No. 7/1999 on Preservation of Wild Flora and Fauna is an implementing regulation of the Act No.5/1990 on Conservation of Living Resources and Their Ecosystems. This Government Regulation considering that flora and fauna are parts of invaluable natural resources, so that its conservation should be maintained through an effort of species preserving. Protected flora and fauna species is enclosed in this Government Regulation. Any change from protected flora and fauna species to be not protected and reversely shall be specified by virtue of the Decree of the Minister after obtaining consideration of Scientific Authority. 4. *Government Regulation No.8/1999 concerning Wild Animals and Plants Species Utilization* This government regulation is an implementing regulation of the Act No.5/1990 concerning Conservation of Living Resources and Their Ecosystems. The Government Regulation No.8/1999 provides penalties for smuggling/misdeclaration or trade that is

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		not in accordance with the provision of the regulation and may be liable to imprisonment and or fines of maximum IDR 250,000,000. 5. *Government Regulation No. 60/2007 about Fish Resources Conservation* Government Regulation No.60/2007 is an implementing regulation of the Act No.31/2004 on Fisheries as amended on the Act No.45/2009. The main objective of this Government Regulation is to prescribe general conservation and management measures for the protection of fish resources in Indonesian water territory. With regards to sharks and rays conservation and management, this Government Regulation arranged that conservation of fish type is an effort to protect, conserve, and use the fish resource, to guarantee the existence, availability, and continuation in fish type for the present and future generations. Further provision stated that conservation of fish species, including sharks and rays, shall aim in protecting endangered fish species, preserving fish biodiversity, maintaining ecosystem balance and utilizing fish resource sustainably. 6. *Ministerial Regulation of MMAF No.4/2010 concerning Procedures of Fish and Fish Genetic Utilization* This Ministerial Regulation is an implementing regulation of the Government Regulation No.60/2007 concerning Conservation of Fish Resource. Furthermore, this Ministerial Regulation provides provisions for the procedures of utilization of protected species and species listed on CITES Appendices (I, II and III) as well as quota determination, permit framework, distribution of fish, monitoring and surveillance and sanction.

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		7. *Ministerial Regulation of MMAF No.12/2012 about Fishing Effort in High Seas* As a member of Regional Fisheries Management Organizations (e.g. Indian Ocean Tuna Commission), Indonesia has committed to improve management measures for CITES-listed species by adopting IOTC Resolution No.12/09 which prohibit fishing vessels to retain on board, transship, land, store, sell or offer for sale any part or whole carcass of thresher sharks of all the species of the family Alopiidae. All violence's to these provisions will be penalized. 8. *Ministerial Regulation of MMAF No.30/2012 jo No.26/2013 jo No.57/2014 about Fishing Effort in Fisheries Management Zone in Indonesia* This Ministerial Regulation is similar to the Ministerial Regulation No.12/2012, however its provisions focused on the implementation in Indonesian water territory or Fisheries Management Zone. Currently, there are eleven Fisheries Management Zones in Indonesia. In addition to that, as a member of Regional Fisheries Management Organizations (e.g. Indian Ocean Tuna Commission), Indonesia has committed to improve management measures for CITES-listed species by adopting IOTC Resolution No.12/09 which prohibit fishing vessels to retain on board, transship, land, store, sell or offer for sale any part or whole carcass of thresher sharks of all the species of the family Alopiidae. All violence's to these provisions will be penalized. 9. *Ministerial Regulation of MMAF No.35/2013 jo No.49/2016 about the Procedure to Determine the Protection Status of Fish Species* In order to support the establishment of new regulation for all shark species, the Government of Indonesia has revised the Ministerial Regulation No.35/2013 regarding the Procedure for Determination of Status Protection of Fish. The Ministerial Regulation No.35/2013 has been amended by the Ministerial Regulation No.49/2016

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		signed on December 13th, 2016 by adding the type of protection status which is life cycle. Protection status arranged under this Ministerial Regulation is limited protection and full-protection. Limited protection related to time, region, size and life cycle. 10. *Ministerial Decree of Ministry of Forestry No.447/2003 concerning the Administration Directive of Harvest and Capture and Distribution of the Specimens of Wild Plants and Animals Species* This Ministerial Decree provides provisions for harvest and trade (export, import, re-export and introduction of the sea) of all wild animals and plants (protected and unprotected) as well as CITES-listed species. 11. *Ministerial Decree of MMAF No.18/2013 about Determination of Full Protection Status of Whale Shark (Rhincodon typus)* In order to protect and ensure the existence and the availability of whale sharks (*Rhincodon typus*) in Indonesian water territory, it is necessary to take full protection of whale sharks. Considering Laws and their implementing regulations as well as scientific recommendation from the Indonesian Institute of Sciences (Lembaga Ilmu Pengetahuan Indonesia/LIPI), Government of Indonesia has determined to fully protect the whale shark since 2013. Exemption of this provision is for research and development activities only. 12. *Ministerial Decree of MMAF No. 4/2014 about Determination of Full Protection Status of Manta rays (Manta birostris and Manta alfredi)* In order to protect and ensure the existence and the availability of manta ray which have decreased in population, it is necessary to take full protection of manta ray in Indonesian water territory. Considering Laws and their implementing regulations as

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		well as scientific recommendation from the Indonesian Institute of Sciences (Lembaga Ilmu Pengetahuan Indonesia/LIPI), Government of Indonesia has determined to fully protect the manta ray since 2014. Furthermore, the exemption of this provision is for research and development activities only. 13. *Ministerial Regulation of MAAF No.48/2014 about Fishing Log Book* Fishing log book has been regulated since 2010 through Ministerial Regulation No.18/2010. Considering the need for data and information in fish resource management, the Government of Indonesia amended the regulation with Ministerial Regulation No.48/2014 about Fishing Log Book. Fishing log book is a daily report of the fishing vessel about its operational activity or fishing activity which consist of essential information including data about fishing vessel, fishing gear, fishing operation, and capture data. 14. Ministerial Regulation Number 33/2017 concerning Public Service outlines that every sharks and rays trades must have recommendation from MMAF. 15. *Ministerial Regulation of MMAF No.5/2018 about Export Prohibition of Oceanic Whitetip Shark (Carcharhinus longimanus) and Hammerhead Shark (Spyhrna spp.) from Indonesia to Overseas* In order to maintain and ensure the existence and the availability of oceanic whitetip sharks (*Carcharhinus longimanus*) and hammerhead sharks (*Sphyrna* spp.) who have decreased in terms of populations, it is necessary to have an extension of the export prohibition of oceanic whitetip sharks (*Carcharhinus longimanus*) and hammerhead sharks (*Sphyrna* spp.) from the territory of the Republic of Indonesia to overseas. The export prohibition has been initiated since 2014. Furthermore, the export prohibition of

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		oceanic whitetip shark (*Carcharhinus longimanus*) and hammerhead shark (*Sphyrna* spp.) and processed products is valid up to December 31st, 2018

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Respuesta a la Notificación a las Partes 2018/041

Solicitud de nueva información sobre actividades de conservación y gestión de tiburones y rayas, incluyendo legislación

Autoridades CITES de México (CONABIO, DGVS-SEMARNAT, PROFEPA)

9 de mayo de 2018,

La información reportada abarca el periodo de mayo de 2017 a mayo del 2018.

a) información científica sobre los tiburones y rayas, como los resultados de las evaluaciones de población, los esfuerzos en materia de gestión y conservación y las actividades de investigación;

Taller sobre aplicación de la ley (Vancouver, 10-12 de julio 2017) en el marco del proyecto CEC Norteamérica: Este taller tendrá por propósito incrementar las capacidades de identificación de aletas de tiburón de las especies prioritarias de tiburón, así como la detección de comercio ilegal de aletas de tiburón, y la identificación de estrategias para abordar el comercio ilegal a través de la colaboración entre la región Norteamérica. La Región Norteamérica CITES presentará los resultados preliminares del taller a la 30ª reunión del Comité de Fauna, bajo el punto de agenda correspondiente a los informes regionales.

b) Ejemplos de dictámenes de extracción no perjudicial; c) Orientación o métodos para formular dictámenes de extracción no perjudicial a escala nacional o regional;

Compilación de datos específicos por especie sobre actividades de captura y pesca de tiburón, con énfasis en especies listadas en la CITES, en el marco del proyecto CEC Norteamérica: En abril de 2017, a través de la CEC, Norteamérica publicó una convocatoria que tiene por finalidad desarrollar: a) Un compendio de datos especie-específicos para tiburones, con miras a que apoye la formulación de NDFs; y b) Una estrategia de construcción de capacidades en materia de implementación de la CITES para tiburones Apéndice II. Actualmente, el Comité Directivo del proyecto está en proceso de revisar los candidatos para desarrollar la consultoría, misma que se espera presente resultados finales en el plazo de los siguientes tres meses.

Información de stock assessment para *Alopias vulpinus* en el Pacífico Noroeste: Con base en la publicación de Teo y colaboradores (2016), la Autoridad Científica de México se encuentra empleando la información de volúmenes estimada en dicha publicación como un elemento mas en la emisión de dictámenes de extracción no prejudicial para la especie. La publicación puede ser consultada en:

https://swfsc.noaa.gov/publications/TM/SWFSC/NOAA-TM-NMFS-SWFSC-557.pdf

d) Los desafíos a los que se enfrentan las Partes al aplicar las nuevas inclusiones de tiburones o rayas adoptadas en la CoP17, y los progresos realizados para abordar esos desafíos;

Emisión de NDF: Uno de los principales desafíos es la emisión de Dictámenes de extracción no Perjudicial para las nuevas especies de tiburones incluidas en la pasada Conferencia de las Partes (CoP17, Sudáfrica, 2016). No obstante, actualmente se están desarrollando proyectos de colaboración regional que buscan fortalecer este punto, así como sinergias interinstitucionales y con el sector privado (ver punto b y c de esta respuesta).

Capacidades de identificación en puertos aeropuertos y fronteras: Los principales desafíos se relacionan con : a) infraestructura necesaria para la revisión de embarques de exportación (generalmente los exportadores mezclan especies reguladas por la CITES con especies no reguladas), b) el uso de tecnología de vanguardia en caso de que la identificación no pueda realizarse por métodos morfométricos y se requiera el uso de análisis molecular o genético (existe un desfasamiento entre el tiempo de respuesta de los centros académicos con los tiempos operativos/legales contemplados en los procesos de despacho aduanero), c) de coordinación interinstitucional (existe competencia compartida de diversas autoridades dependiendo de la legislación nacional e internacional) y d) capacidades, así como personal suficiente para agilizar el proceso de revisión física de los embarques (generalmente el personal oficial tiene conocimientos generales sobre el tipo de mercancías que revisa pero en muy pocos casos es especialista en tiburones y rayas).

Con la finalidad de resolver estos desafíos, el gobierno mexicano se ha enfocado principalmente en la preparación de una plantilla de personal oficial que pueda identificar las diversas presentaciones de las mercancías y los ejemplares, partes o derivados de especies de tiburones y rayas regulados en su comercio internacional por la CITES o incluidos en alguna categoría de riesgo en la legislación nacional; esto se ha hecho a través de un programa de capacitación, la elaboración de materiales de referencia y la certificación de habilidades laborales en los procesos de verificación de movimientos transfronterizos de mercancías con restricciones de tipo ambiental.

Por otro lado, en conjunto con los especialistas del sector académico se han establecidos mecanismos de cooperación para la toma, identificación y determinación de muestras que permitan realizar análisis moleculares y/o genéticos con fines legales, en los casos que se amerite.

Finalmente, se han hecho esfuerzos para que las diferentes autoridades que intervienen en la revisión de embarques de exportación, desarrollen procedimientos mas eficaces y eficientes con base en las atribuciones particulares a cada una de ellas.

e) el estado de desarrollo, adopción o aplicación de los planes de acción nacionales para los tiburones, e información sobre las medidas reglamentarias nacionales o regionales relativas a la gestión o conservación de los tiburones y rayas;

Proyecto de cooperación Regional (CCA): En 2017, la Región América del Norte finalizó un proyecto de dos años (2015-2016) financiado por la Comisión para la Cooperación Ambiental (CEC), titulado

"Fortalecimiento de la conservación y producción sostenible de especies selectas del Apéndice II en Norteamérica". El objetivo del proyecto fue identificar especies Apéndice II altamente comercializadas, y desarrollar recomendaciones para promover su uso y comercio legal, sostenible y trazable. Las generalidades y resultados de dicho proyecto fueron presentadas por México en el marco de las sesiones conjuntas de los Comités de Fauna y Flora de la CITES (AC29/PC23).

Entre los cinco grupos prioritarios identificados en el marco de dicho proyecto están los tiburones, particularmente ocho especies norteamericanas: *Carcharhinus longimanus, Carcharodon carcharias, Cetorhinus maximus, Lamna nasus, Rhicodon typus, Sphyrna lewini, S. mokarran* y *S. zygaena*. Las recomendaciones derivadas del Proyecto abarcan un total de 17 acciones. El Plan de Acción resultante puede consultarse en la siguientes ligas

Español: http://www3.cec.org/islandora/en/item/11714-sustainable-trade-in-sharks-action-plan-north-america-es.pdf

Inglés: http://www3.cec.org/islandora/en/item/11714-sustainable-trade-in-sharks-action-plan-north-america-en.pdf

En junio de 2017, la CEC aprobó un Proyecto de seguimiento "Apoyo al comercio sostenible de especies CITES" que, *inter alia*, se enfocará en la implementación de acciones actividades de mayor prioridad en materia de tiburones.

f) Información sobre el comercio de tiburones y rayas, incluyendo cualquier problema relacionado con la notificación de comercio de especies incluidas en los Apéndices de la CITES en los informes anuales;

En el periodo comprendido entre enero del 2017 y mayo del 2018, se han exportado un total de 3.2 ton de aleta seca de *A. vulpinus*, 6.1 ton de *C. falciformis*, 4.5 ton de *S. lewini* y 12.3 ton de *S. zygaena*.

Es importante aclarar que la diferencia de cifras de exportaciones de aletas de tiburón entre los datos que presenta el Centro de Monitoreo de la Conservación del Ambiente (WCMC) y los que son reportados por la Autoridad Administrativa CITES de México y la Autoridad Mexicana de Aplicación de la Ley se debe a que no todo lo que se autoriza a través de los permisos CITES se exporta (algunos permisos no se usan en su totalidad o se cancelan por parte de los titulares después de haber sido autorizados).

Cabe señalar que los permisos CITES de exportación no son válidos si estos al momento de su presentación con las autoridades aduanales no cuentan con la verificación física por parte del personal de inspección de la PROFEPA, esto en cumplimiento a la notificación a las partes 988 de fecha 13 de octubre de 1997 denominada "México- Control de documentos CITES", donde se establece que si los permisos CITES de exportación de México no cuentan con la validación correspondiente, no se deben aceptar por parte de las autoridades aduaneras del país de destino y de conformidad con lo establecido en la Resolución Conf. 12.3

(Rev. CoP17) "Permisos y Certificados" Fracción XIV "En lo que respecta a la aceptación y autorización de documentos y medidas de seguridad". Inciso f), que se transcribe a continuación:

..f) los permisos de exportación y certificados de reexportación sean ratificados, con indicación de la cantidad, firma y sello, por un oficial inspector, por ejemplo, de Aduanas, en la casilla de ratificación de la exportación del documento. Si el documento de exportación no ha sido ratificado en la fecha de exportación, la Autoridad Administrativa del país importador debería ponerse en contacto con la Autoridad Administrativa del país exportador, teniendo en cuenta cualesquiera documentos o circunstancias atenuantes, para determinar la aceptabilidad del documento;

g) la legislación sobre la conservación y gestión de tiburones y rayas.

Actualización de la NOM-PESC-029: La norma se encuentra en vigor a partir del 15 de mayo de 2007. Su objetivo de inducir el aprovechamiento sostenible de los tiburones y rayas, así como contribuir a la conservación y protección de elasmobranquios y de otras especies que son capturadas incidentalmente, en particular tortugas, mamíferos marinos y especies de pico. A partir de su publicación, la CONAPESCA ha implementado operativos, en concordancia con la SEMAR para llevar a cabo las labores de inspección y vigilancia de los barcos tiburoneros, manteniendo especial atención en la protección y vigilancia de las zonas o áreas protegidas. Actualmente, se encuentra en proceso de revisión de información técnica adicional, el documento correspondiente a las Respuestas a comentarios recibidos al Proyecto de Modificación a la "Norma Oficial Mexicana NOM-029-PESC-2006, Pesca responsable de tiburones y rayas. Especificaciones para su aprovechamiento", mismo que fue publicado a consulta pública el 11 de febrero de 2015.

Response to CITES Notification No. 2018/041 re sharks and rays

a) Scientific information concerning sharks and rays, such as the results of stock assessments, management and conservation efforts, and research activities;

The Ministry for Primary Industries produced a brief summary of information about commercially exploited fish, including sharks and rays, in New Zealand waters. This *Stock status table for fish stocks*, is available at http://www.mpi.govt.nz/dmsdocument/17653-stock-status-table-for-fish-stocks. This gives the most recent year of each stock assessment, the status relative to 4 performance measures and corrective management actions for all stocks that are of unfavourable status relative to the performance measures. The shark and ray species are listed alphabetically by common names (but no species names unfortunately); viz elephant fish, ghost shark (dark), ghost shark (pale), hammerhead sharks, mako shark, porbeagle shark, rig, school shark, school shark, skate – rough, skate – smooth, and spiny dogfish, although unfortunately the stock status of many of them is "unknown".

For more detailed information, the Ministry for Primary Industries produce summaries each May for domestic non-migratory fish species, and a November summary for high-migratory fish species, including the CITES-listed smooth hammerhead (*Sphyrna zygaena*) and porbeagle (*Lamna nasus*). The links to the 2017 summaries are:

- Fisheries assessment plenary May 2017 - Volume 1: Introductory section to groper [PDF, 26 MB]
- Fisheries assessment plenary May 2017 - Volume 2: Hake to pilchard [PDF, 21 MB]
- Fisheries assessment plenary May 2017 - Volume 3: Pipi to yellow-eyed mullet [PDF, 29 MB]
- Fisheries assessment plenary November 2017 - Stock Assessments and Stock Status [PDF, 7.6 MB]

New Zealand would also like to draw attention to several recent publications on NZ shark fisheries or written by New Zealand scientists:

- Fields, A.T.; Fischer, G.A.; Shea, S.K.H.; Zhang, H.; Abercrombie, D.L.; Feldheim, K.A.; Babcock, E.A. Chapman, D.D. 2017. Species composition of the international shark fin trade assessed through a retail-market survey in Hong Kong. Conservation Biology 32: 376-389. (http://scholar.google.co.nz/scholar_url?url=https%3A%2F%2Fonlinelibrary.wiley.com%2Fdoi%2Fabs%2F10.1111%2Fcobi.13043&hl=en&sa=T&ct=res&cd=3&ei=N9T4WuLMLdGiywS_sargDw&scisig=AAGBfm35IzdzcrKrLDByCqR7ieqPUPxAMQ&nossl=1&ws=1600x770)

- Ford, R.B.; Galland, A. Clark, M.R.; Crozier, P.; Duffy, C.A.J.; Dunn, M; Francis, M.P.; Wells, R. 2015. *Qualitative (Level 1) Risk Assessment of the impact of commercial fishing on New Zealand Chondrichthyans*. NZ Aquatic Environment and Biodiversity Report No. 157, Ministry for Primary Industries, Wellington. (https://www.mpi.govt.nz/dmsdocument/9803-aebr-157-qualitative-level-1-risk-assessment-of-the-impact-of-commercial-fishing-on-new-zealand-chondrichthyans)

- Fu, D.; Roux, M.-J.; Clarke, S.; Francis, M.; Dunn, A.; Hoyle, S. 2018.; Edwards, C. 2018: Pacific-wide sustainability risk assessment of bigeye thresher shark (*Alopias superciliosus*) (Revised). *NIWA Client Report 2017418WN*. 102 p. *WCPFC Scientific Committee 13th regular session WCPFC-SC13-2017/SA-WP-11 Rev 3.*

- Hoyle, S. D.; Edwards, C. T. T.; Roux, M.-J.; Clarke, S. C.; Francis, M. P. 2017: Southern Hemisphere porbeagle shark stock status assessment. *NIWA Client Report 2017380WN*. 72 p. *WCPFC Scientific Committee 13th regular session WCPFC-SC13-2017/SA-WP-12 (rev. 2)*. (https://www.wcpfc.int/doc/sc13-sa-wp-12/southern-hemisphere-porbeagle-shark-assessment-placeholder)

b) Examples of non-detriment findings;

The CITES Scientific Authority of New Zealand has completed four NDFs covering: porbeagle shark, hammerhead sharks, silky shark and spine-tailed devil ray. These NDFs are included as attachments.

c) Guidance or methods for making national or regional non-detriment findings;

No new information

d) Challenges faced by Parties in implementing the listings of sharks and rays adopted at CoP17, and progress made to address such challenges;

New Zealand faced no particular challenges in completing NDFs for silky shark or spine-tailed devil ray because they subject to a retention ban imposed by the Western and Central Pacific Fisheries Commission (silky sharks) or are fully protected under the New Zealand Wildlife Act (spine-tailed devil ray). For both species, the NDF was negative except for the collection of scientific specimens of silky shark for research approved by WCPFC. New Zealand is still gathering information for its NDF for thresher sharks.

e) Status of the development, adoption or implementation of National Plans of Action for Sharks, and information on national or regional regulatory measures concerning the management or conservation of sharks and rays;

New Zealand produced its original NPOA-Sharks in 2008, and this was updated it in 2013; see: https://fs.fish.govt.nz/Page.aspx?pk=165. A second review is underway at present.

f) Information on trade in sharks and rays, including any issues regarding the reporting of trade in CITES-listed species in annual reports

Surprisingly, there have been no applications for permits to export any CITES-listed shark species from New Zealand since their various listings on Appendix II. Porbeagle shark is covered by the NZ quota management system, with catch limits (129 tonnes per year) and robust reporting and monitoring systems, but although processors reported 84 tonnes of landings in 2014-15 and 46 tonnes in 2015-16, none of this has apparently been exported.

g) Legislation concerning the conservation and management of sharks and rays.

The Trade in Endangered Species Order 2017 of 20 February 2017 added silky shark *Carcharhinus falciformes*, thresher sharks *Alopias* spp. and devil rays *Mobula* spp to Schedule 2 of the Trade in Endangered Species Act 1989.

INFORME
NOTIFICACIÓN A LAS PARTES N° 2018/041
SOLICITUD DE NUEVA INFORMACIÓN SOBRE ACTIVIDADES
DE CONSERVACIÓN Y GESTIÓN DE TIBURONES Y RAYAS

PARTE PERÚ

ELABORADO POR:
MINISTERIO DE LA PRODUCCIÓN (Autoridad Administrativa CITES para especies hidrobiológicas)
MINISTERIO DEL AMBIENTE (Autoridad Científica CITES)

De acuerdo a lo solicitado en la Notificación a las Partes N° 2018/041 de fecha 24 de abril de 2018, cumplimos con informar lo siguiente:

1. **Información científica sobre los tiburones y rayas, como los resultados de las evaluaciones de población, los esfuerzos en materia de gestión y conservación y las actividades de investigación:**

   - El Ministerio del Ambiente elaboró el "Diagnóstico Situacional del género *Alopias* spp. y Tiburón Sedoso (*Carcharhinus falciformis*) en el Perú" con el objeto de conocer la historia natural, distribución, aprovechamiento, estado de conservación y comercialización de estas especies.

   - Asimismo, elaboró el "Diagnóstico y Análisis de la Información Pesquera y Comercial de Rayas Dulceacuícolas en Loreto", con el objeto de contribuir al conocimiento de las rayas de agua dulce de la familia Potamotrygonidae en el departamento Loreto, fortalecer medidas de gestión y brindar soporte a las herramientas de manejo que aseguren su conservación y aprovechamiento sostenible.

   - El Instituto del Mar del Perú, organismo adscrito al Ministerio de la Producción, ha elaborado el informe denominado "La Pesquería del Tiburón Martillo *Sphyrna zygaena* y Proyecciones de Pesca 2018" a partir del cual el Ministerio de la Producción emitió la Resolución Ministerial N° 188-2018-PRODUCE que establece los límites de captura del recurso tiburón martillo aplicable a las actividades extractivas efectuadas por la flota artesanal correspondiente al periodo 2018.

   - El Instituto Tecnológico de la Producción, organismo adscrito al Ministerio de la Producción, a través de su Centro de Innovación Productiva y Transferencia Tecnológica del Callao (CITE – Callao), ha realizado dos estudios: i) "Determinación de metales pesados y bases volátiles nitrogenadas en el músculo de tiburón azul *Prionace glauca* procedente del triángulo externo de la zona sur del mar peruano" y ii) "Determinación de rendimiento y su relación con el peso y sexo del tiburón azul *Prionace glauca* procedente del triángulo externo de la zona sur del mar peruano".

2. **Ejemplos de dictámenes de extracción no perjudicial**

   El Ministerio del Ambiente ha elaborado determinados Dictámenes de Extracción No Perjudicial los cuales se detallan a continuación:

   - Dictamen de Extracción No Perjudicial del "tiburón martillo" *Sphyrna zygaena*, con el apoyo del Instituto del Mar del Perú-IMARPE, para el año 2017. El Ministerio del Ambiente consideró para la elaboración de este dictamen un levantamiento de información de la pesca de tiburones en la zona norte del país.

   - Dictamen de Extracción No Perjudicial del "tiburón zorro común" *Alopias vulpinus* para el año 2018.

   - Dictamen de Extracción No Perjudicial del "tiburón zorro pelágico" *Alopias pelagicus,* para el año 2018.

- Dictamen de Extracción No Perjudicial del "tiburón zorro ojón" *Alopias superciliosus,* para el año 2018.

3. Orientación o métodos para formular dictámenes de extracción no perjudicial a escala nacional o regional

La Autoridad Científica CITES ha elaborado los dictámenes de extracción no perjudicial empleando como orientación la "Guía sobre los Dictámenes de Extracción No Perjudicial de la CITES para especies de tiburones[1].

4. Los desafíos a los que se enfrentan las Partes al aplicar las nuevas inclusiones de tiburones o rayas adoptadas en la COP 17, y los progresos realizados para abordar esos desafíos

DESAFÍOS	PROGRESOS
1. Capacidad limitada para la identificación de los especímenes rayas continentales y parte de los especímenes de tiburones.	• El Ministerio de la Producción, a través del Decreto Supremo N° 010-2017-PRODUCE, estableció el desarrollo e implementación de un programa de capacitaciones técnicas para la identificación de tiburones, dirigido a los inspectores de la Dirección General de Supervisión, Fiscalización y Sanción, y de las Direcciones o Gerencias Regionales de la Producción de los Gobiernos Regionales. • El Ministerio del Ambiente ha programado la elaboración de guías que permitan la identificación de las diferentes especies de tiburones y móbulas con el fin de fortalecer las acciones de supervisión y fiscalización en toda la cadena de comercialización de las especies en mención.
2. Escasa información biológica-pesquera de determinadas especies de tiburones y rayas continentales comercializadas.	• El Ministerio de la Producción y el Ministerio del Ambiente han programado el desarrollo de investigaciones biológico-pesqueras sobre determinadas especies de rayas amazónicas. • El Ministerio del Ambiente ha programado desarrollar Diagnósticos de la situación actual de los aspectos biológicos, pesqueros y poblacionales de las especies de tiburones, móbulas en el Perú.
3. Limitadas medidas de ordenamiento pesquero para las principales especies de tiburones y rayas continentales comercializadas.	• El Ministerio de la Producción a fin de poder establecer medidas de ordenamiento pesquero adicionales para las especies CITES ha previsto la realización de las investigaciones indicadas precedentemente.

5. Estado de desarrollo, adopción o aplicación de los planes de acción nacionales para los tiburones, e información sobre las medidas reglamentarias nacionales o regionales relativas a la gestión o conservación de los tiburones y rayas

El "Plan de Acción Nacional para la Conservación y Ordenamiento de Tiburones, Rayas y Especies Afines en el Perú (PAN Tiburón – Perú)", aprobado con Decreto Supremo N° 002-2014-PRODUCE, estableció cuatro líneas de acción estratégica, con diez actividades y diecinueve acciones específicas que vienen siendo desarrolladas del 2014 al 2019.

[1] "Guía sobre los Dictámenes de Extracción No Perjudicial de la CITES para especies de tiburones" elaborado por Victoria Mundy-Taylor, Vicki Crook, Sarah Foster, Sara Fowler, Glenn Santa y Jake Rice.2014.

LINEAS DE ACCIÓN ESTRATÉGICA DEL PAN TIBURÓN	ESTADO
Línea de acción estratégica 1: SISTEMA DE RECOLECCIÓN DE INFORMACIÓN Y BASE DE DATOS **Objetivo Específico**: Desarrollar un sistema de información, seguimiento, monitoreo y evaluación de los tiburones, rayas y especies afines.	1. El Ministerio de la Producción, a través de la Oficina General de Evaluación de Impacto y Estudios Económicos, viene realizando el cumplimiento a través de sus diferentes sistemas de recolección de datos (Sistema de Pesca y Sistema de Mercados Mayoristas Pesqueros) que registran información sobre desembarques y comercialización de condrictios. 2. El Instituto del Mar del Perú, organismo adscrito al Ministerio de la Producción, recolecta información de desembarques de las especies de tiburones, rayas y quimeras capturadas por la flota pesquera artesanal a través de observadores de campo (Unidad de pesca artesanal y a través de zonas pilotos: Zorritos, Pucusana e Ilo).
Línea de acción estratégica 2: INVESTIGACIÓN CIENTÍFICA Y TECNOLÓGICA APLICADA A LA CONSERVACIÓN **Objetivo Específico** Desarrollar un programa de investigación de las especies explotadas comercialmente a fin de diseñar un plan de ordenamiento pesquero a nivel de especie. **Objetivo Específico** Desarrollar un programa de investigación de las especies explotadas comercialmente a fin de diseñar un plan de ordenamiento pesquero.	1. El Instituto del Mar del Perú, organismo adscrito al Ministerio de la Producción, ha publicado dos documentos con la finalidad de promover la correcta determinación de las especies, "Guía para la determinación de tiburones de importancia comercial en el Perú" y "Guía de campo para la determinación de tiburones en la pesca artesanal del Perú". 2. El Organismo Nacional de Sanidad Pesquera, organismo adscrito al Ministerio de la Producción, ha desarrollado un Manual de buenas prácticas en la cadena de suministro de pescados – APEC, también ha elaborado un proyecto de desarrollo de "Lineamientos para el enfriamiento de la pesca y buenas prácticas de estiba y preservación para el cumplimiento de la inocuidad y trazabilidad", el cual involucra al recurso tiburones, rayas y especies afines. Y ha desarrollado Lineamientos para la trazabilidad de los recursos y productos pesqueros y acuícola. 3. El Centro de Innovación Productiva y Transferencia Tecnológica del Callao (CITE – Callao) del Instituto Tecnológico de la Producción, organismo adscrito al Ministerio de la Producción, ha realizado dos estudios: i) "Determinación de metales pesados y bases volátiles nitrogenadas en el músculo de tiburón azul *Prionace glauca* procedente del triángulo externo de la zona sur del mar peruano" y ii) "Determinación de rendimiento y su relación con el peso y sexo del tiburón azul *Prionace glauca* procedente del triángulo externo de la zona sur del mar peruano".

LINEAS DE ACCIÓN ESTRATÉGICA DEL PAN TIBURÓN	ESTADO
Línea de acción estratégica 3: MARCO NORMATIVO Y DE CONTROL **Objetivo Específico**: Fortalecer el marco normativo y de control de las actividades pesqueras, concordantes con los compromisos internacionales.	El Ministerio de la Producción, a través del Decreto Supremo N° 021-2016-PRODUCE (Modificado por Decreto Supremo N° 010-2017-PRODUCE), ha establecido medidas de ordenamiento para la pesquería del recurso tiburón. Asimismo, se detallan a continuación medidas de ordenamiento para determinadas especies de tiburones y rayas. <u>*Sphyrna zygaena:*</u> 1. El Ministerio de la Producción ha establecido periodo de veda y cuota de captura anual para la especie tiburón martillo *Sphyrna zygaena* para los años 2016, 2017 y 2018. <u>*Manta birostris:*</u> 2. La Resolución Ministerial N° 441-2015-PRODUCE prohíbe su extracción, desembarque, transporte, retención, transformación y/o comercialización. 3. La Resolución Ministerial N° 329-2017-PRODUCE prohíbe su captura, retención a bordo, desembarque, almacenamiento o descarga por embarcaciones que operan en el marco de la CIAT; liberación en caso de captura incidental (art. 10) <u>*Mobula sp:*</u> (En aguas nacionales tenemos a: *M. japanica, M. thurstoni, M. munkiana* y *M. tarapacana*) 4. La Resolución Ministerial N° 329-2017-PRODUCE prohíbe su captura, retención a bordo, desembarque, almacenamiento o descarga por embarcaciones que operan en el marco de la CIAT; liberación en caso de captura incidental (art. 10). <u>*Rhincodon typus:*</u> 5. La Resolución Ministerial N° 329-2017-PRODUCE prohíbe calar redes de cerco sobre atunes asociados tiburones ballenas; liberación en caso de captura incidental; reporte del suceso (art.8). 6. La Resolución Ministerial N° 331-2017-PRODUCE prohíbe su extracción, desembarque, transporte, retención, transformación y/o comercialización. <u>*Carcharhinus falciformis:*</u> 7. La Resolución Ministerial N° 329-2017-PRODUCE prohíbe su captura, retener a bordo, descarga o almacenamiento por embarcaciones que operan en el marco de la CIAT (art. 9).

LINEAS DE ACCIÓN ESTRATÉGICA DEL PAN TIBURÓN	ESTADO
	Carcharhinus longimanus: 8. La Resolución Ministerial N° 329-2017-PRODUCE prohíbe su captura, retener a bordo, descarga o almacenamiento por embarcaciones que operan en el marco de la CIAT; liberación (art. 11).
Línea de acción estratégica 4: PROMOCIÓN, CAPACITACIÓN, DIFUSIÓN Y SENSIBILIZACIÓN **Objetivo Específico**: Desarrollar programas de promoción, capacitación, difusión y sensibilización a entidades públicas y/o comunidades pesqueras y público en general para la conservación y aprovechamiento sostenible de los tiburones, rayas y especies afines.	1. El Ministerio de la Producción ha efectuado una serie de reuniones de sensibilización con comercializadores de rayas amazónicas durante todo el año 2017 (4 reuniones), en la ciudad de Iquitos, a fin difundir e informar respecto al marco normativo del comercio internacional de dichas especies CITES, que se detallan en el ítem 7 del presente informe. 2. Asimismo, el Ministerio de la Producción mantiene contacto directo con los niveles de gobierno regional los cuales otorgan permisos de pesca para la extracción de recursos hidrobiológicos, a fin de poder gestionar de manera integral la conservación y el aprovechamiento sostenible de las rayas amazónicas. 3. El Ministerio del Ambiente y el Ministerio de la Producción con el apoyo de Humane Society International y Defenders of Wildlife, llevaron a cabo tres talleres regionales (Paita, Ilo y Pucusana) de fortalecimiento de capacidades en la identificación de aletas de tiburón, realizadas el 26 y 27 de junio, 3 y 4 de julio y 6 y 7 de julio de 2017 respectivamente. Con el objetivo de fortalecer las capacidades en la implementación de CITES para el comercio de aletas de tiburones, cuyo público fueron las entidades responsables de la fiscalización y supervisión del comercio de las especies hidrobiológicas. 4. El Instituto del Mar del Perú, organismo adscrito al Ministerio de la Producción, desarrolló el taller "Capacitación técnica para la identificación de tiburones sin presencia de la cabeza de las especies de importancia comercial en el Perú", el 17 de octubre del 2017, tuvo como objetivo general "Fortalecer las capacidades del personal de la Dirección General de Supervisión, Fiscalización y Sanción del Viceministerio de Pesquería y Acuicultura, en el marco de la implementación del D.S. N° 010-2017-PRODUCE". 5. El Ministerio del Ambiente con el apoyo de Sea Shepherd Legal, Oceana y Ecoceánica, desarrolló el "Taller de Fortalecimiento de Capacidades

LINEAS DE ACCIÓN ESTRATÉGICA DEL PAN TIBURÓN	ESTADO
	para la Identificación de Aletas de Tiburones", realizada el 19 y 20 de abril de 2018, con la finalidad de apoyar y potencializar la aplicación de los requisitos de exportación tanto nacionales como internacionales. Participando las entidades de observancia responsables de la fiscalización, supervisión y control del comercio de las especies hidrobiológicas marinas, a través del uso de herramientas morfológicas en la identificación de aletas de tiburones. 6. El Instituto del Mar del Perú, organismo adscrito al Ministerio de la Producción, elaboró el "Manual de identificación de tiburones sin presencia de la cabeza de las especies de importancia comercial en el Perú".

6. Información sobre el comercio de tiburones y rayas, incluyendo cualquier problema relevante relacionado con la notificación de comercio de especies incluidas en los Apéndices de la CITES en los informes anuales

El Ministerio de la Producción ha emitido 4, 38 y 72 Permisos/Certificados CITES para la exportación, importación y reexportación de especies hidrobiológicas CITES (tiburones y rayas amazónicas), durante los años 2016, 2017 y 2018 (hasta el 09/05/18), respectivamente.

7. La legislación sobre la conservación y gestión de tiburones y rayas

- Decreto Supremo N° 002-2014-PRODUCE aprobó el Plan de Acción Nacional para la Conservación y Ordenamiento de Tiburones, Rayas y Especies Afines en el Perú (PAN Tiburón – Perú).

- Decreto Supremo N° 021-2016-PRODUCE, modificado por el Decreto Supremo N° 010-2017-PRODUCE, establece medidas de ordenamiento para la pesquería del recurso tiburón.

- Resolución Directoral N° 073-2016-PRODUCE/DGSF, actualizada con las Resoluciones Directorales N° 012-2017-PRODUCE/DGSF y N° 019-2018-PRODUCE/DGSFS-PA, aprobó el listado de puntos de desembarque de las embarcaciones pesqueras destinadas a la extracción del recurso hidrobiológico tiburón destinado para el consumo humano directo.

- Resolución Ministerial N° 331-2017-PRODUCE, prohíbe la extracción de la especie tiburón ballena, en aguas marinas de la jurisdicción Peruana, así como su desembarque, transporte, retención, transformación y comercialización.

- Resolución Ministerial N° 082-2017-PRODUCE y Resolución Ministerial N° 208-2017-PRODUCE, autorizan la ejecución de una pesca exploratoria del recurso tiburón a efectos de que el Instituto del Mar del Perú elabore un manual de identificación de especies de tiburones que facilite su identificación cuando estas no cuenten con la cabeza adherida al cuerpo.

- Resoluciones Ministeriales N° 008-2016-PRODUCE, N° 129-2017-PRODUCE y N° 188-2018-PRODUCE, establecieron límites de captura del recurso tiburón martillo (*Sphyrna zygaena*) aplicable a las actividades extractivas efectuadas por la flota artesanal, correspondientes a los años 2016, 2017 y 2018.

Republic of the Philippines
Department of Environment and Natural Resources
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MAY 0 2 2018

Mr. Nelson P. Devanadera
Executive Director III
Palawan Council for Sustainable Development
PCSD Building, Sports Complex Road
Sta Monica Heights, Puerto Princesa City, Palawan
Fax No. (048) 434-4234

Subject: **NOTE FOR ATTENTION OF THE CITES MANAGEMENT AUTHORITIES RE: REQUEST OF NEW INFORMATION ON SHARK AND RAY CONSERVATION AND MANAGEMENT ACTIVITIES, INCLUDING LEGISLATION**

Dear **Director Devanadera,**

Greetings!

This pertains to the letter from CITES Secretariat, International Environment House, Geneva, Switzerland dated 24 April 2018 requesting new information on shark and ray conservation and management, including legislation.

As the CITES Management Authority for marine and aquatic resources in the Province of Palawan, we are referring the said request for your appropriate reply. The CITES Secretariat anticipates receiving your reply on or before 11 May 2018.

Please send your comments/inputs to BFAR for integration in the national response to CITES Secretariat, International Environment House, Geneva, Switzerland the soonest.

You may view said Notification under http://cites.org/eng/notif/index.php.

Thank you and best regards.

Very truly yours,

ARMIDA P. ANDRES
OIC Assistant Director
In-Charge, Office of the Director

CC: CITES Secretariat
International Environment House
Geneva, Switzerland
E-mail: info@cites.org

United Nations Decade on Biodiversity

Subject: New Notification to the Parties to CITES

From: no_reply@cites.org
To: pawbdir@yahoo.com
Date: Wednesday, 25 April 2018, 11:05:28 PM GMT+8

The following Notification to the Parties was posted on the CITES website on 24 April 2018:

Notification to the Parties N°. 2018/041:

Request for new information on shark and ray conservation and management activities, including legislation

The Notification can be viewed on the page below:

http://cites.org/eng/notif/index.php

CITES Secretariat
International Environment House
11 Chemin des Anemones
CH-1219 Chatelaine, Geneva
Switzerland
Fax: +41-22-797-34-17
Email: info@cites.org

United States Department of the Interior

FISH AND WILDLIFE SERVICE
International Affairs
5275 Leesburg Pike, MS-IA
Falls Church, VA 22041-3803

CITES Secretariat
International Environment House
11 Chemin des Anémones
CH-1219 Châtelaine, Geneva
Switzerland

MAY 11 2018

VIA EMAIL: info@cites.org

Dear Sir or Madam:

Please find enclosed the U.S. Response to CITES Notification 2018/041, dated 24 April 2018, *Request for new information on shark and ray conservation and management activities, including legislation.* Also included are examples of non-detriment findings per 6.b. of the Notification. We appreciate the opportunity to provide this information. Please feel free to contact me at craig_hoover@fws.gov or Laura Noguchi at laura_noguchi@fws.gov if you have any questions regarding our response.

Sincerely,

Craig Hoover, Chief
Division of Management Authority

Enclosures

U.S. Response to CITES Notification 2018/041: Request for New Information on Shark and Ray Conservation and Management Activities, including Legislation

NOTE: The responses provide publications and information from 2017-2018.

a) Scientific information concerning sharks and rays, such as the results of stock assessments, management, and conservation efforts, and research activities

Stock Assessments:

In 2017, a sandbar shark assessment was completed by SEDAR 54. The peer review and final report were finished in late February 2018. The assessment can be found at: <http://sedarweb.org/sedar-54>

The Standing Committee on Research and Statistics (SCRS) of the International Commission for the Conservation of Atlantic Tunas (ICCAT) assessed North Atlantic shortfin mako shark. Based on the assessment, the U.S. National Marine Fisheries Service (NOAA-Fisheries) determined that the stock was overfished and overfishing was occurring. The assessment is available at: <https://www.iccat.int/Documents/Meetings/Docs/2017_SMA_ASS_REP_ENG.pdf>

Management and Conservation Efforts:

NOAA-Fisheries listed the oceanic whitetip shark (*Carcharinus longimanus*) as threatened under the U.S. Endangered Species Act (ESA). We have reviewed the status of the oceanic whitetip shark, including efforts being made to protect the species, and considered public comments submitted on the proposed listing rule as well as new information received since publication of the proposed rule. Based on all of this information, we have determined that the oceanic whitetip shark warrants listing as a threatened species. At this time, we conclude that critical habitat is not determinable because data sufficient to perform the required analyses are lacking; however, we solicit information on habitat features and areas in U.S. waters that may meet the definition of critical habitat for the oceanic whitetip shark. These regulations can be found at: <https://www.federalregister.gov/documents/2018/01/30/2018-01682/endangered-and-threatened-wildlife-and-plants-listing-the-oceanic-whitetip-shark-as-threatened-under>

NOAA-Fisheries listed the giant manta ray (*Manta birostris*) as threatened under the ESA. In making its determination, NOAA-Fisheries reviewed the status of the giant manta ray, including efforts being made to protect this species, and considered public comments submitted on the proposed rule as well as new information received since publication of the proposed rule. We have made our final determinations based on the best scientific and commercial data available. At this time, we conclude that critical habitat is not determinable because data sufficient to perform the required analyses are lacking; however, we solicit information on habitat features and areas in U.S. waters that may meet the definition of critical habitat for the giant manta ray. These regulations can be found at:

<https://www.federalregister.gov/documents/2018/01/22/2018-01031/endangered-and-threatened-wildlife-and-plants-final-rule-to-list-the-giant-manta-ray-as-threatened>

Research Activities:

NOAA-Fisheries published the following Technical Memorandum:

Gulak, S.J.B., H.E. Moncrief-Cox, T.J. Morrell, A.N. Mathers and J.K. Carlson. 2017. A guide to landing shark species with fins naturally attached. NOAA Technical Memorandum Memorandum NMFS-SEFSC-712, 12p. A copy can be found at: <ftp://ftp.library.noaa.gov/noaa_documents.lib/NMFS/SEFSC/TM_NMFS_SEFSC/NMFS_SEFSC_TM_712.pdf>

b) Examples of non-detriment findings; Please refer to the following attachments provided:

- *AOSA167 Export of wild scalloped hammerhead, great hammerhead, and smooth hammerhead shark harvested in the commercial fishery by U.S. fisherman in the Atlantic Ocean and Gulf of Mexico in the 2017 harvest season*
- *AOSA168 Export and introduction from the sea of wild porbeagle shark harvested in the commercial fishery by U.S. fisherman in 2017*
- *AOSA174 Export of common thresher harvested in the commercial fishery by U.S. fisherman in the Atlantic Ocean, Gulf of Mexico, and Caribbean Sea in the 2017 and 2018 harvest season*

c) Guidance or methods for making national or regional non-detriment findings;

Please refer to the guidance provided on pg. 2 of the attached document "Part 23 Subpart D findings, section 23.61."

d) Challenges faced by Parties in implementing the listings of sharks and rays adopted at CoP17, and progress made to address such challenges;

The U.S. Division of Scientific Authority has not encountered any challenges implementing the listings of sharks and rays adopted at CoP17.

e) Status of the development, adoption or implementation of National Plan of Action for Sharks, and information on national or regional regulatory measures concerning the management or conservation of sharks and rays

National Plan of Action for Sharks:

The United States developed the U.S. National Plan of Action for the Conservation and Management of Sharks (NPOA-Sharks) in 2001 to fulfill the requirements of the International Plan of Action for the Conservation and Management of Sharks (IPOA –Sharks) adopted by the Food and Agriculture Organization of the United Nations (FAO) in 1999. (A copy is available at: <http://www.nmfs.noaa.gov/ia/resources/publications/ccrf/npoa_sharks_2001.pdf>.) As noted in the U.S. response to Notification to the Parties No. 2017/031, a report published in 2014 presents some of the achievements of the United States in the implementation of the NPOA-Sharks, highlighting U.S. management measures, research activities, outreach and education efforts, and international fishery management measures. This document can be found at: <http://www.nmfs.noaa.gov/ia/resources/publications/ccrf/npoa_sharks_2014.pdf>.

Regulatory Measures for the Management and Conservation of Sharks and Rays:

Between 2017 and 2018, the following new shark measures were adopted by NOAA-Fisheries:

ICCAT adopted shortfin mako management measures (Recommendation 17-08) based on the SCRS assessment. The recommendation can be found at: <http://www.iccat.int/Documents/Recs/compendiopdf-e/2010-06-e.pdf>

As a result of ICCAT Recommendation 17-08 and the shortfin mako shark stock assessment, NOAA-Fisheries implemented an emergency interim final rule on March 2, 2018. The Environmental Assessment and rule can be found at: <https://www.fisheries.noaa.gov/bulletin/emergency-regulations-address-overfishing-north-atlantic-shortfin-mako-sharks>. The emergency rule is effective until August 29, 2018, with a possible extension for 186 days (until March 2018).

As a result of ICCAT Recommendation 17-08 and the SCRS shortfin mako shark stock assessment, NOAA-Fisheries also started the process for more long-term measures to address overfishing and rebuild shortfin mako sharks by starting scoping for Amendment 11 to the 2006 Consolidated HMS FMP. Scoping ended on May 7. The scoping document can be found at: <https://www.fisheries.noaa.gov/webdam/download/67308876>.

NOAA-Fisheries' Amendment 5b for dusky sharks went into effect on January 1, 2018. Those measures included a requirement for a shark fishing endorsement on recreational HMS fishing permits in the recreational shark fishery (fishermen must watch a video and take a quiz to get the endorsement) and a circle hook requirement in both the recreational fishery and directed shark bottom longline fishery. More information on Amendment 5b can be found at: <https://www.fisheries.noaa.gov/action/amendment-5b-2006-consolidated-hms-fishery-management-plan-atlantic-shark-management>.

On November 22, 2017, NOAA-Fisheries published a final rule regarding the commercial quotas, retention limits, and season opening dates for the 2018 shark fishing season. All fishing seasons opened on January 1 but the retention limits differed by management group and region. The final rule can be found at:

<https://www.federalregister.gov/documents/2017/11/22/2017-25203/atlantic-highly-migratory-species-2018-atlantic-shark-commercial-fishing-season>. Every month, NOAA-Fisheries posts preliminary landings information and takes action as appropriate and needed to change the retention limit or close various management groups to ensure the quota is not exceeded. Landings updates can be found at: <https://www.fisheries.noaa.gov/atlantic-highly-migratory-species/2018-atlantic-shark-commercial-fishery-landings-and-retention>.

f) Information on trade in sharks and rays, including any issues regarding the reporting of trade in CITES listed species in annual reports;

Please see contents provided in the previous Annual Report Submission to CITES.

g) Legislation concerning the conservation and management of sharks and rays

No new legislation to report. Kindly refer to information provided in May 17, 2017, in response to Notification to the Parties No. 2017/031.

United States Department of the Interior

FISH AND WILDLIFE SERVICE

International Affairs
5275 Leesburg Pike, MS: IA
Falls Church, VA 22041-3803

MAY 09 '17 AM10:33

MEMORANDUM

To: Chief, Division of Management Authority

From: Chief, Division of Scientific Authority Rosemarie Gnam, Ph.D.

Subject: General advice for the export of wild *Sphyrna lewini* (scalloped hammerhead shark), *Sphyrna mokarran* (great hammerhead shark) and *Sphyrna zygaena* (smooth hammerhead shark) harvested in the commercial fishery by U.S. fisherman in the Atlantic Ocean and Gulf of Mexico in the 2017 harvest season.

Advice: *The Division of Scientific Authority (DSA) finds that the export of wild Sphyrna lewini (scalloped hammerhead shark), Sphyrna mokarran (great hammerhead shark) and Sphyrna zygaena (smooth hammerhead shark) harvested by U.S. fisherman in the 2017 harvest season* in *the Atlantic Ocean and Gulf of Mexico is not detrimental to the survival of the species, provided that the harvest is in compliance with U.S. management plan in place for the species.*

We will review and re-issue a general advice for these hammerhead sharks annually, in an effort to be responsive to new data and information that may become available. This finding only pertains to hammerhead sharks caught in the Atlantic Ocean and the Gulf of Mexico and applications for the export of hammerhead sharks caught in U.S. waters other than the Atlantic Ocean and Gulf of Mexico will be reviewed separately.

Basis for advice:

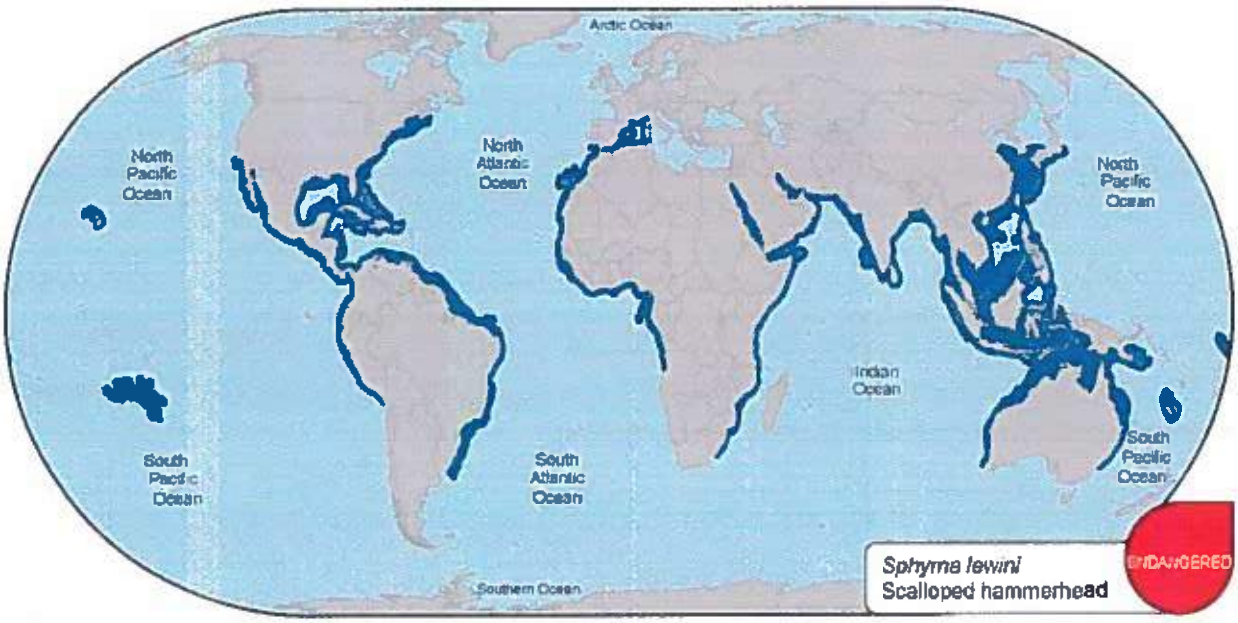
Species Distribution/Range in the United States

Sphyrna lewini (scalloped hammerhead shark), *Sphyrna mokarran* (great hammerhead shark) and *Sphyrna zygaena* (smooth hammerhead shark) are wide-ranging, primarily coastal species which are also occasionally found in the open oceans. These species are found primarily in warm temperate and tropical waters worldwide at depths to 1000 meters; however, most often these species are associated with continental shelf habitat. In the Western Atlantic the scalloped hammerhead is found from New Jersey to Brazil, including Gulf of Mexico and the Caribbean, while the great hammerhead and smooth hammerhead are found as far northward as North Carolina and Nova Scotia, respectively (Compagno, 1984).

The scalloped hammerhead (*Sphyrna lewini*) is found world-wide in coastal warm temperate and tropical seas. It is primarily a coastal species, occasionally documented in open ocean, and is found from the surface and intertidal areas to greater than 275 m deep (Morales et al. 2007).

The great hammerhead has a wide ranging population throughout tropical waters of the world, from approximately latitudes 40°N to 35°S. It is migratory, with some populations moving poleward in the summer, as seen along the Florida coast and in the South China Sea. This species is found throughout the south-west Indian Ocean but in South Africa is confined to the KwaZulu-Natal coast, where it co-exists with the scalloped hammerhead *S. lewini*, also an inhabitant of the tropics, and the smooth hammerhead *S. zygaena*, which favors cooler waters. There is a pupping and nursery ground in a coastal mangrove estuarine area of southern Belize (Denham et al. 2007).

The distribution of the smooth hammerhead is not well known partially because it is believed that it is occasionally misidentified as the scalloped hammerhead. Nevertheless it is known to have a wider range than the other two species since it is more tolerant of cooler water (Casper et al. 2005). Compared to the scalloped and great hammerheads, the smooth hammerhead stays closer to the surface and is generally found in water less than 20 meters (66 ft) deep.



Distribution map for *Sphryna lewini* (from IUCN).

Biological characteristics

These three species of hammerhead are the largest species within the family Sphyrnidae. Hammerhead sharks are viviparous with reproductive cycles including an 8-12 month gestation period followed by a one year resting period. The northwestern Atlantic population of scalloped hammerhead appears to grow more slowly and to a smaller overall size than conspecifics in the eastern and western Pacific Ocean. The oldest known specimen, including both males and females, was from the northwestern Atlantic and was estimated to be 31.5 years of age (Kotas et al. 2011), while Piercy et al. (2007) estimated the oldest age of males and females in the Gulf of Mexico to be 30.5 years.

Although the scalloped hammerhead is relatively fecund compared to other large sharks (with litters of 12-38 pups) the generation period is greater than 15 years in the Gulf of Mexico and its life-history characteristics mean that it resilience to exploitation is relatively low (Morales et al. 2007). This species is also expected to have a low resilience to exploitation because of its tendency to aggregate during certain life history phases (Maguire et al. 2006). Maximum size reported in different studies of the scalloped hammerhead ranged from 219-340 cm total length (TL) for males and 296-346 cm for females (Morales et al. 2007). A growth study by Branstetter (1987) in the Gulf of Mexico found maximum length for both sexes to be 329 cm TL. The age and size of first maturity in the Gulf of Mexico has been estimated at 10 years and 180 cm TL for males and 15 years and 250 cm TL for females (Branstetter 1987).

The great hammerhead (*S. mokarran*) is viviparous with females breeding only once every two years. Litter size ranges between 6 and 42 pups after an 11 month gestation period. Size at birth is 50 to 70 cm. The species suffers from very high bycatch mortality, making it vulnerable to over-exploitation and population depletion (Lemine et al. 2007). Generally solitary, it is unlikely to be abundant wherever it occurs. The maximum total length is reported to be between 550 and 610 cm however, 400 cm is more common for a mature adult. Males mature at between 234 and 269 cm, and reach at least 341 cm. Females mature at between 250 and 300 cm and reach between 482 and 549 cm (Lemine et al. 2007).

The smooth hammerhead (*Sphryna zygaena*) is encountered least among the three species (Ha 2006). While this species is primarily a coastal-pelagic and semi-oceanic species which occurs on the continental shelf to 200 m depth, it has also been observed in freshwater in the Indian River in Florida (Ebert 2003). While there is limited biological data available, the smooth hammerhead is believed to have a lifespan of at least 20 years (FLMNH 2008) and reach a maximum size of between 370 and 400 cm TL (Compagno 2007). Gravid smooth hammerhead females have been reported at sizes ranging from 220 to 255 cm forked length (FL), however, no conversion factor between FL and TL was provided. Work on the coast of West Africa showed, of 21 sampled specimens, there was a mean litter size 33.5 (Castro and Mejuto 1995).

Population Status and Trends:

The IUCN Redlist assessed the smooth hammerhead (*Sphryna zygaena*) in 2005 and the scalloped hammerhead (*Sphryna lewini*) and great hammerhead (*Sphryna mokarran*) in 2007. *Sphyrna lewini* was assessed as Endangered with an unknown population trend, *Sphryna mokarran* as Endangered with decreasing population and *Sphryna zygaena* as Vulnerable with a decreasing population trend. All of these were global assessments. Since each species in found worldwide, and there are known to be discrete populations in different areas of the world, threats and population statuses will vary locally.

In late 2011, the scalloped hammerhead was reviewed by the National Marine Fisheries Service (NMFS) for an Endangered Species Act (ESA) listing. During that review six distinct population segments (DPS) were identified including the Northwest Atlantic and Gulf of Mexico DPS, Central and Southwest Atlantic DPS, Eastern Atlantic DPS, Indo-West Pacific DPS, Central Pacific DPS, and Eastern Pacific DPS (Miller et al. 2013, Hayes 2008). In July 2014, NMFS determined that while the Northwest Atlantic and Gulf of Mexico DPS did not warrant an ESA listing, the Eastern Atlantic and Eastern Pacific DPSs warranted an Endangered designation

and the Central and Southwestern Atlantic and Indo-Pacific DPSs warranted a Threatened designation (Miller et al. 2013).

The total global catch of hammerhead species is estimated between 2000 and 6000 tonnes over the past decade and continues to rise (Simpfendorfer 2014). Multiple sources of data point to severe population declines of the scalloped hammerhead in the Atlantic over the past few decades. It is likely that scalloped hammerheads have experienced periodic overfishing from 1983 - 2005 and overfishing began in the Northwest Atlantic and Gulf of Mexico in the early 1980s (Jiao et al. 2011). In the Northwest Atlantic, longline fleets exert intense fishing pressure on sharks and in an analysis of grouped hammerhead data from U.S. pelagic longline logbook data it was estimated that hammerhead shark abundance declined by up to 91% since 1986 (Baum et al. 2003). The primary component of the harvest was scalloped hammerhead and data from the Virginia Institute of Marine Science indicates that the harvest of the scalloped hammerhead outnumbered that of the smooth hammerhead by more than ten to one (Ha 2006). Both the pelagic and bottom longline observer programs in the United States have recorded a 2 to 3:1 ratio for the scalloped hammerhead to the great hammerhead (Denham et al. 2007, Lemine et al. 2007).

Sphryna lewini populations in the northwestern Atlantic may be overestimated due to the recent discovery of a cryptic species that morphologically appears to be almost identical to the scalloped hammerhead shark (Naylor et al. 2012, Quatro et al. 2006, Quatro et al. 2013). The new species, the Carolina hammerhead (*Sphyrna gilbert* sp. nov.), was originally identified within South Carolina waters (Quatro et al. 2006, Quatro et al. 2013) but can be found from South Carolina to Brazil (Pinhal et al. 2011), thus overlapping the current range of *S. lewini*. Coastal South Carolina is also believed to be a nursery ground for this new, cryptic species (Quattro et al. 2006). Currently, there are no available data regarding the ratio of this new, cryptic species to the Atlantic *S. lewini* population (Miller et al. 2013).

Multiple data sources from the Atlantic Ocean have documented substantial declines in populations of the scalloped hammerhead but few population assessments are available for the species. In the Northwest Atlantic Ocean however, Hayes et al. (2009) conducted an assessment from which NMFS determined that scalloped hammerhead sharks were overfished and experiencing overfishing (76 FR 23794, April 28, 2011). That assessment also informed a NMFS management plan that uses a quota system to regulate harvest of the hammerhead species complex (*S. lewini*, S. *mokarran* and *S. zygaena*). The assessment indicated that the scalloped hammerhead population size had declined between 83 and 85 percent between 1981 and 2005 with the population in 1981 estimated at between 142,000 and 169,000 individuals, but by 2005 the population estimate had declined to about 24,000 sharks (Hayes et al. 2009). An assessment for the hammerhead complex in the northwest Atlantic Ocean, utilizing catch and population trend data from multiple studies, found a 72% decline in abundance from 1981-2005 (Jiao et al. 2008). A standardized catch rate index of a hammerhead complex (*S. lewini, S. mokarran, and S. zygaena*) from commercial fishing logbook data in the U.S. pelagic longline fishery between 1986-2000, and from observer data between 1992-2005, estimated a decline of 89%, while pelagic longline observer data indicated that *Sphyrna spp.* declined by 76% between 1992-2005 (Camhi et al. 2009, Baum *et al.* 2003).

Catch of all species within the hammerhead complex by the commercial sector in the Hawaiian coastal and pelagic waters is very low, averaging only 226 pounds per year over the years 1953-2013 and there was no indication of a trend over this time period. Most of the hammerheads were either smooth or scalloped and no catches of great hammerheads have been documented in these waters by fisheries observers since the observer program was initiated in the region in 1990 (Miller et al. 2014).

Threats

Globally, overharvest in both directed and bycatch fisheries is the primary threat. Fishing on juvenile members of the stocks is of particular concern since these fish will never have the opportunity to reproduce and replace themselves in the population. The directed and bycatch fisheries primarily utilize the fins but some meat is also utilized, especially for local consumption. Fins are primarily consumed in the Asian market. The high price for "grade-A" fins, the grade assigned to all three hammerhead species, is an important factor driving unsustainable harvest.

Species Management:

At the global level, the entire family Sphyrnidae, which includes the three CITES listed hammerhead sharks, are listed among the Highly Migratory Species (Annex 1) in the United Nations (UN) Convention on the Law of the Sea (UNCLOS). The 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, which builds on UNCLOS and has been in force since 2001, encourages States to cooperate on these multijurisdictional stocks through regional and sub-regional management bodies. Since the Agreement's inception there have been regional agreements aimed at conserving these migratory stocks but while the agreement's aim is conservation, there are relatively few enforcement measures.

Also globally, on November 9, 2014, the scalloped hammerhead (*Sphyrna lewini*) and the great hammerhead (*Sphyrna mokarran*) were listed under Appendix II of the Convention on Migratory Species of Wild Animals (CMS or Bonn Convention). The CMS provides a global platform for the conservation and sustainable use of migratory animals and their habitats. A CMS Appendix II listing acknowledges that these species need, or would greatly benefit from, international cooperation on management and encourages Parties to take cooperative actions on management, including establishing global or regional measures to conserve the species. CMS decisions may also trigger management responses nationally. It should be noted that the United States is not a Party to CMS.

At the regional level, the International Commission for the Conservation of Atlantic Tunas (ICCAT) manages tunas and tuna-like species and adopts measures to address bycatch of other species caught in association with ICCAT fisheries. ICCAT, an intergovernmental regional fishery management organization founded in 1969, has 50 Contracting Parties and its Convention area spans the entire Atlantic Ocean, including the Gulf of Mexico, Caribbean and Mediterranean Seas. Under a recommendation adopted in 2004, ICCAT Parties are required to report data on catches of sharks in all fisheries managed by ICCAT. However, catch data for sharks (including hammerheads) are still not reported by many Contracting Parties. Effective in

2011, ICCAT Recommendation 10-08 established a prohibition on retaining onboard, transshipping, landing, storing, selling, or offering for sale any part or whole carcass of a hammerhead shark of the family Sphyrnidae (except *Sphyrna tiburo*) taken in the Convention area in association with ICCAT fisheries. Annual reporting of hammerhead discards and releases is required by this measure, although these data are also incomplete.

At the national level, the United States has a species management plan for the hammerhead shark complex (scalloped, great, smooth) in the Atlantic, Gulf of Mexico, and Caribbean Sea, which was developed as part of the larger National Marine Fisheries Service 2006 Consolidated Atlantic Highly Migratory Species (HMS) Management Plan. The hammerhead management plan, included in Amendment 5a of the 2006 plan, incorporates regulatory mechanisms designed to rebuild the hammerhead stock complex over a 10 year period with the rebuilding starting July 3, 2013 (NMFS 2013). The regulations that implement the management plan provide for a quota system which allows U.S. Atlantic permitted fishermen, both commercial and recreational, to harvest a specified amount of hammerhead sharks on an annual basis. The harvest quota is based on the best available science which currently includes a stock assessment for the scalloped hammerhead (Hayes et al. 2009) and historical catch data from each of the fisheries.

The hammerhead sharks in the management complex (great, scalloped, and smooth) are included under a single hammerhead shark fisheries harvest quota, which is based on the scalloped hammerhead stock assessment performed by Hayes et al. in 2009. The harvest quota is split and allocated separately for the Gulf of Mexico fishery, with the Gulf being split into separate allocations for the Eastern Gulf and Western Gulf, and the Atlantic coastal fishery. A single harvest quota was established for the hammerhead shark complex because it is difficult to differentiate among these three hammerhead species, particularly when dressed.

The Atlantic and Gulf of Mexico commercial quotas were calculated by subtracting recreational landings, commercial discards, and research set-aside from the hammerhead shark total allowable catch (TAC) of 79.6 metric tons (mt) dressed weight (dw). This calculation was based on a harvest of 2,853 scalloped hammerhead sharks having average dressed weight of 61.5 pounds per individual. The resultant total commercial quota for all hammerhead shark species is 52.4 mt dw (115,457 lb dw), which is then divided into the Atlantic and Gulf of Mexico regions using the average percentage of total hammerhead shark landings in each region over the years 2008 through 2011; 51.7 percent in the Atlantic and 48.3 percent in the Gulf of Mexico. Consequently, the Atlantic hammerhead shark complex commercial base quota is 27.1 mt dw (59,736 lb dw) and the Gulf of Mexico commercial base quota is 25.3 mt dw (NMFS 2013). In 2015, under Amendment 6 of the 2006 HMS Fishery Management Plan, the shark fishery harvest quota in the Gulf of Mexico was split into an eastern quota and a western quota to allow for better regulation of the fishery (FR Notice 2015 19914). The NMFS made their sub-regional quota calculation using 2014 eDealer landings data and these calculations resulted in an Eastern Gulf quota of 13.4 mt dw (29,421 lb dw), and a Western Gulf quota of 11.9 mt dw (23,301 lb dw) (FR Notice 2015 19914). Together, these quotas equal the overall Gulf of Mexico harvest quota of 25.3 mt dw.

In the Atlantic Ocean, including the Gulf of Mexico and Caribbean, in addition to the annual harvest quota, license and reporting requirements, size limit and gear restrictions for recreational

fishermen are used to regulate the harvest. Commercial permits are issued for both the directed and bycatch fisheries. In the directed fishery, fishermen target hammerhead sharks, while in the bycatch fishery, fisherman target other species but retain the hammerheads that are caught incidentally. A Directed permit allows the holder to harvest up to a default maximum of 45 hammerheads per day up to the annual quota, but if the harvest is not progressing as expected, a maximum of 55 hammerhead sharks per day is allowed, after notification is issued by the NMFS (FR Notice 2015 19914). An Incidental permit allows the holder to retain up to three hammerhead sharks per trip. Once the annual harvest quota is reached, the fishery is closed and neither directed nor incidental permit holders may land hammerhead sharks but shark dealers are allowed to sell any hammerhead sharks that were stored before the closure. Commercial fishermen may use bottom longline, gillnet, rod and reel, handline, and bandit gear; fishermen using pelagic longline gear cannot land, possess, or sell hammerhead sharks. A Recreational permit is issued to an individual who may harvest up to one hammerhead shark per day provided no tunas, swordfish, or billfish are onboard the vessel; the fish must be a minimum of 87 inches (fork length); a recreationally caught hammerhead shark cannot be sold. Recreational fishing for hammerhead sharks is allowed year-round and only rod and reel and handline are allowed. All fish landed in both the recreational and commercial fisheries must be landed with their fins naturally attached. Dealers who purchase hammerhead shark from commercial fisherman must adhere to strict reporting requirements.

The harvest of the Atlantic hammerhead shark complex is monitored through reporting by fishermen and dealers. The commercial fishermen must report their directed and incidental catch to NMFS within seven days of landing at the dock and the dealers must report activity every Tuesday for purchases made the previous Sunday through Saturday time period. When a level of 80% of the annual quota has been reported, the fishery is closed to further harvest; this closure becomes effective five days after a notice is issued. The buffer of the additional 20% of quota is to allow time for fish already harvested to be landed and reported. If the annual quota is exceeded, the overharvest is deducted from the following year's harvest quota. Through this accounting measure, the calculated annual harvest quota averages out to the allowed annual harvest over a series of years. Also, due to the real-time nature of the harvest reporting, there is less chance of harvesting significantly more than any one year's quota allocation.

A linked quota system reduces bycatch and overharvest by allowing for the simultaneous closure of two shark management groups in a region where shark species that are in separate management groups have the potential to be caught together on the same shark fishing trip. In both the Atlantic and the Gulf of Mexico (for management purposes, the Gulf of Mexico includes fish landed in the Caribbean), the hammerhead management group (scalloped, great and smooth hammerheads) is linked to the Aggregated Large Coastal Sharks Species Group (LCS) (silk, tiger, blacktip, spinner, bull, lemon and nurse sharks). If either the hammerhead management group or the LCS group reaches the 80% harvest limit explained above, both of these management groups are closed to harvest simultaneously, even if only one of the groups has reached 80% of their quota. The splitting of the Gulf of Mexico shark fishery into an eastern and western component in 2015 in Amendment 6 also split the hammerhead/LCS linkages into eastern and western components; each section follows the 80% harvest limit closure described previously (FR Notice 2015 19914). During the first two years of the quota linkages (2013 and 2014), the quantity of hammerheads caught had only reached approximately 50% of the quota

when the harvest season was closed because the linked LCS complex quota had been reached. The Gulf of Mexico hammerhead and LCS harvest season opened its 2015 season on January 1, 2015, and closed on May 3, 2015 with only 55% (13.8 mt dw) of Gulf of Mexico hammerhead quota harvested.

The Atlantic and Gulf of Mexico hammerhead and LCS 2016 harvest seasons opened on January 1, 2016; both the opening of the season and the seasonal quota are adjusted annually based on harvest from the prior year (NMFS 2013; FR Notice 2015 19914). In 2016, a commercial retention limit for directed shark limited access permit holders was implemented in the Gulf of Mexico allowing a maximum of 45 large coastal sharks, other than sandbar sharks, to be taken per vessel per trip; in the Atlantic this new regulation allowed for a maximum of 25 large coastal sharks other than sandbar sharks to be taken per vessel per trip. Also in the 2016 fishing season, the Gulf of Mexico was split into eastern and western sections to better manage the harvest (FR Notice 2015 19914). With this division the eastern portion received 52.8% of the hammerhead landings allocated to the Gulf of Mexico (13.4 mt dw) while the western portion received 47.2% (11.9 mt dw) of the allocation. With the division the TAC of hammerhead sharks within the entire Gulf of Mexico remained at 25.3 mt dw. During the 2016 commercial hammerhead harvest season (as of 12/31/2016), there were 23.4 mt dw harvested in the entire Gulf of Mexico and 14.0 mt dw harvested in the Atlantic. Both of these harvests were below the allowed quotas for their respective regions (NOAA Fisheries 2017).

The 2017 LCS harvest season for hammerheads in the Atlantic, and in the eastern Gulf of Mexico, starts on January 1, 2017; the 2017 season in the western Gulf of Mexico begins on February 1, 2017. Harvest quotas are the same as in 2016 with the eastern and western Gulf of Mexico allowed 13.4 mt dw and 11.9 mt dw, respectively, while in the Atlantic a 27.1 mt dw harvest is allowed (FR Notice 2016 84491; NOAA Fisheries 2016).

Hammerhead shark regulations are set on both state and federal levels, and state regulations are consistent with regulations issued by NMFS. In the Atlantic, state fishery regulations are promulgated jointly among the states within the Atlantic States Marine Fisheries Commission (ASMFC). In certain instances, state regulations may be more restrictive than the corresponding federal regulations but they cannot allow for a harvest in excess of the federally established TAC. State specific regulations apply to fisheries within three nautical miles from the shoreline, while federal regulations apply to fisheries from the three mile limit to the 200 mile nautical mile EEZ (ASMFC 2008, ASMFC 2013).

Summary

The hammerhead shark fisheries in U.S. waters of the Northwestern Atlantic and Eastern and Western Gulf of Mexico are managed under a quota system which allows harvest from directed, bycatch and recreational fisheries. Anyone participating in these fisheries is required to be licensed, either by the NMFS or in the state where they are fishing. The quotas under which this system is managed are determined based on the best available data which includes a 2009 species assessment, a species assessment of the scalloped hammerhead in 2013, a species assessment of the great hammerhead in 2014, and historical harvest records from the directed, bycatch and recreational fisheries. The annual harvest is closed to fishermen when the NMFS

determines, through harvester and dealer reports, that 80% of the annual quota has been harvested. The harvest quota is adjusted annually, based on the previous year's harvest, to insure the quota is not exceeded, over a multi-year period. If there is overharvest in one year, the TAC for the following year is reduced. There is one TAC quota for the three species of hammerhead which are harvested in U.S. Atlantic, the Eastern Gulf of Mexico, the Western Gulf of Mexico and Caribbean waters and it encompasses all fish harvested whether they are taken from waters governed by state or federal regulations. The species management plan currently being followed is designed so that the population will rebuild within 10 years (by 2023) and the harvests since the plan was implemented have not exceeded the established quotas.

Conclusion

The Division of Scientific Authority (DSA), based on the information and data available, and management measures currently in place, finds that the export of wild hammerhead sharks harvested by U.S. fisherman in the Atlantic Ocean and Eastern and Western sections of the Gulf of Mexico in the 2017 harvest season is not detrimental to the survival of the species, provided that the harvest is in compliance with the U.S. management plan in place for the species.

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United States Department of the Interior

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MAY 09 '17 AM10:33

MEMORANDUM

To: Chief, Division of Management Authority

From: Chief, Division of Scientific Authority Rosemarie Gnam, Ph.D.

Subject: General advice for the export and introduction from the sea of wild porbeagle shark (*Lamna nasus*) harvested in the commercial fishery by U.S. fisherman in 2017

Advice: *The Division of Scientific Authority (DSA) finds that the export and introduction from the sea of wild porbeagle shark harvested by U.S. fisherman in the 2017 harvest season is not detrimental to the survival of the species, provided that the harvest is in compliance with U.S. management plans in place for the species.*

We will review and re-issue a general advice for porbeagle shark annually, in an effort to be responsive to new data and information that may become available.

Basis for advice:

Species Distribution/Range in the United States

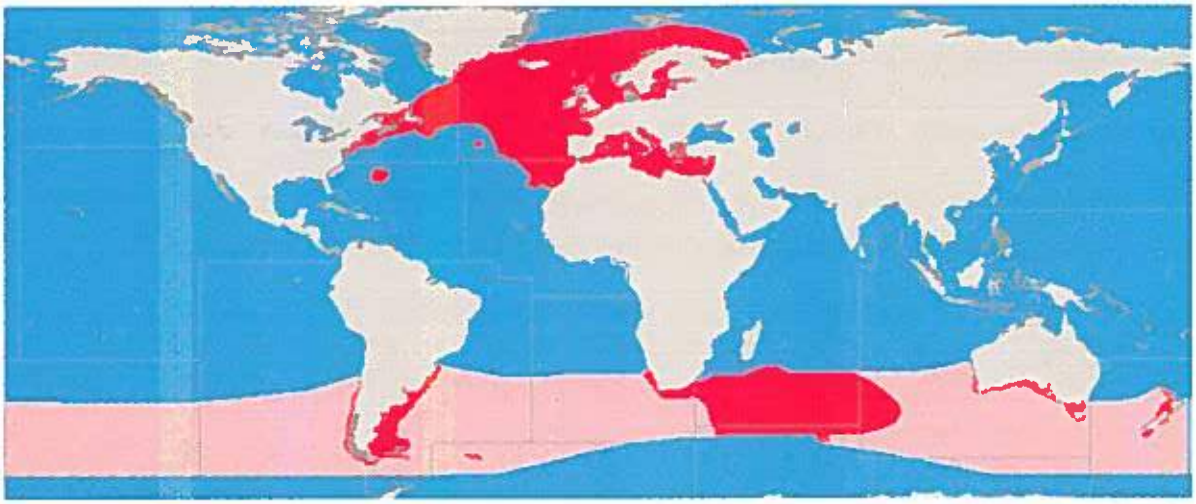
The porbeagle shark is a wide-ranging, primarily coastal species which is also found in the open oceans. It is found in temperate and cold-temperate waters worldwide (1 to 18°C), at depths of approximately 1-700 meters; this species is most commonly associated with continental shelf habitat (Compagno, 2001). The species is centered within the North Atlantic, and within a circumglobal region of temperate water in the Southern Hemisphere including the South Atlantic Ocean, the Indian Ocean, the South Pacific Ocean and the Southern Ocean (Compagno, 2001).

The global population is generally separated into fished stocks located within the Northeast Atlantic, the Mediterranean Sea, the Northwest Atlantic, South Atlantic, Indian Ocean and Southern Ocean. The United States' harvest occurs within the Northwest Atlantic stock.

In the Northwest Atlantic this species' primary population center is located within Canada's territorial waters (Campana and Gibson, 2008). There is seasonal movement within this stock and the species is most commonly associated with continental shelf habitat from close inshore (summer) to far offshore; it is seldom found beyond the Canadian and U.S 200 mile Exclusive Economic Zone (EEZ) (Campana and Gibson, 2008).

In the Northwest Atlantic this species has been found to make annual migrations along the coast between the Gulf of Maine and Newfoundland, and is known occasionally from areas to as far south as New York, New Jersey and possibly South Carolina (Compagno, 2001; Campana *et al.*

1999; Campana and Joyce, 2004). Within U.S. territorial waters, the species is primarily located in 5-10°CC water (Campana and Joyce, 2004). Compagno (2001) noted its distribution included Bermuda. While the Northwest Atlantic stock of porbeagle has been shown to undertake migrations up and down the Atlantic coast of North America, long-term tagging data indicates this stock does not mix with the Northeastern Atlantic porbeagle stock (Compagno, 2001; ICCAT SCRS/ICES, 2009).



Distribution map for Lamna nasus (from FAO Species Identification Sheet 2003). Red/Dark: certain; Pink/Light: uncertain).

Biological Characteristics

This is a relatively slow growing, long-lived species that is late maturing and bears an average of four pups yearly after a gestation period of about eight months (in the North Atlantic) (Aasen, 1963; Gauld, 1989). Metabolically it maintains core body temperature above ambient sea temperature and is therefore often referred to as "warm-blooded". Due to its low reproductive potential, long life and late age of maturity, this species is vulnerable to overharvest.

Overall, when comparing porbeagle sharks from the North and South Atlantic stocks, the North Atlantic stocks are larger, faster growing and have a shorter lifespan than the South Atlantic stock. In the southern hemisphere (southwest Pacific), the species is estimated to live for approximately 65 years (Francis *et al.*, 2007), while some research has estimated the Northwest Atlantic stock to live up to 45 years(Compagno 2001) . The Northeast Atlantic stock is slightly slower growing than the stock in the Northwestern Atlantic (Francis *et al.*, 2008).

Maximum total length for this species is over 300 cm and possibly as long as 370 cm, but most fully grown specimens are much smaller (Compagno 2001). In the western North Atlantic, ages at maturity for males and females are approximately eight and 13 years, respectively, and lengths at maturity are 180-215cm and 230-260cm total length, respectively (Natanson *et al.*, 2002).

Population Status and Trends

The International Union for Conservation of Nature (IUCN) Redlist assessment for the global population of porbeagle indicates the status is Vulnerable (Stevens *et al.*, 2006). The most recent

A 2009 ICCAT/ICES joint assessment estimated the total population size in the Northwest Atlantic, which is defined as north of 35N and west of 42W(approximately from Labrador, Canada south to Rhode Island), to be 22 to 27 percent of its size in 1961 and 95 to 103% of its size in 2001. By 2000, overharvest of this stock had reduced the average size of sharks and catch rates to the lowest levels on record, and catch rates of mature sharks in 2000 were 10% of those in 1992. In 2000, biomass was estimated to be 11–17% of virgin biomass (DFO, 2001). Since harvest quotas were reduced in 2002, population abundance has remained relatively stable with SSB, and number of mature females in the population, estimated at about 95-103% and 83-103% of the 2001 levels, respectively. The Northwest Atlantic porbeagle stock has been determined to be overfished, but due to the management in place it is not currently experiencing overfishing. Currently, this stock is increasing (Campana *et al.*, 2009).

On January 20, 2010 the Wild Earth Guardians requested that the NMFS list the porbeagle shark throughout its entire range as endangered under the Endangered Species Act (ESA). The following day, on January 21, 2010 the Humane Society of the United States (HSUS) requested the NMFS to list the Northwest Atlantic distinct population segment (DPS) as endangered under the ESA. On July 12, 2010 the NMFS published a finding that neither petition presented substantial information indicating that listing porbeagle sharks may be warranted and so a full status review was not initiated. In August 2011 the petitioners filed a court challenge to this finding and on December 12, 2014 the court vacated the 2010 90-day finding. Finally, on March 27, 2015, the NMFS published a *90 Day Petition Finding; Request For Information* and based on the information they received they produced a 90 day finding. The results of the review were to be published on or before December 12, 2015 (FR Notice 2015 07073) and on August 1, 2016 a Federal Register Notice (FR Notice 2016 18101) was published indicating that it had been determined that porbeagle sharks do not warrant listing at this time.

Threats

Globally, overharvest is the primary threat (Stevens *et al.*, 2006). The fishing of juveniles is of particular concern since these fish will never have the opportunity to reproduce and replace themselves in the population. The fisheries produce meat and fins; consumption of meat occurs primarily in Europe, and fins primarily in the Asian market. Porbeagle fins are generally less valued than fins of other shark species, but fins are still exported to Asian markets as by-products of meat processing (Mundy-Taylor and Crook 2013).

Detailed catch records exist for the North Atlantic fisheries, which have been primarily exploited by North American and European fleets, but less data are available for the southern stocks (Semba *et al* 2013). In the early 1960s, before the fishery collapsed, the Northwest Atlantic supported harvests up to 9,000 metric tons (mt). Apparently sustainable harvests of 350 mt occurred here until the 1990s and this allowed some rebuilding of the stock (Campana *et al.*, 2002). With tightened harvest restrictions in place in the Northeast and Northwest Atlantic, additional pressure is a concern for the South Atlantic stocks where cooperative stock management is not well developed. The lack of restrictive management of the southern stocks without adequate monitoring and proper documenting of harvest and trade has the potential to result in regional stock collapses.

Most harvest occurs within the Canadian and U.S. EEZs, where essential habitat for this pelagic species is located (ICCAT SCRS/ICES, 2009) and where harvest is strictly regulated.

Species Management

At the global level, the porbeagle shark is listed among the Highly Migratory Species (Annex 1) in the United Nations (UN) Convention on the Law of the Sea (UNCLOS). A UN Agreement on Straddling and Highly Migratory Fish Stocks, which builds on UNCLOS and has been in force since 2001, calls on States to cooperate on these multijurisdictional stocks on actions and approaches to ensure their long-term conservation and sustainable use.

There is bilateral understanding that the Northwest Atlantic stock of porbeagle shark is a shared stock between the United States and Canada. The U.S. and Canada are utilizing the latest stock assessment information to manage the fishery. Each country independently determines their harvest quota for this species and the combined quotas provide for rebuilding the stock. This type of regional cooperation is what was envisioned in both the UNCLOS and the UN Agreement on Straddling and Highly Migratory Fish Stocks.

Also at the regional level, porbeagle shark have been harvested as bycatch in fisheries targeting other species, including the Northwest Atlantic tuna and swordfish fisheries. The International Commission for the Conservation of Atlantic Tunas (ICCAT), founded in 1969, is the intergovernmental organization responsible for the conservation and management of Atlantic tuna and tuna like species occurring in the Atlantic Ocean and adjacent seas. ICCAT (which is currently composed of 49 Contracting Parties) has adopted numerous recommendations for the management and conservation of both target stocks and bycatch species. ICCAT has also adopted both binding and non-binding measures on porbeagle data collection and management.

In 1995, ICCAT adopted its first (non-binding) measure on sharks, which called on its members to provide relevant information to FAO to support that body as the focal point of an effort to initiate a program to collect biological data on sharks, including stock abundance and the magnitude of bycatch. Additional measures have been adopted since 2003 encouraging and eventually requiring ICCAT members to provide all catch and effort data for porbeagle and other shark species caught in association with fisheries managed by ICCAT, including estimates of dead discards and size frequencies. Regular reporting to ICCAT of harvest and discard data on porbeagle has greatly improved in recent years. Some Contracting Parties do not, however, fully report their data on porbeagle shark to ICCAT.

ICCAT adopted a specific management measure for porbeagle in 2007 that required Contracting Parties to take appropriate measures to reduce fishing mortality of porbeagle shark. In 2007, ICCAT requested that its science body conduct a stock assessment for porbeagle shark no later than 2009. In ICCAT's Standing Committee for Research and Statistics, in cooperation with the International Counsel for the Exploration of the Sea, ICCAT's science body conducted the requested stock assessment for Atlantic stocks. The results of the assessment are the scientific basis for porbeagle species management plans in both Canada and the United States. Additional conservation action has been considered by ICCAT since the 2009 stock assessment, in particular, a prohibition on retention of porbeagle shark. To date, no consensus has been reached on the need for such action. In the United States, porbeagle shark are primarily caught

incidentally to other target species in the longline fishery and represent a relatively small proportion of the global catch.

The European Union (EU), as of January, 2010, prohibited all EU vessels from fishing for, landing, retaining, transshipping or finning porbeagle sharks either within or outside of EU territorial waters (EU, 2010). The EU has been a primary global consumer of porbeagle products (particularly the meat), and prior to the 2010 action, EU member states, especially Spain, were major contributors to worldwide porbeagle harvest.

At the national level in the United States, the National Marine Fisheries Service (NMFS) began managing Atlantic sharks, including porbeagle sharks, in 1993. Currently, the 2006 Consolidated Highly Migratory Species Fishery Management Plan incorporates regulatory measures designed to rebuild the Northwest Atlantic porbeagle stock over a 100 year time frame, with the rebuilding start date of July 24, 2008 (NMFS, 2009 2008). As part of the rebuilding plan, NMFS established a total allowable catch that allows for commercial and recreational harvest. The total allowable catch level is based on average U.S. landings at the time in an effort to maintain the level of fishing mortality recommended in a 2005 Canadian assessment (NMFS, 2008). The 2009 ICCAT stock assessment did not change the conclusions from the 2005 or 2009 Canadian assessments and therefore did not require a change to the rebuilding plan.

In addition to the annual commercial harvest quotas, permit and reporting requirements, size limit and gear restrictions for recreational fishermen are used to regulate the harvest. Commercial fishermen must have at least one of two permits in order to land and sell porbeagle sharks. The directed limited access permit allows commercial fishermen to target porbeagle sharks as long as the fishing season is open. The incidental limited access permit allows commercial fishermen to land up to 16 pelagic sharks, including porbeagle sharks, per trip as long as the fishing season is open. Commercial fishermen who target swordfish and tuna using pelagic longline gear must have one of these shark limited access permits in order to allow them to keep any porbeagle sharks that are caught incidental to their target species. Recreational fishermen must also have a permit and are restricted to one shark per trip with a minimum size of 54 inches fork length; recreationally caught fish cannot be sold. Many recreational fishermen fish in tournaments, many of which target pelagic sharks, including porbeagle sharks. These tournaments are required to be registered and may be selected to report. All fishermen, commercial and recreational, are required to keep shark fins naturally attached to the shark carcass. Dealers, who purchase the porbeagle from commercial fishermen, must have a federal dealers permit and must adhere to strict reporting requirements.

The annual total allowable catch (TAC) for U.S. permitted fishermen, both commercial and recreational, is 11.3 metric tons (mt) dressed weight (dw). The TAC includes allowances for commercial discards and incidental catch of 9.5 mt dw, recreational landings of 0.1 mt dw, and commercial landings of 1.7 mt dw (NMFS, 2008). The commercial harvest of porbeagle sharks is restricted by a commercial quota of 1.7 mt dw and is monitored through reporting by fishermen and dealers. The commercial fishermen must report their directed and incidental catch to NMFS within seven days of landing at the dock and the dealers must report activity within 10 days of purchasing catch. When an estimated 80% of the annual commercial quota has been landed, the fishery is closed to further harvest; this closure notice becomes effective five days

after it is issued. The buffer of the additional 20% of quota is used to account for any late reports and to ensure the quota is not exceeded. If closure the quota is exceeded, any overharvest is deducted from the following year's harvest quota.

In the 2011 and 2012 fishing seasons, the commercial quota was exceeded by 2.1 metric tons and as a result, the commercial quotas for subsequent seasons were reduced. The fishing season was closed in 2013, and in 2014 the quota was reduced by 0.5 mt dw to account for previous overharvest. This resulted in a 2014 quota of 1.2 mt dw. The actual harvest in 2014 amounted to 2.5 mt dw, an overharvest of 1.3 mt dw for the year. Since the management plan calls for the fishery to close after 80% of the quota is harvested, the fishery was closed for the entire 2015 season because of the difficulty of effectively monitoring and managing the 0.5 mt dw of the 1.7 mt dw quota remaining (NMFS, 2014). The quota for the 2016 harvest season, which began on January 1, 2016, reset to the default 1.7 mt dw for this species (FR Notice 2015 19914; NOAA Fisheries 2015). There was no harvest reported throughout the 2016 harvest season. The quota for the 2017 harvest season, which began on January 1, 2017, was again 1.7mt dw (FR Notice 2016 84491; NOAA Fisheries 2016).

Porbeagle regulations are set on both state and Federal levels, and state regulations are consistent with regulations issued by NMFS. The Atlantic state fishery regulations are promulgated jointly among the states within the Atlantic States Marine Fisheries Commission (ASMFC). In certain instances state regulations may be more restrictive than the corresponding Federal regulations but they cannot allow for a harvest in excess of the federally established TAC. State-specific regulations apply to fisheries within three nautical miles from the shoreline, while Federal regulations apply to fisheries from the three mile limit to the 200 mile nautical mile EEZ. These regulations also apply to U.S. fishermen permitted to fish on and in the high seas.

Recreational fishing for porbeagle shark is allowed year-round. Only hand lines, and hook and line gears are allowed in the recreational fishery. There is a one shark per vessel per trip bag limit, and the shark must have a minimum fork length of 54 inches. All porbeagle sharks must be landed with their fins naturally attached.

Summary

The porbeagle fishery in U.S. waters of the Northwestern Atlantic is managed under a rebuilding plan which allows harvest from directed, bycatch and recreational fisheries. Fishers participating in these fisheries are required to be permitted, either by NMFS or in the state where they are fishing. The total allowable catch is based on the ICCAT/ICES joint stock assessment, which is the best available science. The annual harvest is closed to fishermen when NMFS determines, through federal dealer reports, that at least 80% of the annual quota has been harvested. The commercial quota is adjusted annually, based on the previous year's harvest, to ensure the quota is not exceeded, over a multi-year period. If there is overharvest in one year, the commercial quota for the following year is reduced. There is one TAC for this species which is harvested in U.S. waters, and it encompasses all fish harvested whether they are taken from waters governed by state or federal regulations. The species management plan currently being implemented allows the population to rebuild. According to the results of the 2009 assessment, the Northwestern Atlantic population is increasing.

Conclusion

The Division of Scientific Authority (DSA), based on the information and data available, and management measures currently in place, finds that the export and introduction from the sea of wild porbeagle shark harvested by U.S. fisherman in the 2017 harvest season is not detrimental to the survival of the species, provided that the harvest is in compliance with U.S. management plans in place for the species.

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
Washington, D.C. 20240

OCT 4 - 2017

MEMORANDUM

To: Chief, Division of Management Authority

From: Chief, Branch of Consultation and Monitoring Eleanora Babij

Subject: General advice for the export of common thresher (*Alopias vulpinus*) harvested in the commercial fishery by U.S. fisherman in the Atlantic Ocean, the Gulf of Mexico and the Caribbean Sea in both the 2017 and 2018 harvest seasons.

Advice: *The Division of Scientific Authority (DSA) finds that the export of common thresher (Alopias vulpinus) harvested by U.S. fisherman in the 2017 and 2018 harvest seasons in the Atlantic Ocean, the Gulf of Mexico and the Caribbean is not detrimental to the survival of the species, provided that the harvest is in compliance with the U.S. management plan in place for the species.*

All harvest and export of bigeye thresher (Alopias superciliosus) is prohibited, as per National Marine Fisheries Service regulations.

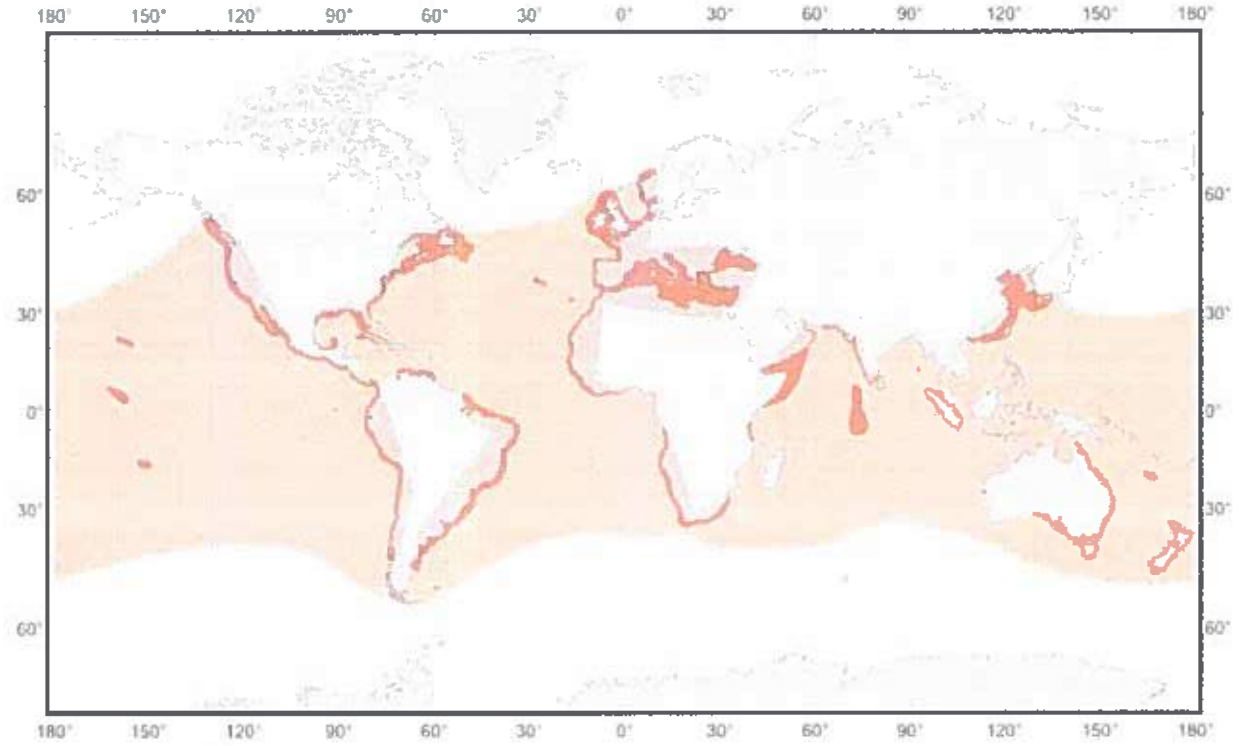
We will review and re-issue a general advice for these thresher sharks annually, beginning with the 2019 harvest season, in an effort to be responsive to new data and information that may become available. This finding only pertains to common thresher sharks caught in the Atlantic Ocean, the Gulf of Mexico and the Caribbean and applications for the export of common and bigeye thresher sharks caught in U.S. waters other than the Atlantic Ocean, the Gulf of Mexico and the Caribbean will be reviewed separately.

Basis for advice:

Species Distribution/Range in the United States

The common thresher (*Alopias vulpinus*) is a highly migratory, circumglobal species which moves regionally but is not known to move between areas such as the Pacific and northwest Atlantic (Moreno et al., 1989; Bedford, 1992; Trejo, 2005). This species is found primarily in warm temperate and tropical waters worldwide at depths shallower than 335 meters; however, the species is most often associated with continental shelf habitat. While this species is known to occur in the open oceans far from land, it is most common within approximately 40-50 nautical miles from shore (Bedford, 1992). In the whole of the North Atlantic, the common thresher is found in the northeast from Norway and the British Isles south to the African coast and in the Western Atlantic it is found from Newfoundland, Canada to southern Argentina, including Gulf of Mexico and the Caribbean (Moreno et al., 1989; Goldman, 2009; Gervelis and Natanson, 2013). In the Pacific they are known to occur in association with several Pacific Islands

including Hawaii and American Samoa. In the Northeast Pacific they occur in the north from British Colombia, Canada south to the coast of Chile in waters from near coastal to 200 miles offshore (Goldman, 2009; Compagno, 1984; Ebert et al., 2014).



Geographic distribution of *A. vulpinus* noting highest concentrations in coastal temperate waters (Source: Compagno 2001).

Biological characteristics

The common thresher shark is the fastest-growing, earliest-maturing and largest of the three *Alopias* species, with historical records indicating that this species can reach maximum lengths in the range of 690-760 cm total length (TL), but maximum size varies among geographic locations (Bigelow and Schroeder, 1948; Hart, 1973; Smith et al., 2008). A common thresher shark measuring 975 cm and weighing 567 kg was recorded in a 2007 commercial trawl harvest in Cornwall, UK (Cleland, 2007). United States West Coast populations of the common thresher shark are estimated to have a maximum size of 550 cm (Smith et al., 2008; Gervelis and Natanson, 2013), whereas studies by Calliet and Bedford (1983) and Bedford (1992) indicate that the largest specimens from the Northwest Atlantic and the California coast range from 487 cm to 573 cm total length (TL).

Maximum age of common thresher sharks has been estimated to be between 15 and 50 years, but additional work refined this estimate to between 22 and 38 years, at least in the Northwest Atlantic (Gervelis and Natanson, 2013). A maximum age estimate of 50 years was suggested by Calliet and Bedford (1983) for populations in the eastern North Pacific, with maturity being reached in this group at between 3 and 8 years of age. Common thresher sharks from the Northwest Atlantic are estimated to reach sexual maturity at 188 cm forked length (FL) and 8

years of age, and 216 cm FL and 12 years of age for males and females, respectively (Gervelis and Natanson, 2013).

Common thresher sharks exhibit aplacental ovoviviparity with oophagy, a reproductive system where eggs are deposited into one of two uterine horns and developing embryos are nourished by feeding on other eggs; gestation is believed to last approximately nine months (PFMC, 2003; Smith et al., 2008). Evidence from the Northeast Atlantic and Eastern Pacific indicate that breeding occurs every other year and that mating occurs in the summertime with pupping occurring the following spring. It is thought that young thresher sharks remain in near-shore nursery areas for the first few years before becoming less reliant on this relatively shallow habitat (PFMC, 2003; Smith et al., 2008; Goldman, 2009; Natanson and Gervelis, 2013). Litter sizes are typically small with 3-4 pups being most common in the Eastern Pacific, but occasionally as many as 6 pups are observed off California), while the average is 3.7 pups per litter in the Northwest Atlantic (Holts, 1988; Moreno et al., 1989; Bedford, 1992; Goldman, 2009; Gervelis and Natanson, 2013).

Population Status and Trends:

In 2009, the IUCN Redlist assessed the common thresher shark (*Alopias vulpinus*) as globally vulnerable and at this time the global population trend was declining. The 2009 assessment indicated the population in the Northwest and Western Central Atlantic was Vulnerable, considering there had been population declines prior to the assessment; the Eastern Central Pacific population was assessed as Near Threatened, given the major declines observed in the population between the late 1970's and the early 1990's (Goldman et al., 2009). Since these major declines additional harvest restrictions have been implemented along the U.S. West Coast and the population has rebounded.

The National Marine Fisheries Service (NMFS) conducted a comprehensive status review of the common thresher shark, along with the bigeye thresher shark, in response to the 2014 petition from the group Friends of Animals to list the common thresher shark as either "threatened" or "endangered" under the Endangered Species Act, and an April, 2015 petition by the Defenders of Wildlife to list the bigeye thresher shark as either "threatened" or "endangered" under the Act. The request to list the common thresher shark specifically asked that the NMFS list the species throughout its entire range, or alternatively, within one or more of six distinct population segments, including: the Eastern Central Pacific, Indo-West Pacific, Northwest and Western Central Atlantic, Southwest Atlantic, Mediterranean, and Northeast Atlantic. The bigeye thresher petition asked that the species either be listed throughout its entire range, or alternatively, listed within one or more distinct population segments, should they be found to exist. Positive 90-days findings indicating that the petitioned actions may be warranted were issued for the common thresher in March, 2015 (Federal Register 80 FR 11379), and then in August, 2015 for the bigeye thresher (Federal Register 80 FR 48061). In April, 2016 the NMFS published a combined 12 month finding, indicating that based on the best scientific and commercial information available, including the status review report (Young et al., 2016), and after taking into account efforts currently being made to protect these species, it was determined that the common thresher (*A. vulpinus*) and the bigeye thresher (*A. superciliosus*) did not warrant ESA listing at this time. It was concluded that neither species is currently in danger of extinction

throughout all or a significant portion of its range nor likely to become so within the foreseeable future (Federal Register 81 FR 18979).

Globally there is a general lack of quantitative abundance data for thresher sharks and therefore, there is a lack of population trend information throughout most of the species' ranges. The available information generally indicates stock declines in areas where the species are targeted and declines are also indicated in some areas where the species are taken primarily as bycatch in fisheries targeting tuna and swordfish. Another issue with most data is that harvest is often reported only to genus level (i.e., as the "thresher complex"), thus precluding the ability to accurately document abundance trends in individual species unless harvested from an area where only one species is encountered, or where there is a known ratio of abundance between the species harvested. Often however, harvest reporting may be totally absent. One notable exception to the general lack of consistent data however is for thresher populations that are encountered and harvested within the Exclusive Economic Zone (EEZ) of the continental United States. This data includes information on both directed harvest and incidental bycatch harvest in commercial fisheries within the EEZ, as well as commercial data on harvest from within state regulated waters inland of the EEZ. Recreational harvest data is also occasionally available, though this harvest is much smaller than that of the commercial fisheries and recreationally harvested specimens cannot be sold commercially. The only available stock assessment for thresher sharks occurring within U.S. waters was recently completed on the common thresher shark stock occurring in waters off the West Coast of North America (Teo et al., 2016). As previously mentioned, a comprehensive worldwide status review was conducted by the NMFS in 2016 on common and bigeye thresher sharks (Young et al., 2016).

According to the Food and Agricultural Administration (FAO) of the United Nations (UN) Global Capture Production dataset, total reported global harvest of thresher sharks (*Alopias* spp.) increased dramatically from 2004 to 2005 then peaked in 2011 at 18,464 metric tonnes (mt). Common thresher shark harvest increased sharply in the late 1990s, peaking in 2000 at 654 mt; worldwide reported catch then declined to 188 mt in 2013. Worldwide landings of bigeye threshers ranged from between 49 and 301mt per year during the years 2000-2009 and then ranged from 27 mt in 2010 to 440 mt per year in 2013. However, FAO data is misleading as it is often incomplete due to harvesters not consistently reporting catch, bycatch, and discards at sea. FAO data is also limited due to lack of species specific reporting and the lack of a consistent data management and reporting system in some nations (Young et al., 2016).

In the Eastern Pacific Ocean, shark catch data is compiled by the Inter-American Tropical Tuna Commission (IATTC), the Regional Fisheries Management Organization (RFMO) operating in this region. Their data includes information on both common and bigeye thresher sharks, which are caught as bycatch in the fisheries targeting tunas and swordfish, primarily using longline and purse-seine gears. Prior to 2005 most shark data consisted of aggregated data where all sharks caught as bycatch were lumped into one category. In a 2005 study, thresher sharks comprised approximately 3% of the shark species observed, with common threshers accounting for only 0.2% of the catch and bigeye and pelagic threshers accounting for approximately 1% each. Unidentified thresher sharks accounted for another 0.7% (Roman-Verdesoto and Orozco-Zellor, 2005). Overall, bycatch of thresher sharks in purse-seine vessels operating in the Eastern Pacific Ocean ranged between 9 and 17 tons per year over the years 2010 through 2014 (IATTC, 2013).

Harvest of common thresher shark peaked along the Pacific Coast of North America in the early 1980s followed by a dramatic decline in the population. In the 1990s, following a series of regulations imposed on the U.S. and Mexican fisheries, the coastal population rebounded. Currently, the population has recovered to a level approximating that seen prior to the peak fishing effort, and due to current regulations harvest has been maintained well below the harvest guidelines of 340 tons per year. Commercial landings of common thresher, for the years 2004-2014 have averaged approximately 115 mt per year. Bigeye threshers were estimated to comprise only about 9% of the total thresher harvest and no bigeye threshers are recorded from catches from 2010 to 2015 (NMFS, 2009; PFMC, 2003; Teo et al., 2016; Young et al., 2016).

In the Western and Central Pacific Ocean, shark catch data is compiled by the Western and Central Pacific Fisheries Commission (WCPFC), the RFMO operating in this region. Like with the IATTC there has been a lack of consistent reporting of shark bycatch data and when such data is available, it is often reported simply as "shark". In 2011, WCPFC instituted a shark reporting requirement which required threshers to be reported by species; yet, several fishing fleets are still not reporting this data (Miller et al., 2014). Bigeye threshers are the most commonly caught species of thresher shark in the WCPFC area, especially in longline fisheries south of Hawaii; common threshers are also caught, although infrequently. Overall, thresher sharks are estimated to only comprise approximately 1.81% of the commonly caught shark species in the longline fisheries operating within the WCPFC region (Clarke et al., 2011). Within the purse-seine fisheries thresher sharks are rarely encountered in this area (Clarke, 2013). Based on Hawaii-based logbook data, overall thresher shark catches have shown an upward trend since 1991, while actual landings data declined from 50 mt in 2001 to 16 mt in 2010; this decline may be the result of the United States' ban on shark finning imposed in 2010 (NMFS, 2011). In the Pacific Island region landings are not generally reported by species, but bigeye threshers are believed to be encountered more frequently than common threshers. Total thresher landings in the Pacific Islands actually declined from 63,314 pounds in 2005 to 39,856 pounds in 2010 (Young et al., 2016).

In the Atlantic Ocean, data on the catch of thresher sharks is compiled by the International Commission for the Conservation of Atlantic Tunas (ICCAT), the RFMO coordinating fisheries management in this area. While pelagic thresher sharks are not found within this region, both bigeye thresher and common thresher are harvested. Approximately 1,142 mt of common thresher sharks were reported harvested to the ICCAT during the years 1993 to 2013, with about 96% being reported by European Union flagged vessels. While this species is harvested using purse seines, gillnets, trawls and trammel nets, approximately 70% of the catch over the years 1987 to 2013 was reported as being caught in the longline fishery; this represented approximately 802 metric tons of the total harvest. Bigeye threshers are also caught in ICCAT regulated fisheries, and between 1993 and 2013 there were approximately 1,608 mt reported; nearly half of this catch was reported by Brazilian fleets. In 2009 ICCAT began prohibiting the retention, transshipping, landing, storing, selling, or offering for sale any part or whole carcass of bigeye thresher sharks, after which reported catch declined dramatically. While the bigeye and common thresher have been harvested along the U.S. Atlantic coast for decades, a prohibition against harvest of bigeye thresher was implemented in the United States in 2000, although they are still caught as bycatch. In 2010, 46 tons of dead, discarded bigeye thresher accounted for the second largest amount of dead discards in the Atlantic, but in 2011 this number had dropped to

27 tons (NMFS, 2010; Young et al., 2016). Results from a variety of studies however, indicate that both species' populations in the Northwest Atlantic, while depleted, appear to have stabilized (Young et al., 2016).

Threats

Globally, overharvest in both directed and bycatch fisheries is the primary threat. Also, there is a general lack of species specific data available to reliably estimate populations and often, when data is available, it is not provided at the species level, thus precluding its use for species specific population estimates. In some areas, species are known to represent a specific proportion of the overall population, thus allowing a relative population estimate to be determined. Unfortunately, even when species specific reporting of shark harvest is required by an RFMO, data is often not available due to non-compliance with reporting requirements. Without reliable population data, populations cannot be assessed. Both meat and fins harvested from directed and bycatch fisheries are utilized from thresher shark fisheries. At this time however, we are unsure of what proportion of harvested thresher shark in the United States is used domestically versus how much enters international trade. Thresher shark fins are believed to be primarily consumed in the Asian market, but it is unclear how much fin trade originates from thresher sharks harvested in U.S. waters.

Species Management:

At the global level, the entire family Alopiidae, which only includes the three CITES listed thresher shark species, the common thresher *(Alopias vulpinus),* the bigeye thresher *(Alopias superciliosus)* and the pelagic thresher (*Alopias pelagicus)*, are listed among the Highly Migratory Species (Annex 1) in the United Nations (UN) Convention on the Law of the Sea (UNCLOS). The 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, which builds on UNCLOS and has been in force since 2001, encourages States to cooperate on these multijurisdictional stocks through regional and sub-regional management bodies. Since the Agreement's inception there have been regional agreements aimed at conserving these migratory stocks but while the agreement's aim is conservation, there are relatively few enforcement measures specific to thresher sharks.

Also globally, on November 9, 2014, the common thresher (*Alopias vulpinus*), the pelagic thresher (*Alopias pelagicus*) and the bigeye thresher (*Alopias superciliosus*) were listed under Appendix II of the Convention on Migratory Species of Wild Animals (CMS or Bonn Convention). The CMS provides a global platform for the conservation and sustainable use of migratory animals and their habitats. A CMS Appendix II listing acknowledges that these species need, or would greatly benefit from, international cooperation on management and encourages Parties to take cooperative actions on management, including establishing global or regional measures to conserve the species. CMS decisions may also trigger management responses nationally. It should be noted that the United States is not a Party to CMS.

At the regional level, the International Commission for the Conservation of Atlantic Tunas (ICCAT) manages tunas and tuna-like species and adopts measures to address bycatch of other species caught in association with ICCAT fisheries. ICCAT, an intergovernmental regional

fishery management organization founded in 1969, has 50 Contracting Parties and its Convention area spans the entire Atlantic Ocean, including the Gulf of Mexico, Caribbean and Mediterranean Seas. Under a recommendation adopted in 2004, ICCAT Parties are required to report data on catches of sharks in all fisheries managed by ICCAT. However, catch data for sharks (including threshers) are still not reported by many Contracting Parties. Effective in 2010, ICCAT Recommendation 09-07 established a prohibition on retaining onboard, transshipping, landing, storing, selling, or offering for sale any part or whole carcass of a bigeye thresher shark (*Alopias superciliosus*) taken in the Convention area in association with ICCAT fisheries; exempted from this recommendation are Mexican small-scale coastal fisheries with a catch of less than 110 fish. Annual reporting of all thresher species' harvest, discards and releases is required by this ICCAT measure.

At the national level, since 1993 the United States has had a species management plan for all sharks, including the common thresher shark (*Alopias vulpinus*) and bigeye thresher (*A. superciliosus*), in the U.S. Atlantic, Gulf of Mexico, and the Caribbean Sea. Under the 2006 Consolidated Atlantic Highly Migratory Species (HMS) Fishery Management Plan (FMP) and its amendments, the harvest of the bigeye thresher is prohibited. While fishermen may harvest common thresher, there are regulatory measures in place to limit mortality of this species that include commercial and recreational permits, commercial quotas, and recreational size limits. The HMS FMP and its amendments do not manage the pelagic thresher shark as this species does not occur within this range. The commercial quota, while not being based on a species or Alopias spp. based stock assessment, is based on the best available science which includes several studies involving thresher shark population dynamics. These studies are comprehensively reviewed and evaluated in the 2016 Status Review of the Common and Bigeye Thresher Sharks (Young et al., 2016).

In the United States, the population of thresher sharks in the Atlantic, Gulf of Mexico and Caribbean are managed as part of a shark complex which includes common thresher, oceanic whitetip and shortfin mako sharks; harvest of bigeye thresher is prohibited. This group of sharks, referred to as "Pelagic sharks other than porbeagle and blue sharks" (PS) has an overall quota of 488 mt dressed weight (dw) for 2017. Unlike other shark management groups, the PS do not have a regional quota so any commercial harvest of these sharks by U.S. fishermen within the Atlantic, Gulf of Mexico and the Caribbean all are counted against the 488 mt annual quota.

The Atlantic pelagic species group was issued its first group quota in 1993 and the maximum sustainable yield for this group was calculated as 1,560 mt dw, based on an average of the 1986 to 1991 commercial landings. Subsequently, indications that Atlantic shark populations were declining resulted in a reduction of the quota for this group to 580 mt in 1997. In 1999 several regulations concerning the harvest of pelagic species were modified resulting in a new quota of 853 mt dw. This quota was apportioned between porbeagle, blue shark and other pelagic sharks with quotas of 92 mt dw, 273 mt dw and 488 mt dw, respectively. Additional regulation changes in 1999 included limiting the recreational catch to 1 shark per vessel per trip with a minimum size of 137cm fork length (fl) and a harvest prohibition on bigeye thresher. Ultimately, the quota system allows for the 488 mt dw quota to be distributed among oceanic whitetip, shortfin mako and common thresher sharks. Species specific quotas have not been implemented due the general lack of sufficient reliable data available for each species

individually, but over the years 2004 to 2007, the average commercial harvests for shortfin mako was 72 mt dw and the combined harvest for oceanic whitetip and common thresher was only 17.5 mt dw, thus leaving a large surplus within the pelagic species group available for harvest (NMFS 2008; Young et al., 2016).

In addition to the annual harvest quota for pelagic sharks in the U.S. Atlantic, Gulf of Mexico and Caribbean, license and reporting requirements, size limit and gear restrictions for commercial and recreational fishermen are used to regulate the harvest. Commercial permits are issued for both the directed and bycatch fisheries. In the directed fishery, of which there were approximately 85 commercial permits between the years 2004 and 2007, fishermen target pelagic sharks, while in the incidental fishery fishermen target other species but retain the sharks that are caught incidentally. A directed permit allows the holder to harvest an unlimited number of individual pelagic sharks per trip while the incidental permit allows the holder to harvest 16 pelagic and/or small coastal sharks (SCS) combined per trip. Currently there is no minimum size limit for the commercial harvest of pelagic sharks.

Once the annual harvest quota is reached, the fishery is closed and neither directed nor incidental permit holders may land pelagic species group sharks, but shark dealers are allowed to sell any sharks that were stored before the closure. Commercial fishermen may use bottom longline, gillnet, rod and reel, handline, and bandit gear. Dealers who purchase pelagic shark from commercial fisherman must adhere to strict reporting requirements. A recreational permit is issued to an individual who may be on a vessel that harvests up to one pelagic shark per day. For most sharks, including common thresher, there is a minimum size limit of 54 inches (fork length); a recreationally caught shark cannot be sold. Recreational fishing for pelagic sharks is allowed year-round and only rod and reel and handline are allowed. All fish landed in both the recreational and commercial fisheries must be landed with their fins naturally attached. While commercial fishermen are allowed to remove the head and viscera, recreational fishermen must keep the head naturally attached, although they are allowed to remove the viscera and bleed the fish.

The harvest of the Atlantic pelagic shark complex is monitored through reporting by fishermen and dealers. The commercial fishermen must report their directed and incidental catch to NMFS within seven days of landing at the dock and the dealers must report activity every Tuesday for purchases made the previous Sunday through Saturday time period. When a level of 80% of the annual quota has been reported, the fishery is closed to further harvest; this closure becomes effective five days after a notice is issued. The buffer of the additional 20% of quota is to allow time for fish already harvested to be landed and reported. If the annual quota is exceeded, the overharvest is deducted from the following year's harvest quota. Through this accounting measure, the calculated annual harvest quota averages out to the allowed annual harvest over a series of years. Also, due to the real-time nature of the harvest reporting, there is less chance of harvesting significantly more than any one year's quota allocation. The Atlantic 2017 harvest season opened on January 1, 2017 and the Atlantic 2018 harvest season will begin on January 1, 2018; both the opening of the season and the seasonal quota are adjusted annually based on harvest from the prior year. As of September 22, 2017, only 17 percent of the 2017 harvest season quota of the Pelagic Species group, which includes the thresher sharks, had been

harvested; therefore, no change is anticipated in the 2018 harvest season quota, or harvest season opening date.

Pelagic shark regulations are set on both state and federal levels, and state regulations are consistent with regulations issued by NMFS. In the Atlantic, state fishery regulations are promulgated jointly among the states within the Atlantic States Marine Fisheries Commission (ASMFC). In certain instances, state regulations may be more restrictive than the corresponding federal regulations but they cannot allow for a harvest in excess of the federally established quota. State specific regulations apply to fisheries within three nautical miles from the shoreline, while federal regulations apply to fisheries from the three-mile limit to the 200 mile nautical mile EEZ (ASMFC 2008, ASMFC 2013).

Summary

The common thresher shark fisheries in U.S. waters of the Northwest Atlantic, Gulf of Mexico and Caribbean Sea are managed under a quota system which allows harvest from directed, bycatch and recreational fisheries in a combined pelagic species group. Anyone participating in these fisheries is required to be licensed, either by the NMFS or in the state where they are fishing. The quota under which this system is managed is determined based on the best available data which includes numerous studies related to pelagic species' population dynamics and historical harvest records from the directed, bycatch and recreational fisheries. The annual harvest is closed to fishermen when the NMFS determines, through harvester and dealer reports, that 80% of the annual quota has been harvested. The harvest quota is adjusted annually, based on the previous year's harvest, to insure the quota is not exceeded over a multi-year period. If there is overharvest in one year, the quota for the following year is reduced. There is one combined quota for the three species of the pelagic species management group, which are harvested in the U.S. Atlantic, Gulf of Mexico and Caribbean waters and encompasses all fish harvested whether they are taken from waters governed by state or federal regulations. The species management plan currently in place is designed to ensure that the populations of the pelagic species within the management group remain stabilized or increase and that harvests recorded since the plan was implemented do not exceed the established quota.

Conclusion

The Division of Scientific Authority (DSA), based on the information and data available, and management measures currently in place, finds that the export of wild common thresher sharks harvested by U.S. fishermen in the Atlantic Ocean, Gulf of Mexico and Caribbean in the 2017 and 2018 harvest seasons is not detrimental to the survival of the species, provided the harvest is in compliance with the U.S. management plan in place for the species.

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Subpart D—Factors Considered in Making Certain Findings

§ 23.60 What factors are considered in making a legal acquisition finding?

(a) *Purpose*. Articles III, IV, and V of the Treaty require a Management Authority to make a legal acquisition finding before issuing export permits and re-export certificates. The Parties have agreed that a legal acquisition finding must also be made before issuing certain CITES exemption documents.

(b) *Types of legal acquisition*. Legal acquisition refers to whether the specimen and its parental stock were:

(1) Obtained in accordance with the provisions of national laws for the protection of wildlife and plants. In the United States, these laws include all applicable local, State, Federal, tribal, and foreign laws; and

(2) If previously traded, traded internationally in accordance with the provisions of CITES.

(c) *How we make our findings*. We make a finding that a specimen was legally acquired in the following way:

(1) The applicant must provide sufficient information (see § 23.34) for us to make a legal acquisition finding.

(2) We make this finding after considering all available information.

(3) The amount of information we need to make the finding is based on our review of general factors described in paragraph (d) of this section and additional specific factors described in paragraphs (e) through (k) of this section.

(4) As necessary, we consult with foreign Management and Scientific Authorities, the CITES Secretariat, State conservation agencies, Tribes, FWS Law Enforcement, APHIS or CBP, and other appropriate experts.

(d) *Risk assessment*. We review the general factors listed in this paragraph and additional specific factors in paragraphs (e) through (k) of this section to assess the level of scrutiny and amount of information we need to make a find- ing of legal acquisition. We give less scrutiny and require less-detailed in- formation when there is a low risk that specimens to be exported or re-ex- ported were not legally acquired, and give more scrutiny and require more detailed information when the pro- posed activity poses greater risk. We consider the cumulative risks, recog- nizing that each aspect of the inter- national trade has a continuum of risk from high to low associated with it as follows:

(1) *Status of the species*: From Appendix I to Appendix III.

(2) *Origin of the specimen*: From wild-collected to born or propagated in a controlled environment to bred in captivity or artificially propagated.

(3) *Source of the propagule used to grow the plant*: From documentation that the plant was grown from a non-ex- empt seed or seedling to documenta- tion that the plant was grown from an exempt seed or seedling.

(4) *Origin of the species*: From species native to the United States or its bordering countries of Mexico or Canada to nonnative species from other countries.

(5) *Volume of illegal trade*: From high to low occurrence of illegal trade.

(6) *Type of trade*: From commercial to noncommercial.

(7) *Trade by range countries*: From range countries that do not allow commercial export, or allow only limited noncommercial export of the species, to range countries that allow commercial export in high volumes.

(8) *Occurrence of the species in a controlled environment in the United States*: From uncommon to common in a controlled environment in the United States.

(9) *Ability of the species to be bred or propagated readily in a controlled environment*: From no documentation that the species can be bred or propagated readily in a controlled environment to widely accepted information that the species is commonly bred or propagated.

(10) *Genetic status of the specimen*: From a purebred species to a hybrid.

(e) *Captive-bred wildlife or a cultivated plant*. For a specimen that is captive- bred or cultivated, we may consider whether the parental stock was legally acquired.

(f) *Confiscated specimen*. For a confiscated Appendix-II or -III specimen, we consider whether information shows that the transfer of the confiscated specimen or its offspring met the con- ditions of the remission decision, legal settlement, or disposal action after for- feiture or abandonment.

(g) *Donated specimen of unknown ori- gin*. For an unsolicited specimen of un- known origin donated to a public insti- tution (see § 10.12 of this subchapter), we consider whether:

(1) The public institution follows standard recordkeeping practices and has made reasonable efforts to obtain supporting information on the origin of the specimen.

(2) The public institution provides sufficient information to show it made a reasonable effort to find a suitable recipient in the United States.

(3) The export will provide a conservation benefit to the species.

(4) No persuasive information exists on illegal transactions involving the specimen.

(5) The export is noncommercial, with no money or barter exchanged except for shipping costs.

(6) The institution has no history of receiving a series of rare and valuable specimens or a large quantity of wildlife or plants of unknown origin.

(h) *Imported previously*. For a specimen that was previously imported into the United States, we consider any reliable, relevant information we receive concerning the validity of a CITES document, regardless of whether the shipment was cleared by FWS, APHIS, or CBP.

(i) *Personal use*. For a wildlife or plant specimen that is being exported or re-exported for personal use by the applicant, we consider whether:

(1) The specimen was acquired in the United States and possessed for strict- ly personal use.

(2) The number of specimens is reasonably appropriate for the nature of your export or re-export as personal use.

(3) No persuasive evidence exists on illegal transactions involving the specimen.

(j) *Sequential ownership*. For a specimen that was previously possessed by someone other than the applicant, we may consider the history of ownership for a specimen and its parental stock, breeding stock, or cultivated parental stock.

(k) *Wild-collected in the United States*. For a specimen collected from the wild in the United States, we consider the site where the specimen was collected, whether the species is known to occur at that site, the abundance of the species at that site, and, if necessary, whether permission of the appropriate management agency or landowner was obtained to collect the specimen.

§ 23.61 What factors are considered in making a non-detriment finding?

(a) *Purpose*. Articles III and IV of the Treaty require that, before we issue a CITES document, we find that a proposed export or introduction from the sea of Appendix-I or -II specimens is not detrimental to the survival of the species and that a proposed import of an Appendix-I specimen is for purposes that would not be detrimental to the survival of the species.

(b) *Types of detriment*. Detrimental activities, depending on the species, could include, among other things, unsustainable use and any activities that would pose a net harm to the status of the species in the wild. For Appendix-I species, it also includes use or removal from the wild that results in habitat loss or destruction, interference with recovery efforts for a species, or stimulation of further trade.

(c) *General factors*. The applicant must provide sufficient information for us to make a finding of non-detriment. In addition to factors in paragraphs (d) and (e) of this section, we will consider whether:

(1) Biological and management information demonstrates that the proposed activity represents sustainable use.

(2) The removal of the animal or plant from the wild is part of a biologically based sustainable-use management plan that is designed to eliminate over-utilization of the species.

(3) If no sustainable-use management plan has been established, the removal of the animal or plant from the wild would not contribute to the over-utilization of the species, considering both domestic and international uses.

(4) The proposed activity, including the methods used to acquire the specimen, would pose no net harm to the status of the species in the wild.

(5) The proposed activity would not lead to long-term declines that would place the viability of the affected population in question.

(6) The proposed activity would not lead to significant habitat or range loss or restriction.

(d) *Additional factor for Appendix-II species*. In addition to the general fac- tors in paragraph (c) of this section, we will consider whether the intended ex- port of an Appendix-II species would cause a significant risk that the spe- cies would qualify for inclusion in Ap- pendix I.

(e) *Additional factors for Appendix-I species*. In addition to the general factors in paragraph (c) of this section, we will consider whether the proposed activity:

(1) Would not cause an increased risk of extinction for either the species as a whole or the population from which the specimen was obtained.

(2) Would not interfere with the recovery of the species.

(3) Would not stimulate additional trade in the species. If the proposed activity does stimulate trade, we will consider whether the anticipated increase in trade would lead to the decline of the species.

(f) *How we make our findings*. We base the non-detriment finding on the best available biological information. We also consider trade information, in- cluding trade demand, and other sci- entific management information. We make a non-detriment finding in the following way:

(1) We consult with the States, Tribes, other Federal agencies, scientists, other experts, and the range countries of the species.

(2) We consult with the Secretariat and other Parties to monitor the level of trade that is occurring in the spe- cies.

(3) Based on the factors in paragraphs (c) through (e) of this section, we evaluate the biological impact of the proposed activity.

(4) In cases where insufficient information is available or the factors above are not satisfactorily addressed, we take precautionary measures and would be unable to make the required finding of non-detriment.

(g) *Risk assessment*. We review the status of the species in the wild and the degree of risk the proposed activity poses to the species to determine the level of scrutiny needed to make a finding. We give greater scrutiny and require more detailed information for activities that pose a greater risk to a species in the wild. We consider the cumulative risks, recognizing that each aspect of international trade has a continuum of risk (from high to low) associated with it as follows:

(1) *Status of the species*: From Appendix I to Appendix II.

(2) *Origin of the specimen*: From wild-collected to born or propagated in a controlled environment to bred in captivity or artificially propagated.

(3) *Source of the propagule used to grow the plant*: From documentation that the plant was grown from a non-ex- empt seed or seedling to documenta- tion that the plant was grown from an exempt seed or seedling.

(4) *Origin of the species*: From native species to nonnative species.

(5) *Volume of legal trade*: From high to low occurrence of legal trade.

(6) *Volume of illegal trade*: From high to low occurrence of illegal trade.

(7) *Type of trade*: From commercial to noncommercial.

(8) *Genetic status of the specimen*: From a purebred species to a hybrid.

(9) *Risk of disease transmission*: From high to limited risk of disease transmission.

(10) *Basis for listing*: From listed under Article II(1) or II(2)(a) of the Treaty to listed under Article II(2)(b).

(h) *Quotas for Appendix-I species*. When an export quota has been set by the CoP for an Appendix-I species, we

will consider the scientific and management basis of the quota together with the best available biological information when we make our non-detriment finding. We will contact the Scientific and Management Authorities of the exporting country for further information if needed.

§ 23.62 What factors are considered in making a finding of not for primarily commercial purposes?

(a) *Purpose*. Under Article III(3(c)) and (5(c)) of the Treaty, an import permit or an introduction-from-the-sea certificate for Appendix-I species can be issued only if the Management Authority is satisfied that the specimen is not to be used for primarily commercial purposes. Trade in Appendix-I species must be subject to particularly strict regulation and authorized only in exceptional circumstances.

(b) *How we make our findings*. We must find that the intended use of the Appendix-I specimen is not for primarily commercial purposes before we can issue a CITES document.

(1) We will make this decision on a case-by-case basis considering all available information.

(2) The applicant must provide sufficient information to satisfy us that the intended use is not for primarily commercial purposes.

(3) The definitions of ''commercial'' and ''primarily commercial purposes'' in § 23.5 apply.

(4) We will look at all aspects of the intended use of the specimen. If the noncommercial aspects do not clearly predominate, we will consider the import or introduction from the sea to be for primarily commercial purposes.

(5) While the nature of the transaction between the owner in the country of export and the recipient in the country of import or introduction from the sea may have some commercial aspects, such as the exchange of money to cover the costs of shipment and care of specimens during transport, it is the intended use of the specimen, including the purpose of the export, that must not be for primarily commercial pur- poses.

(6) We will conduct an assessment of factors listed in paragraph (d) of this section. For activities involving an anticipated measurable increase in revenue and other economic value associated with the intended use, we will conduct an analysis as described in paragraph (e) of this section.

(7) All net profits generated in the United States from activities associated with the import of an Appendix-I species must be used for conservation of that species.

(c) *Examples*. The following are examples of types of transactions in which the noncommercial aspects of the intended use of the specimen may predominate depending on the facts of each situation. The discussions of each example provide further guidance in assessing the actual degree of commerciality on a case-by-case basis. These examples outline circumstances commonly encountered and do not cover all situations where import or introduction from the sea could be found to be not for primarily commercial purposes.

(1) *Personal use*. Import or introduction from the sea of an Appendix-I specimen for personal use generally is considered to be not for primarily commercial purposes. An example is the import of a personal sport-hunted trophy by the person who hunted the wildlife for display in his or her own home.

(2) *Scientific purposes*. The import or introduction from the sea of an Appendix-I specimen by a scientist or scientific institution may be permitted in situations where resale, commercial exchange, or exhibit of the specimen for economic benefit is not the primary intended use.

(3) *Conservation, education, or training*. Generally an Appendix-I specimen may be imported or introduced from the sea by government agencies or nonprofit institutions for purposes of conservation, education, or training. For exam- ple, a specimen could be imported or introduced from the sea primarily to train customs staff in effective CITES control, such as for identification of certain types of specimens.

(4) *Biomedical industry*. Import or introduction from the sea of an Appendix-I specimen by an institution or company in the biomedical industry is initially presumed to be commercial since specimens are typically imported or introduced from the sea to develop

and sell products that promote public health for profit. However, if the importer clearly shows that the sale of products is only incidental to public health research and not for the primary purpose of economic benefit or profit, then such an import or introduction from the sea could be considered as scientific research under paragraph (c)(2) of this section if the principles of paragraph (b) of this section are met.

(5) *Captive-breeding or artificial propagation programs.* The import of an Appendix-I specimen for purposes of establishing a commercial operation for breeding or artificial propagation is considered to be for primarily commercial purposes. As a general rule, import or introduction from the sea of an Appendix-I specimen for a captive-breeding or artificial propagation program must have as a priority the long-term protection and recovery of the species in the wild. The captive-breeding or artificial propagation program must be part of a program aimed at the recov- ery of the species in the wild and be undertaken with the support of a country within the species' native range. Any profit gained must be used to support this recovery program. If a captive- breeding or artificial propagation oper- ation plans to sell surplus specimens to help offset the costs of its program, im- port or introduction from the sea would be allowed only if any profit would be used to support the captive- breeding or artificial propagation pro- gram to the benefit of the Appendix-I species, not for the personal economic benefit of a private individual or share- holder.

(6) *Professional dealers.* Import or introduction from the sea by a professional dealer who states a general intention to eventually sell the specimen or its offspring to an undetermined recipient would be considered to be for primarily commercial purposes. However, import or introduction from the sea through a professional dealer by a qualified applicant may be acceptable if the ultimate intended use would be for one of the purposes set out in paragraphs (c)(2), (3), and (5) of this section and where a binding contract, conditioned on the issuing of permits, is in place.

(d) *Risk assessment.* We review the factors listed in this paragraph (d) to assess the level of scrutiny and amount of information we need to make a find- ing of whether the intended use of the specimen is not for primarily commercial purposes. We give less scrutiny and require less detailed information when the import or introduction from the sea poses a low risk of being primarily commercial, and give more scrutiny and require more detailed information when the proposed activity poses greater risk. We consider the cumulative risks, recognizing that each aspect of the international trade has a continuum of risk from high to low associated with it as follows:

(1) *Type of importer*: From for-profit entity to private individual to nonprofit entity.

(2) *Ability of the proposed uses to generate revenue*: From the ability to generate measurable increases in revenue or other economic value to no antici- pated increases in revenue or other economic value.

(3) *Appeal of the species*: From high public appeal to low public appeal.

(4) *Occurrence of the species in the United States*: From uncommon to common in a controlled environment in the United States.

(5) *Intended use of offspring*: From commercial to noncommercial.

(e) *Analysis of anticipated revenues and other economic value.* We will analyze revenues and other economic value anticipated to result from the use of the specimen for activities with a high risk of being primarily commercial.

(1) We will examine the proposed use of any net profits generated in the United States. We consider net profit to include all funds or other valuable considerations (including enhanced value of common stock shares) re- ceived or attained by you or those af- filiated with you as a result of the im- port or introduction from the sea, to the extent that such funds or other val- uable considerations exceed the reason- able expenses that are properly attrib- utable to the proposed activity.

(2) We will consider any conservation project to be funded and, if the species was or is to be taken from the wild, how the project benefits the species in its native range, including agreements,

timeframes for accomplishing tasks, and anticipated benefits to the species.

(3) We will consider any plans to monitor a proposed conservation project, including expenditure of funds or completion of tasks.

(4) In rare cases involving unusually high net profits, we will require the applicant to provide a detailed analysis of expected revenue (both direct and indirect) and expenses to show anticipated net profit, and a statement from a licensed, independent certified public accountant that the internal accounting system is sufficient to account for and track funds generated by the proposed activities.

§ 23.63 What factors are considered in making a finding that an animal is bred in captivity?

(a) *Purpose*. Article VII(4) and (5) of the Treaty provide exemptions that allow for the special treatment of wild- life that was bred in captivity (see §§ 23.41 and 23.46).

(b) *Definitions*. The following terms apply when determining whether specimens qualify as ''bred in captivity'':

(1) A *controlled environment* means one that is actively manipulated for the purpose of producing specimens of a particular species; that has bound- aries designed to prevent specimens, including eggs or gametes, from entering or leaving the controlled environment; and has general characteristics that may include artificial housing, waste removal, provision of veterinary care, protection from predators, and artificially supplied food.

(2) *Breeding stock* means an ensemble of captive wildlife used for reproduction.

(c) *Bred-in-captivity criteria*. For a specimen to qualify as bred in captivity, we must be satisfied that all the following criteria are met:

(1) If reproduction is sexual, the specimen was born to parents that either mated or transferred gametes in a controlled environment.

(2) If reproduction is asexual, the parent was in a controlled environment when development of the offspring began.

(3) The breeding stock meets all of the following criteria:

(i) Was established in accordance with the provisions of CITES and relevant national laws.

(ii) Was established in a manner not detrimental to the survival of the species in the wild.

(iii) Is maintained with only occasional introduction of wild specimens as provided in paragraph (d) of this section.

(iv) Has consistently produced offspring of second or subsequent generations in a controlled environment, or is managed in a way that has been demonstrated to be capable of reliably producing second-generation offspring and has produced first-generation offspring.

(d) *Addition of wild specimens*. A very limited number of wild specimens (including eggs or gametes) may be introduced into a breeding stock if all of the following conditions are met (for Appendix-I specimens see also § 23.46(b)(12)):

(1) The specimens were acquired in accordance with the provisions of CITES and relevant national laws.

(2) The specimens were acquired in a manner not detrimental to the survival of the species in the wild.

(3) The specimens were added either to prevent or alleviate deleterious inbreeding, with the number of speci- mens added as determined by the need for new genetic material, or to dispose of confiscated animals.

§ 23.64 What factors are considered in making a finding that a plant is artificially propagated?

(a) *Purpose*. Article VII(4) and (5) of the Treaty provide exemptions that allow for special treatment of plants that were artificially propagated (see §§ 23.40 and 23.47).

(b) *Definition*s. The following terms apply when determining whether specimens qualify as ''artificially propagated'':

(1) *Controlled conditions* means a nonnatural environment that is intensively manipulated by human intervention for the purpose of plant production. General characteristics of controlled conditions may include, but are not limited to, tillage, fertilization, weed and pest control, irrigation, or nursery operations such as potting, bedding, or protection from weather.

(2) *Cultivated parental stock* means the ensemble of plants grown under controlled conditions that are used for reproduction.

(c) *Artificially propagated criteria*. Except as provided in paragraphs (f) and (g) of this section, for a plant specimen to qualify as artificially propagated, we must be satisfied that the plant specimen was grown under controlled conditions from a seed, cutting, divi- sion, callus tissue, other plant tissue, spore, or other propagule that either is exempt from the provisions of CITES or has been derived from cultivated pa- rental stock. The cultivated parental stock must meet all of the following criteria:

(1) Was established in accordance with the provisions of CITES and relevant national laws.

(2) Was established in a manner not detrimental to the survival of the species in the wild.

(3) Is maintained in sufficient quantities for propagation so as to minimize or eliminate the need for augmentation from the wild, with such augmentation occurring only as an exception and limited to the amount necessary to maintain the vigor and productivity of the cultivated parental stock.

(d) *Cutting or division*. A plant grown from a cutting or division is considered to be artificially propagated only if the traded specimen does not contain any material collected from the wild.

(e) *Grafted plant*. A grafted plant is artificially propagated only when both the rootstock and the material grafted to it have been taken from specimens that were artificially propagated in accordance with paragraph (c) of this section. A grafted specimen that consists of taxa from different Appendices is treated as a specimen of the taxon listed in the more restrictive Appendix.

(f) *Timber*. Timber taken from trees planted and grown in a monospecific plantation is considered artificially propagated if the seeds or other propagules from which the trees are grown were legally acquired and obtained in a non-detrimental manner.

(g) *Exception for certain plant specimens grown from wild-collected seeds or spores*. Plant specimens grown from wild-collected seeds or spores may be considered artificially propagated only when all of the following conditions have been met:

(1) Establishment of a cultivated parental stock for the taxon presents significant difficulties because specimens take a long time to reach reproductive age.

(2) The seeds or spores are collected from the wild and grown under controlled conditions within a range country, which must also be the country of origin of the seeds or spores.

(3) The Management Authority of the range country has determined that the collection of seeds or spores was legal and consistent with relevant national laws for the protection and conservation of the species.

(4) The Scientific Authority of the range country has determined that collection of the seeds or spores was not detrimental to the survival of the species in the wild, and allowing trade in such specimens has a positive effect on the conservation of wild populations. In making these determinations, all of the following conditions must be met:

(i) The collection of seeds or spores for this purpose must be limited in such a manner as to allow regeneration of the wild population.

(ii) A portion of the plants produced must be used to establish plantations to serve as cultivated parental stock in the future and become an additional source of seeds or spores and thus re- duce or eliminate the need to collect seeds from the wild.

(iii) A portion of the plants produced must be used for replanting in the wild, to enhance recovery of existing populations or to re-establish populations that have been extirpated.

(5) Operations propagating Appendix-I species for commercial purposes must be registered with the CITES Secre- tariat in accordance with the Guide- lines for the registration of nurseries exporting artificially propagated speci- mens of Appendix-I species.

§ 23.65 What factors are considered in making a finding that an applicant is suitably equipped to house and care for a live specimen?

(a) *Purpose*. Under Article III(3)(b) and (5)(b) of the Treaty, an import permit or introduction-from-the-sea certificate for live Appendix-I specimens

can be issued only if we are satisfied that the recipients are suitably equipped to house and care for them.

(b) *General principles.* We will follow these general principles in making a decision on whether an applicant has facilities that would provide proper housing to maintain the specimens for the intended purpose and the expertise to provide proper care and husbandry or horticultural practices.

(1) All persons who would be receiving a specimen must be identified in an application and their facilities approved by us, including persons who are likely to receive a specimen within 1 year after it arrives in the United States.

(2) The applicant must provide sufficient information for us to make a finding, including, but not limited to, a description of the facility, photographs, or construction plans, and resumes of the recipient or staff who will care for the specimen.

(3) We use the best available information on the requirements of the species in making a decision and will consult with experts and other Federal and State agencies, as necessary and appro- priate.

(4) The degree of scrutiny that we give an application is based on the biological and husbandry or horticultural needs of the species.

(c) *Specific factors considered for wildlife.* In addition to the general provisions in paragraph (e) of this section, we consider the following factors in evaluating suitable housing and care for wildlife:

(1) Enclosures constructed and maintained so as to provide sufficient space to allow each animal to make normal postural and social adjustments with adequate freedom of movement. Inadequate space may be indicated by evidence of malnutrition, poor condition, debility, stress, or abnormal behavior patterns.

(2) Appropriate forms of environmental enrichment, such as nesting material, perches, climbing apparatus, ground substrate, or other species-specific materials or objects.

(3) If the wildlife is on public display, an off-exhibit area, consisting of indoor and outdoor accommodations, as appropriate, that can house the wildlife on a long-term basis if necessary.

(4) Provision of water and nutritious food of a nature and in a way that are appropriate for the species.

(5) Staff who are trained and experienced in providing proper daily care and maintenance for the species being imported or introduced from the sea, or for a closely related species.

(6) Readily available veterinary care or veterinary staff experienced with the species or a closely related species, including emergency care.

(d) *Specific factors considered for plants.* In addition to the general provisions in paragraph (e) of the section, we consider the following factors in evaluating suitable housing and care for plants:

(1) Sufficient space, appropriate lighting, and other environmental conditions that will ensure proper growth.

(2) Ability to provide appropriate culture, such as water, fertilizer, and pest and disease control.

(3) Staff with experience with the imported species or related species with similar horticultural requirements.

(e) *General factors considered for wildlife and plants.* In addition to the spe- cific provisions in paragraphs (c) or (d) of this section, we will consider the fol- lowing factors in evaluating suitable housing and care for wildlife and plants:

(1) Adequate enclosures or holding areas to prevent escape or unplanned exchange of genetic material with specimens of the same or different species outside the facility.

(2) Appropriate security to prevent theft of specimens and measures taken to rectify any previous theft or secu- rity problem.

(3) A reasonable survival rate of specimens of the same species or, alternatively, closely related species at the facility, mortalities for the previous 3 years, significant injuries to wildlife or damage to plants, occurrence of significant disease outbreaks during the previous 3 years, and measures taken to prevent similar mortalities, injuries, damage, or diseases. Significant injuries, damage, or disease outbreaks are those that are permanently debilitating or re-occurring.

(4) Sufficient funding on a long-term basis to cover the cost of maintaining the facility and the specimens im- ported.

(f) *Incomplete facilities or insufficient staff.* For applications submitted to us before the facilities to hold the speci- men are completed or the staff is iden- tified or properly trained, we will:

(1) Review all available information, including construction plans or in- tended staffing, and make a finding based on this information.

(2) Place a condition on any permit that the import cannot occur until the facility has been completed or the staff hired and trained, and approved by us.

MVOTMA
Ministerio de Vivienda Ordenamiento Territorial y Medio Ambiente

DIRECCION NACIONAL DE MEDIO AMBIENTE
Autoridad Administrativa
CITES-Uruguay

Galicia 1154 Of. 11-12-13 – 11100 Montevideo, URUGUAY
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DÍA MUNDIAL DE LA VIDA SILVESTRE
3 MARZO

Montevideo, 24 de abril de 2018.

Señor Secretario General de la CITES
David Morgan

De nuestra mayor consideración:

Nos dirigimos a Usted a efectos de dar cumplimiento a lo solicitado en la Notificación a las Partes Nº 2018/041 de 23 de abril de 2018, y según lo recomendado en la Res. Conf. 12.6 (Rev. CoP17), relativa a aportar nueva información sobre las actividades en materia de conservación y gestión de tiburones y rayas.
Desde nuestro informe anterior de mayo de 2017 y según lo reportado tras la Notificación a las Partes Nº 2017/031 de 11 de abril de 2017, se han adoptado dos nuevas resoluciones en el marco de la Comisión Técnica Mixta del Frente Marítimo de Argentina y Uruguay (CTMFM – ZCPAU), relativas a la conservación de Condrictios, que se agregan en negrita al final del resumen de actividades:

- Ley general de pesca y acuicultura Nº 19.175 de 20 de diciembre de 2013.
- PAN - *IPOA Sharks* 2015: Plan de Acción Nacional para la Conservación de Condrictios y Aves Marinas en las Pesquería Uruguayas, revisado en su nueva edición de 2015, que deriva del primer PAN - Condrictios (2008).
- Res. CTMFM 05-09: Prohibición de "aleteo" (finning) en tiburones dentro de la ZCPAU.
- Decreto Nº 67/013: Prohíbe captura y desembarco del tiburón pinocho (*porbeagle*) *Lamna nasus*.
- Recomendaciones ICCAT Nº 08/07 y Nº 34/10, prohíbe la captura de tiburón zorro de ojo grande *Alopias supercilious*, y medidas de conservación para *Alopias* spp.
- **Res. CTMFM 13-17: Prohibición de pesca de arrastre de fondo para conservación de peces cartilaginosos.**
- **Res. CTMFM 18-17: Se fija una captura total permisible y medidas de manejo para 2018, sobre rayas costeras y rayas de altura.**

Esperamos que la información aportada sea de utilidad para la labor del Comité de Fauna de la Convención, a fin de cumplir con sus funciones de acuerdo a lo recomendado en las Decisiones 17.209 a 17.216 y Decisión 17.211.

Hacemos propicia la ocasión para reiterar al Señor Secretario General las seguridades de nuestra más alta consideración.

Dr. MSc. Marcel Calvar
Autoridad Administrativa CITES

MVOTMA-DINAMA CITES URUGUAY

MPPPA-17-N°: 00995 Caracas, 17-10-17

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Ciudadano
RAMÓN CELESTINO VELÁSQUEZ ARAGUAYÁN
Ministro del Poder Popular para Ecosocialismo y Aguas
Su Despacho.

Tengo el agrado de dirigirme a usted, en la oportunidad de hacerle llegar un cordial saludo Bolivariano, Socialista, Revolucionario y Chavista, extensivo al personal que le acompaña en su gestión.

Distraigo su atención a efectos de remitir, con base a los compromisos asumidos en la 17ª Conferencia de las Partes de la Convención sobre el Comercio Internacional de Especies Amenazadas de Fauna y Flora Silvestre (CITES), el informe sobre aprovechamiento de las especies de tiburones y rayas que compete a este Despacho.

En ese sentido, agradecemos de sus buenos oficios a fin de hacer llegar, en su calidad de representante nacional ante la CITES, el presente informe a la Secretaría de la Convención, ya que el mismo muestra el impulso que ha dado este Órgano Rector a las políticas orientadas al aprovechamiento sustentable de estas especies.

Sin más que agregar y agradeciendo se tome debida nota de esta información, me despido de usted, quedando a sus gratas órdenes en el Ministerio del Poder Popular de Pesca y Acuicultura.

ORLANDO M. MANEIRO GASPAR
ALMIRANTE
MINISTRO DEL PODER POPULAR DE PESCA Y ACUICULTURA
(Decreto N° 2.918 de fecha 20 de junio de 2017
Publicado en la Gaceta Oficial de la República Bolivariana de Venezuela
Nº 41.176 de fecha 20 de junio de 2017)

OMG/MCS/JM/tc

INFORMACIÓN GENERAL DE LOS TIBURONES EN VENEZUELA

Los tiburones son peces cartilaginosos que se encuentran dentro de la clase Chondrichthyes. Son separados de las Quimeras y Rayas por su forma hidrodinámica, dientes y aleta caudal. Están separados aproximadamente por 14 órdenes, 54 familias, 184 géneros con alrededor de 970 especies a nivel mundial. En Venezuela se han registrado alrededor de 106 escualos, de los cuales al menos 50 son tiburones verdaderos, adicionando a los llamados tiburones martillos. Todos habitan en aguas marinas, pocos entran en estuarinas y en menos cantidad entran al agua dulce como el caso de tiburón toro. Comúnmente son bentónicos y pelágicos que mantienen el equilibrio ecológico y trófico en los ecosistemas costeros venezolanos.

La pesca de los tiburones está registrada desde los años 70 del siglo pasado, aunque es meritorio mencionar que en ocasiones eran cazados por nuestros indígenas Caribes con arpón. Se conoce por registro histórico que los tiburones o cazones se han pescado con todo tipo de artes pero la mayor parte de las capturas provienen por palangre y tendederos cuando es una pesca dirigida, sin mencionar que son frecuentes como pesca incidental en flotas atuneras y de otras pesquerías.

Para el 2016, la producción pesquera del recurso tiburón fue de 880.7 ton, explotando alrededor de 21 especies presente en las costas marinas en 10 estados. Ahora bien, el estado de mayor producción fue Sucre con 518.9 ton, siguen Nueva Esparta con 204.6 ton, Vargas con 92,7 ton, Monagas con 20.7, Falcón 13.7 ton y finalmente Aragua con 12.8 ton.

Ya para el 2017, en los primeros 6 meses se han reportado 17 especies entre tiburones, viudas y cazones. Siendo la Viuda blanca (*Mustelus higmani*) y el cazón playón (*Rhizoprionodon porosus*) los recursos de mayor producción. Al mismo tiempo, los estados Falcón (20 ton), Sucre (38 ton), Nueva Esparta (74) y Vargas (23 ton) son las entidades donde se han reportado la mayor proporción.

En gran parte, la Convención sobre el Comercio Internacional de Especies Amenazadas de Fauna y Flora Silvestre (CITES) y la Unión Internacional para la Conservación de la Naturaleza (UICN) incluyen bajo criterios de protección a un gran grupo de tiburones, viudas y cazones. De manera más puntual, el Tiburón ballena (*Rhincodon typus*) se encuentra en el Apéndice II de CITES, y en Peligro según sub criterios de A2bd+4bd, por disminución drástica poblacional de más de 50% a nivel mundial en tres generaciones, con una tendencia de aumentar esta declinación hasta el 30%.

En el libro Rojo de la Fauna de Venezuela (2008), se hace mención la dificultad que hay para la evaluación de los tiburones, la falta de información es uno de los puntos focales más notorios de esta problemática. En vista a esto, se optó por identificar a las especies venezolanas incluidas en la Lista Roja global (IUCN, 2007) y utilizar esta categoría a escala nacional. Dado que muchos de estos peces marinos son especies cosmopolitas o con distribución amplia en varios países del Caribe, en algunos casos, cuando la información para Venezuela era prácticamente inexistente, se optó por la categoría de: Datos Insuficientes (DD). En esta categoría se incluyen 30 especies. Al mismo tiempo, el Tiburón chuchivano (*Negaprion brevirostris*) y el Tiburón azul (*Prionace glauca*) se encuentran en categoría de: Casi amenazado.

Por otra parte, el Centro para la Investigación de Tiburones (CIT) realizó análisis poblacional de los escualos venezolanos en El Caribe y Atlántico Centro Occidental, bajo la información histórica del Programa de Observadores de Palangre Pelágico de Venezuela (POPPV), resultando el registro de 15 especies de tiburones capturados en la pesca comercial artesanal palangrera de media altura que opera en las islas oceánicas venezolanas.

Dentro de las medidas de ordenación nacional se hace mención la Resolución MPPAT DM/Nº 062 del año 2012, publicada en la Gaceta Oficial Nº 39.947. Específicamente, hace mención la veda permanente en todo el Territorio Nacional el tiburón zorro ojón (*Alopias superciliosus*), tiburón oceánico (*Carcharhinus longimanus*) y veda permanente de captura para todo buque pesquero industrial el tiburón bobo (*Carcharhinus falciformis*) y todos los tiburones martillos (Familia *Sphyrnidae*).

Cabe acotar, que en todo el territorio nacional está prohibido la práctica del aleteo en cualquier especie de tiburón, así como realizar capturas en las aguas de los archipiélagos de Los Roques y Las Aves, a menos que sean del tipo cazón, raya y quimera o que los pescadores sean residentes de la zona. En ese caso sólo podrán atrapar cinco ejemplares por jornada.

Las prohibiciones mencionadas con anterioridad se basan en la evaluación ecológica propuesta por la Comisión Internacional para la Conservación del Atún del Atlántico (CICAA), de la cual Venezuela es Parte Contratante, donde se identifican a los tiburones zorro ojón, oceánico y bobo con grado de riesgo.

En el 2013, se formuló el Plan de Acción Nacional (PAN) para la conservación de tiburones como un instrumento de planificación y gestión que tiene como objeto

principal garantizar el aprovechamiento sustentable y conservación de los tiburones en Venezuela, busca establecer la línea base de información sobre tiburones, inspección, vigilancia en los puertos de desembarque así como los Comité de Seguimiento para la evaluación de la pesquería y del recurso, este plan fue elaborado mediante la consulta y el trabajo en conjunto con un equipo de expertos convocados por la Administración Pesquera nacional.

Flota venezolana en el Océano Pacífico Oriental (Comisión Interamericana del Atún Tropical)

Aun cuando la pesca de la flota venezolana en el océano Pacífico oriental realiza las capturas en gran medida sobre manadas de delfines y ocasionalmente sobre cardúmenes puros de atún o sobre objetos flotantes, se pueden observar en algunos casos tiburones involucrados en las maniobras de pesca. Durante muchos años se capturaban un número significativo de tiburones a los cuales en su gran mayoría solo se les aprovechaban las aletas (aleteo), se guardaban cierta cantidad de los cuerpos y el resto se desechaba. Una pequeña cantidad se utilizaba para ser consumida por la tripulación. En los últimos años, se ha venido disminuyendo significativamente el aleteo y durante el 2016 no se reportó ningún aleteo en el marco de la normativa nacional que regula este recurso y las disposiciones de la Comisión Interamericana del Atún Tropical (CIAT) sobre la materia.

REPÚBLICA BOLIVARIANA DE VENEZUELA MINISTERIO DEL PODER POPULAR DE PESCA Y ACUICULTURA MPPPA PESCA Y ACUICULTURA VICEMINISTERIO DE PRODUCCIÓN PRIMARIA PESQUERA Y ACUÍCOLA

MIGUEL EMILIO CARPIO SERRANO
VICEMINISTRO DE PRODUCCIÓN PRIMARIA PESQUERA Y ACUÍCOLA
(Decreto N.° 2.826 de fecha 26 de abril de 2017, publicado en
Gaceta Oficial de la República Bolivariana de Venezuela N 41.138 del 26 de abril de 2017)

May 11, 2018

Submission in response to:

CONVENTION ON INTERNATIONAL TRADE IN ENDANGERED SPECIES OF WILD FAUNA AND FLORA NOTIFICATION TO THE PARTIES No. 2018/041 (Geneva, 24 April 2018

CONCERNING: Request for new information on shark and ray conservation and management activities, including legislation

Subject: New approach for rapid and inexpensive genetic identification of CITES listed sharks in the field.

Outline:

- Resolution Conf. 12.6 (Rev. CoP17) on Conservation and management of sharks, the Conference of the Parties recommended that parties "*share experiences with, and knowledge of, forensic means to efficiently, reliably and cost- effectively identify shark products in trade*".

- We have developed a DNA test that can identify products from 9 of 12 CITES listed sharks in the field, using a low-footprint mobile laboratory. This approach allows rapid initial detection of products from these species and a positive result provides sufficient cause to detain the product(s) for further evidentiary analysis.

- It takes only a few hours to screen up to 94 products and costs less than $USD1 per sample.

- Start up costs for the mobile field laboratory can range from around USD$6,000 to $50,000 depending on how many samples/products can be tested simultaneously, ranging from 14 at the low end cost estimate to 94 at the high end.

- This approach can be used in conjunction with other approaches deployed at the border (visual identification guides, risk assessments) to detect illegal trade in fins, meat, and other products from these CITES listed sharks.

- With some research and development the approach could be used for other CITES listed species using the same mobile laboratory.

Details of the approach:

Real-time PCR (rtPCR) uses target-specific primers and fluorescent dyes (e.g. SYBR Green,) to detect PCR amplification of a targeted DNA template (e.g. DNA from a CITES listed shark), eliminating the need for sequencing and agarose gels, and enabling a reliable identification of targeted species in real time.

We have developed a rtPCR technique that is an easy-to-use, inexpensive ($0.94 USD per samples), reliable, and to our knowledge, the fastest molecular protocol to date to detect the majority of CITES-listed shark species that are relatively common in international trade (at least from the perspective of fins). It identifies nine out of twelve CITES-listed shark species, only omitting whale, basking, and oceanic whitetip sharks. The approach requires only a real time thermal cycler, laptop computer, pipettes, disposal plastics, and reagents, all of which can be packed into a mobile laboratory that can be used at any field site with electricity.

We suggest the following workflow for putative detection of CITES listed sharks using this approach. After taking tissue samples from suspect products the real time thermal cycler can be used for Chelex extraction of DNA (~ 45 minutes), which is then added to a reaction plate (16-96 wells depending on the model of real time thermal cycler). The primer mix and SYBR Green are added and 35 PCR cycles are run. We suggest reserving 2 wells for a positive control that includes DNA from a known CITES listed shark species in the multiplex that has previously amplified, and a negative control without a template. If the positive control sample fails to amplify it suggests the reagents are compromised. The time taken to conduct DNA extractions and screen the products is < 5-6 hours, depending on how long it takes to subsample tissue for extraction.

Real time PCR thermal cyclers have a relatively small footprint and are sufficiently portable, together with the laptop and all necessary reagents, pipettes, and disposable plastics, for this to be deployed in the field (i.e., in major wildlife product entry ports). Combining this approach with other resources such as morphological identification guides enables highly efficient and cost effective screening of imports at the border for the most common CITES listed sharks in trade. Primers can also be developed for any other animal or plant to use the same approach to screen for a wide variety of CITES listed taxa.

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May 11, 2018

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To Whom It May Concern,

The Pew Charitable Trusts is an international observer to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). As an organization actively engaged in global shark conservation, Pew offers the following information in response to CITES Notification 2018/041 concerning information on shark and ray conservation and management activities, including legislation.

Pew has committed to supporting shark and ray implementation efforts whenever possible and has provided multiple tools and trainings to do so since 2013. Pew has helped with the development of tools that will aid governments in the visual identification of dried and wet shark fins of the commercially traded CITES listed shark species. Two quick reference posters and a more detailed shark fin identification guide can be downloaded at www.identifyingsharkfins.org to aid governments in establishing probable cause in enforcement settings. These tools are available in the following languages: Arabic, Chinese, English, French, Portuguese, Spanish, and Bengali. In addition, a DNA manual is currently being finalized and will be made available at the Animals Committee meeting. This manual synthesizes all of the DNA tools available in the published literature to date and outlines which tools are best to use under different scenarios, which can be used for all of the CITES listed shark species.

Pew has been fortunate enough to work with governments to provide non-detriment finding and shark fin identification trainings to customs, environment, and fisheries officials. Since the 17th meeting of the Conference of the Parties to CITES (CoP17), Pew has helped support regional workshops in these locations, where over 60 Parties were trained on shark and ray CITES implementation and the policy options needed to properly implement their obligations:

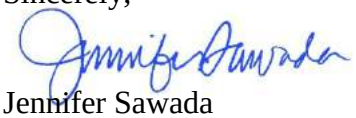
- Oceania, May 2017
- Latin America and Caribbean, November 2017
- West Africa, December 2018
- South Asia, March 2018
- South East Asia, March 2018
- Middle East, April 2018

In addition, Pew attended or was able to support experts to attend national workshops in these locations that focused on the development of national policies for shark management and the development of non-detriment findings:

- Sri Lanka, June 2017
- Dominican Republic, November 2017
- Mauritania, October 2017
- Cape Verde, December 2017
- Senegal, December 2017
- Philippines, March 2018
- Fiji, March 2018
- India, April 2018
- Bangladesh, May 2018

Thank you for the opportunity to share this information. We look forward to continuing to work with the CITES Secretariat, CITES Parties, and other organizations to assist governments in meeting their CITES obligations and helping to reduce the mortality of sharks.

Sincerely,



Jennifer Sawada
Project Director, Global Shark Conservation
The Pew Charitable Trusts

RESPOND TO CITES NOTIFICATION ON SHARKS AND RAYS
WCS INDONESIA PROGRAM

ITEM	WCS Indonesia Program
General	• WCS Indonesia Program (WCS-IP) as a science based organization puts a major effort to collect scientific data as a reference for recommendations to better manage sharks and rays in Indonesia. Since 2015, WCS-IP has been actively involved in data collection in at least 2 provinces in Indonesia, West Nusa Tenggara and Aceh. • Shark landing report in Tanjung Luar from 2014 – 2016 provides information on (a) shark fisheries profile, (b) level of effort, (c) catch composition, and (d) stock assessment for a number of species. • Survey to identify critical habitat areas for sharks and rays in Aceh Jaya in 2017, after similar survey conducted in Lunyuk, West Nusa Tenggara previously. • National-level scoping research on the status of shark and ray species, habitat, fisheries, trade (legal and illegal) and tourism conducted for the development of an NGO and donor investment strategy, as summarised in '*Shark and Ray Conservation and Management in Indonesia - Status and Strategic Priorities 2018 - 2023*'
Stock assessment result	Of 82 recorded species landed in Tanjung Luar, West Nusa Tenggara, WCS-IP managed to analysis 12 species for stock assessment, i.e : *Sphyrna lewini, Sphyrna mokarran, Alopias pelagicus, Alopias superciliosus, Carcharinus albimarginatus, Calcharinus falciformis, Carcharinus obscurus, Rhynchobatus australiae, Isurus oxyrinchus, Isurus paucus, Mobula japanica, Himantura jenkinsii*. A number of parameter assessed for stock assessment are growth parameter ($L\infty$, k, t_0, lifespan); length indicator (Lm, Lopt, Lmean, Lc); mortality and exploitation rate (M, F, Z, E); and spawning potential ratio (SPR). Stock assessment on the 12 species above show **overfished stock** for *Sphyrna lewini, Carcharinus falciformis, Rhynchobatus australiae*, and *Isurus paucus*; **fully fished stock** for *Alopias pelagicus, Alopias superciliosus, Carcharinus albimarginatus, and Carcharinus obscurus*; **underfished stock** for *Sphyrna mokarran, Isurus oxyrinchus, Mobula japanica, and Himantura jenkinsii*.
Management and conservation efforts	Until 2017, most of the work conducted at the ground level by WCS-IP are in the form: - *Improved fisheries data collection* - *Application of fisheries data in MPAs, fisheries and trade management (e.g. MPA expansion in Aceh*

	Jaya, Aceh; fisheries management recommendations in Tanjung Luar, NTB) - *Campaign on shark conservation and regulations* - *Developing livelihood diversification options for shark and ray fishers in Tanjung Luar, NTB and Lamakera, NTT.* - *Law enforcement assistance by Wildlife Crime Unit (WCU) with MMAF and water police for reducing illegal fishing (Lamakera, NTT) and with MMAF, police, prosecutors, AGO, aviation security etc. for combatting illegal trade and trafficking.* At national and provincial levels (Aceh and NTB), WCS-IP is working closely with Ministry of Environment and Forestry (MoEF) and Ministry of Marine Affairs and Fisheries (MMAF) to strengthen shark management and implement CITES and the NPOA sharks and mantas through policy and regulation development.
Research	In 2017, WCS-IP produced 3 technical reports: - *Lestari, W.P., M.N. Sayuti, Muhsin, B.A.Akbar, E. Sundari, Isnaini, P.N. Paridi, S. Rahmayanti. 2017. Social Economic Study on Shark Fishers in East Lombok, West Nusa Tenggara. WCS Indonesia Program.* - *Simeon, B.M., S. Agustina, E. Muttaqin, I. Yulianto, M. Ichsan, and Muhsin. 2017. Sharks and Rays Landing Monitoring in Tanjung Luar, West Nusa Tenggara Province. WCS Indonesia Program.* - *Booth, H., Muttaqin, E., Simeon, B., Ichsan, M., Siregar, U., Yulianto, I. and Kassem, K. 2018. Shark and ray conservation and management in Indonesia: Status and strategic priorities 2018-2023. Wildlife Conservation Society. Bogor, Indonesia.* One manuscript accepted with revisions to PLOS1 - *Practical measures for sustainable shark fisheries: lessons learned from an Indonesian targeted shark fishery* Six additional manuscripts are in draft: - *Finding unlikely allies: The prospect of shark fishers role in sustainable management of sharks and rays fishery* - *Estimating the size of illegal sharks and rays trafficking network using a Capture Recapture - Multistate Model approach* - *Towards a monitoring framework for illegal manta ray catch and trade* - *Combining law enforcement and livelihoods to deliver measurable conservation outcomes in the world's largest targeted manta ray fishery*

	- *Assessing trends in catch and trade of CITES-listed species in Indonesia* - *The economic value of shark and ray tourism in Indonesia, and its role in delivering conservation outcomes* One book chapter is in draft, on social methods in conservation, using Tanjung Luar socioeconomic research as a case study *Research to understand local resource users' behaviour, perspectives and priorities, to underpin conservation practice* in *Conservation Research, Policy and Practice (British Ecological Society, Ecological Reviews Series, published by Cambridge University Press)*
NDF's	• In 2017, WCS-IP worked together and assisted Government of Indonesia (GoI) in developing Non Detrimental Findings (NDFs) for 3 species of hammerhead sharks and oceanic white tip. However, after series of discussion, a positive NDF could be developed only for hammerheads sharks. The NDF for hammerhead is currently finalized by the Indonesian Institute for Sciences (LIPI) as CITES Scientific Authority for Indonesia. • Currently, WCS-IP is working together with GoI to develop NDF for silky shark. • In addition to the NDF development processes, WCS-IP and LIPI documented these processes in the form of guideline to develop NDFs. Hopefully, in the future government and other stakeholders can refer to this document if there will be new shark listing. 34 indicators are approved as requirement for NDF document by far.
Challenges	Several challenges in implementing new shark listing and WCS-IP contribution to address these challenges: a. *Socio economic pressure*. WCS-IP initiated an alternative livelihood for sharks fishers in Tanjung Luar by engaging these fishers to tourism activity. b. *Insufficient data*. In addition to landing monitoring in Tanjung Luar, WCS-IP since 2017 starts a landing monitoring at 2 fishing ports in Aceh Province c. *Vary derivative products*. WCS-IP is currently working together with Bogor Agricultural University to identify barcode for CITES listed sharks for hammerhead shark, thresher shark, and silky shark. d. *National data production for sharks and rays are recorded in group level*. WCS-IP record shark landing data on species level thus the collected data is readily to support NDF development process. e. Limited information on critical habitat (nursery and mating ground). WCS-IP in 2017 has completed the nursery areas for sharks in Lunyuk, West Nusa Tenggara and Rigaih, Aceh.

NPOA's	A review to implementation of Sharks and Rays NPOA 2016 – 2020 shows that in 2017 WCS-IP involves in 7 of 8 targets in NPOA for sharks: ***a. Review shark fisheries status*** (i) Conducted national workshop on shark data validation; (ii) support the development of NDF, quota implementation and other regulations; ***b. Strengthening data and information on sharks fisheries*** (i) involve in the development of landing data collection guide; (ii) conduct landing data monitoring in Tanjung Luar and Lampulo ***c. Enhance research on sharks*** (i) conduct biological research on sharks and rays in Tanjung Luar; (ii) critical habitat identification survey; (iii) conduct DNA barcoding for sharks products; (iv) socioeconomic survey for sharks fisher in Tanjung Luar and Aceh ***d. Conserving critical shark species and habitat*** (i) involve in regulation development for Mobula rays; (ii) disseminate regulations on sharks and awareness campaign; (iii) development of MPA in sharks critical habitat ***e. Reduce shark fishing effort*** (i) provide information related to illegal act against sharks regulation; (ii) involve in the development of catch quota ***f. Awareness campaign*** (i) develop campaign tools ***g. Institutional development*** (i) actively participate in National Working Group for Sharks ***h. Capacity building*** WCS-IP in 2017, has no specific activity for capacity building in the form of training
Other CITES shark and ray related work	WCS Indonesia Program has been working closely with the GoI in strengthening the existing policy and legal frameworks for the protection of wildlife including sharks and rays. Some of the works are as follow; 1. Revise the Act no. 5 concerning the Conservation of Living Resources and Their Ecosystems. WCS-IP's main focuses on this revision are to strengthen the law enforcement aspects (penalties and sanctions) in the law to give deterrent effect and to strengthen the protection of species (incl. native and non-native) by including the category of protection referring to CITES appendix. The status of revision is now included in the National Legislation Program for 2018 and targeted by parliament to be finalized in 2018. *2.* Update the annex of GR No. 8/1999 which consists of Indonesian protected species. The updated list has been finalized and will be submitted to the Minister of Environmental and Forestry for signing and

	enacted by Ministerial Regulation. The list also contains protection for *Pristis spp.* *3.* Revise the Ministerial Regulation of MMAF No.4/2010 concerning Procedures of Fish and Fish Genetic Utilization. The revision highlighted the importance to improve procedures of utilization of protected species and species listed on CITES Appendices (I, II and III) as well as quota determination, permit framework, distribution of fish, monitoring and surveillance and sanction. The draft has been submitted to the MMAF legal bureau for further review.

SHARK AND RAY CONSERVATION AND MANAGEMENT IN INDONESIA

Status and strategic priorities 2018 - 2023

Hollie Booth, Efin Muttaqin, Benaya Simeon, Muhammad Ichsan, Ulfah Siregar, Irfan Yulianto, Ken Kassem

Wildlife Conservation Society – Indonesia Program

Februari 2018

"Indonesia is a global priority for shark and ray conservation and management, as it's both a hotspot of diversity and a hotspot of pressures"

© Hollie Booth

By:

Funded by:

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CITATION

Booth, H., Muttaqin, E., Simeon, B., Ichsan, M., Siregar, U., Yulianto, I. and Kassem, K. 2018. Shark and ray conservation and management in Indonesia: Status and strategic priorities 2018-2023. Wildlife Conservation Society. Bogor, Indonesia.

Cover Photo: Silky Shark © CF Chok

PREPARATION OF THIS DOCUMENT

Purpose

This document is a summary of current knowledge on the status of shark and ray conservation and management in Indonesia, and an outline of strategic priorities for the next five years. This document intends to support implementation of the National Plans of Action (NPOA) for sharks and rays and mantas, and international policy commitments under the Convention on the International Trade of Endangered Species of Flora and Fauna (CITES), the Convention on Biological Diversity (CBD) and relevant Regional Fisheries Management Organisations (RFMOs) by outlining priority areas of investment – for donors and non-governmental organization (NGOs) - than can significantly improve the conservation and management of sharks and rays in Indonesia by 2023.

This document was prepared to supplement the Indonesian National Plans of Action (NPOA) on sharks and rays and mantas. It is intended to be a summary of the current state of knowledge on the status of sharks and ray conservation and management in Indonesia and to outline strategic priorities for action in the next five years. In addition to the NPOA documents, Indonesia also has commitments for shark and ray management under several international conventions, and regional multi-lateral agreements (e.g. the Convention on the International Trade of Endangered Species of Flora and Fauna (CITES), the Convention on Biological Diversity (CBD), Regional Fisheries Management Organisations (RFMOs). This document is intended to assist in outlining priority areas of investment for non-governmental organizations (NGOs) and conservation donors so that shark and ray conservation and management in Indonesia can advance to support the goals of sustainable management and sustainable livelihoods in Indonesia.

Methods

Process

This document was developed through a generous grant from the Walton Family Foundation to the Wildlife Conservation Society (WCS) for a joint strategy with Conservation International (CI). The data and priorities summarised herein are the results of an intensive 1-year mixed-methods process, which incorporated extensive data gathering, analysis and synthesis, and consultation, collaboration and consensus building across several organisations and stakeholders, including the Indonesian government and other NGO partners (see Contributors). The process and strategies herein are intended to build upon and integrate with the work already conducted by the Global Sharks and Rays Initiative (GSRI) and the Global Priorities for Conserving Sharks and Rays (Bräutigam et al. 2015).

The key stages in this process included:

1. Systematic literature reviews and compilation of available data on species, sites and utilisation. This review drew from sources in English and Bahasa Indonesia, and all forms of published and unpublished literature;
2. Initial consultations with experts, NGOs, field researchers and government agencies through a workshop (30 January 2017) and targeted follow-up discussions (see Contributors). This enabled gathering of unpublished data, expert knowledge and anecdotal information;
3. Targeted primary and secondary data collection on key topics in priority locations (detailed information on methods and assumptions for relevant sections available in the references and Supplementary Materials);

4. Further expert consultation and data validation through a 2-day workshop (29-30 August 2017) to share, review and validate data; conduct joint threat and strategy mapping; and explore knowledge gaps and uncertainties;
5. External review by key partners and expert reviewers (see Contributors).

It should be acknowledged that the data compiled during this process is of varying degrees of quality, quantity and reliability, ranging from peer-reviewed literature, to reports, to anecdotal information. There are notable biases and gaps in availability of data for certain geographic areas and species, which will need to be addressed in order to develop a fully comprehensive spatial- and species-based prioritisation.

Knowledge on sharks and rays in Indonesia remains incomplete. There are large gaps in information on population sizes, ranges, and status. The data compiled in this report reflect the status of understanding of sharks and rays in Indonesia. It is of varying degrees of quality, quantity, and reliability, ranging from peer-reviewed literature, to reports, to anecdotal information. There are notable biases and gaps in availability of data for certain geographic areas and species, which will need to be addressed in order to develop a fully comprehensive spatial- and species-based prioritisation. We have tried to acknowledge data gaps, biases, uncertainties and research needs throughout this document.

Further detailed information on assumptions and methods for specific sections is available in the Supplementary Materials, as references throughout the document.

Contributors

The contents of this document were developed in collaboration with: the Ministry of Marine Affairs and Fisheries (MMAF), Conservation International (CI), with additional contributions from Bogor Agricultural University (IPB), Charles Darwin University, Hatfield Group, the Indonesian Nature Film Society (INFIS), the IUCN Shark Specialist Group, Manta Trust, Manta Watch, the Marine Megafauna Foundation (MMF), Misool Foundation, Mongabay Indonesia, Yayasan Masyarakat dan Perikanan Indonesia (MDPI), Murdoch University, Reef Check, Sea Sanctuaries Foundation, the World Wide Fund for Nature (WWF).

Special acknowledgements go to the following **contributors**: Sarah Lewis and Iqbal Herwata (Misool Foundation), Betty Laglbauer and Vidlia Rosady (Manta Trust), Vanessa Jaiteh (Murdoch University) and **expert reviewers**: Dr. Mark Erdmann (Conservation International), Dr. Peter Kyne (Charles Darwin University/IUCN Shark Specialist Group), Dr. Colin Simphendorfer (James Cook University/IUCN Shark Specialist Group), Dr. Vanessa Jaiteh (Murdoch University), Luke Warwick and Amie Brautigam (Wildlife Conservation Society HQ).

ABSTRACT

Sharks and rays are increasingly recognized as a priority species group for conservation action. They play critical roles in maintaining functional and productive ecosystems, and contribute directly to human well-being through the fishing industry, tourism industry and role in coastal livelihoods and food security. Sharks are also one of the most threatened species groups in the world, with several species experiencing drastic population declines across much of their range, and an estimated one in four species now threatened with extinction. The long-term maintenance of healthy shark populations is critical for people and the planet.

Indonesia is a global priority for shark and ray conservation and management, as it's both a hotspot of diversity and a hotspot of pressures. Implementing effective conservation for sharks and rays in Indonesia is challenging for a number of practical, epistemological and socioeconomic reasons, including: species diversity, complex spatial and population dynamics, prevalence of incidental and non-selective fishing, indistinguishable products in trade, indiscriminate consumer preferences, and diverse and conflicting human uses and values. What is more, Indonesia is a large country, with a considerable coastline and ocean area, and limited resources for conservation and fisheries management. Despite these challenges, there is huge momentum and opportunity the improve the status of sharks and rays in Indonesia over the next five years.

This document summarizes available information on the status of shark and ray species, sites and utilisation in Indonesia. It highlights some of the ecological and socioeconomic complexities surrounding shark conservation and management, and outlines five overarching strategic priorities and five key approaches for improving the status of sharks and rays in Indonesia over the next five years. Implementing this strategy requires the development of nuanced interventions that are specific to the ecological and socioeconomic characteristics of certain species, geographies and people, and a concerted effort from a wide range of stakeholders.

BACKGROUND

Sharks and rays are under threat

Many shark and ray species are intrinsically vulnerable to over exploitation due to their conservative life history traits and ecological sensitivity to fishing pressure (Stevens et al. 2000). With rapid global expansion of exploitation and trade in recent decades to meet growing demand for a range of consumer goods – from fins to meat to cartilage - it is estimated that annual global fishing mortality of sharks and rays now exceeds the average rebound potential of many species (Clarke et al. 2006). Concurrently, drastic population declines have been observed for several species (Dulvy et al. 2008, Ferretti et al. 2010) and total global landings of sharks is falling (Dent and Clarke 2015). It is now estimated that one-in-four chondrichthyan species is threatened with extinction. This makes sharks among the most threatened vertebrate species group in the world (Dulvy et al. 2014).

What is a shark?

For the purposes of this document, the term 'shark' encompasses all species of cartilaginous fish i.e. any species within the class Chondrichthyes. This includes sharks, rays and skates (Elasmobranchs) and chimera (Holocephali). Throughout this document the terms 'sharks', 'sharks and rays' and 'chondrichyans' are used interchangeably, but unless specifically stated, these terms refer to the class Chondrichthyes as a whole.

Sharks and rays are important for people and the planet

Sharks and rays are increasingly acknowledged as ecologically and economically important species. Ecologically, sharks comprise one of the most ancient, widespread and diverse clades of predators (White & Last 2012). Sharks have evolved to serve a wide variety of ecosystem functions, serving as apex predators and mesopredators (Heupel et al. 2014), and with certain species playing critical roles in maintaining functional and productive ocean ecosystems (e.g. Myers et al. 2007, Ferretti et al. 2010).

Economically, sharks and rays provide an important source of income and food security for hundreds of fishing communities and thousands of people. The export value of shark and ray products in Indonesia is estimated at US$ 125 million (ComTrade 2017), with thousands of people employed in fishing, processing, distribution and retail, and a sizeable domestic market operating alongside the export trade. The domestic market is primarily for meat and provides a source of low-cost animal protein for coastal communities and some big cities. As such, the shark industry also plays role in food security and nutrition, although its size and importance remains poorly understood.

At the same time, shifts in societal perceptions are leading to sharks and rays being increasingly valued for their indirect and non-use values, such as those derived from shark-observing tourism and existence of species (Stevens et al. 2000, Kriwet et al. 2008, Simpfendorfer et al. 2011). With total annual expenditures of shark and ray tourists in Indonesia estimated at US$ 130 million to US$ 195 million per year, Indonesia's burgeoning marine- and dive-based tourism sector now exceeds the export value of shark and ray fisheries. Provided tourism and shark populations are well-managed, total expenditures of shark and ray tourists could exceed US$ 570 million by 2027, almost five times the current consumptive value of the export industry (Mustika and Booth 2017).

These two industries are not mutually exclusive. Often species that are the focus of ecotourism operations are only a fraction of the total species caught in fisheries, while the people engaged in and benefiting from ecotourism operations are only a fraction of those dependent on shark fisheries for livelihoods and food security. Both industries must be sustainably managed side-by-side in order to maintain the long-term value of sharks for people and the planet.

Indonesia is a global priority for shark and ray conservation

Indonesia is a global priority for shark and ray conservation and management, as it's both a hotspot of diversity and a hotspot of pressures (Dulvy et al. 2014, Brautigam et al. 2015). Indonesia lies at the heart of the Coral Triangle, a mega-diverse region for marine fauna and a hotspot of shark diversity. Indonesia is also the world's largest shark fishing nation (FAO 2017), and with limited management of the fishery in recent decades fishing pressure has taken a toll on Indonesia's shark populations. It is estimated that approximately 40% of sharks occurring in Indonesian waters are threatened with extinction, making it one of the highest relative extinction risk regions in the world (Dulvy et al. 2014).

There is a huge opportunity for improving shark and ray conservation in Indonesia

Despite these threats, there is considerable momentum within Indonesia to improve conservation of sharks and rays. This is reflected in the establishment of no-take zones for sharks, which protect more than 4 million hectares of Indonesia's waters; the development of National Plans of Action (NPOAs) for sharks and mantas; and policy measures to confer full and partial protection to several species of conservation concern, including manta rays, whale sharks and hammerheads sharks.

Implementing effective shark and ray conservation is challenging: a nuanced approach is required

Despite this momentum, implementing effective shark and ray conservation in Indonesia is challenging. In part because Indonesia is a large, disparate and relatively under-resourced country, with a huge coastline and marine area, but moreover because there are several practical challenges associated with managing shark and ray fisheries and trade in Indonesia:

Species diversity: Sharks and rays comprise one of the largest and most diverse species groups on the planet (White & Last 2012). There are over 200 described species of sharks and rays in Indonesia (MMAF 2016), with a wide range of physiological and ecological characteristics, and different vulnerabilities and threats. Further, many of these species are relatively new to science, and remain poorly researched and understood. This necessitates a range of management interventions tailored towards specific life-histories and threats, and precautionary principles for species which are still poorly understood.

Complex spatial and population dynamics: Indonesia's marine ecosystems are vast and difficult to monitor. Within these ecosystems sharks and rays have a huge, three-dimensional range: the average geographic range of sharks and rays is 500,000 km^2, while depth ranges can be several kilometers (Davidson and Dulvy 2017, Brunnschweiler et al. 2009). This creates a barrier for conducting robust population monitoring and understanding population dynamics, which in turn leads to a paucity of management-relevant data for informing fisheries and trade controls. It also means that traditional approaches to species protection, such as protected areas, have limited utility for protecting many shark and ray species, particularly those which have large home-ranges or that are highly migratory. Since the median size of marine protected areas in Indonesia is just 500 km^2, many shark and ray species will range outside of protected areas, and therefore be susceptible to fishing pressure (Davidson and Dulvy 2017).

Prevalence of incidental and non-selective fisheries: Globally, sharks are incidentally caught as by-catch in many fisheries, and this catch can often exceed that of the target species (Molina and Cooke 2012). In Indonesia, most fisheries are non-selective, with sharks and rays caught opportunistically in small-scale mixed fisheries, or incidentally and retained as valuable secondary catch. Even in targeted shark fisheries there is very little species-specific targeting. The most widely-used fishing gears are non-selective at the species-level. Since fishers have little control over which species they catch, species-specific prohibitions for sharks are often of limited practicality and effectiveness for reducing mortality rates. This is further exacerbated by low survivability of sharks in most fisheries, particularly in non-longline interactions, such that bycatch release regulations can be futile for conservation efforts, and wasteful (Gallagher et al. 2014).

Indistinguishable products in trade: Shark products are generally traded as partially processed (i.e. dissected and dried or frozen) body parts, with high morphological similarity between different species. This limits the ability of monitoring and law enforcement officers to discriminate products at the species level, particularly for meat products, without specialist training and/or genetic testing capabilities. In turn, this undermines the ability of fisheries and enforcement agencies to verify that shark products are from legal, sustainable sources and effectively implement CITES regulations.

Indiscriminate consumer preferences: At the consumer level – in Indonesia and internationally - there are few species-specific preferences for shark products, and limited market demand for verifiable sustainably sourced products. This limits the current utility of market-based incentives for driving legal and sustainable fisheries and trade.

Diverse and conflicting human uses and values. Indonesia's shark industry is shaped by a range of interacting drivers, both local and global. Indonesia is the primary source country for shark and ray products for the Asian market, with an annual capture production at least two times greater than any other countries in the region (FAO 2017). Considerable volumes of fin and non-fin products are also consumed domestically. This industry plays a significant role in Indonesia's economy, employing thousands of people across hundreds of fisheries and communities, generating more than US$125 million per year in export value alone (ComTrade 2016). For many of these communities, shark fishing is not just economically important, but also plays important role in food security, and often holds intangible social value as part of local history, culture and self-identity. On the other hand, marine-based and shark-watching tourism is sizeable and growing, with estimated total annual tourist expenditures in the region of US$$ 130-195 million per year. However, the costs and benefits of these different industries accrue for different people in different places, and there is a need to balance competing trade-offs of protection and sustainable use. Crucially, management interventions must be appropriately adapted to the socioeconomic contexts in which they are implemented, and due consideration must be given to conservation ethics and the potential negative socioeconomic impacts of bans and trade controls on vulnerable coastal communities.

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THE STATUS OF SHARK AND RAY CONSERVATION AND MANAGEMENT IN INDONESIA

Species

Key findings

- There is a huge diversity of sharks and rays species in Indonesia. Different types of approaches are required for different species, based on their ecological and life-history characteristics, and the fisheries and socio-economic context within which they are threatened
- Management-relevant data is still limited for many species, including information on taxonomy, life history traits, population status, exploitation rates, distribution, critical habitat and migratory behaviour.

There are over 200 described species of sharks and rays in Indonesia with a range of life history traits, ecological niches and susceptibilities to fishing mortality (Fig. 1; Fig. 2; S1). These characteristics influence the extinction risk of each species (Dulvy et al. 2014), and therefore their relative conservation priority, and practical management measures that can be adopted to improve their status (Harry et al. 2011, Gallagher et al. 2014, Dulvy et al. 2017).

An adapted productivity-sensitivity analysis was used to assess the relative extinction risk of shark and ray species in Indonesia, based on key factors influencing their exposure to overexploitation (*threat*) and their intrinsic life history and ecological sensitivity (*vulnerability*), according to published literature Dulvy et al. 2014). The analysis identified 133 species of higher conservation concern, 53 species as moderate conservation concern and 11 species as lower conservation concern (S1). Some species could not be classified due to data gaps.

At-risk species

Based on averages across all species, the majority of shark families in Indonesia (30 families incorporating 146 species) are both highly threatened by overexploitation, and highly vulnerable to overexploitation (Fig. 1). Amongst the most at risk-families are whale sharks (Rhincodontidae), sawfishes (Pristidae), nurse sharks (Ginglymostomatidae), zebra sharks (Stegostomatidae), giant guitarfishes (Glaucostegidae), mobulid rays (Mobulidae), wedgefishes (Rhinidae), thresher sharks (Alopiidae), pelagic eagle rays (Aetobatidae) and requiem sharks (Carcharhinidae). These species are typically characterised by large body size, small litter size and late age at maturity, with high susceptibility to fishing pressure due to shallow minimum depths and high economic value.

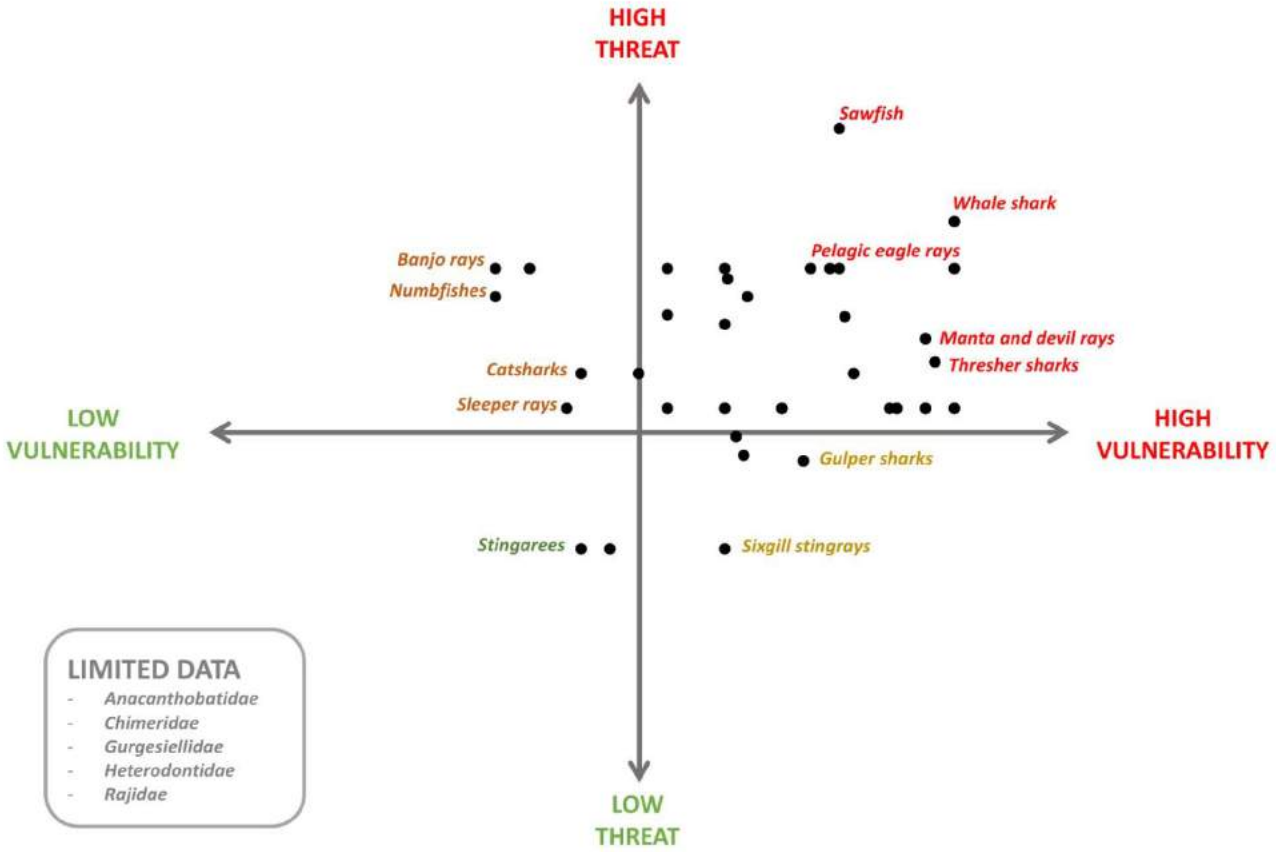
Taxonomic Uncertainty

With such a large, diverse and ancient species group, shark and ray taxonomy is a topic of on-going debate. New species continue to be discovered every year, and innovations in genetic methods uncover new and different patterns in phylogeny and relatedness. This document aims to use the most up to date taxonomy available, although some species remain undescribed (e.g. *Rhynchobatus cf. laevis*) while other species have undergone recent taxonomic revisions which have not yet been incorporated in to international and domestic policy (e.g. the merging of *Manta* spp. into *Mobula* spp.).

This document strives to be as practical as possible. We have therefore removed several undescribed species from the species list, in an attempt to reduce taxonomic uncertainty, and maintained the original nomenclature of mobulids and mantas as separate genera, as they are still classified as such under Indonesian law. The regulations will need to be revised to reflect this change in due course.

Lower risk families include Stingarees (Urolophidae) and Pentanchidae, which typically have a higher fecundity and lower vulnerability to fishing mortality due to their deep-water ecology. Moderate risk species include gulper sharks (Centrophoridae) and dogfish sharks (Squalidae), which are of high ecological vulnerability but lower threat risk, and numbfishes (Narcinidae), catsharks (Scyliorhinidae) and sleeper rays (Narkidae) which are of lower ecological vulnerability but higher threat risk. These species don't face immediate risk of extinction but require monitoring and management to maintain exploitation within sustainable limits.

Fig. 1: A shark and ray species priorisation matrix, based on family averages for threat and ecological vulnerability. The majority of families (30 in total) on average are classified as both high threat and high vulnerability.



Rare and endemic species

Indonesia is a hotspot of shark species diversity, and home to at least 25 rare and endemic species with highly restricted ranges (Fahmi and Darmadi 2013). These include several species of whiptail stingray (Dasyatidae) and bamboo shark (Hemiscylliidae), as well as species of guitarfish (Rhinobatidae), catshark (Scyliorhinidae), Houndsharks (Triakidae), Pygmy skates (Gurgesiellidae), Dogfish (Squalidae) and Angelsharks (Squatinidae) (Table 1)

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Table 1. A summary of the known endemic and rare shark species in Indonesia

Family	Species
Whiptail stingrays (Dasyatidae)	Speckled maskray (*Neotrygon picta*) Narrowtail stingray (*Pastinachus gracilicaudus*) Roughnose stingray (*Pastinachus solocirostris*) Starynose stingray (*Pastinachus stellurostris*) Hortle's whipray (*Pateobatis hortlei*) Tubemouth whipray (*Urogymnus lobistomus*) Round whipray *(Maculabatis pastinacoides*) White-edge freshwater whipray (*Fluvitrygon signifier*)* Fluvitrygon oxyrhynchus (*Longnose Marbled Whipray*)* Urogymnus polylepis (*Freshwater whipray*)*
Pygmy skates (Gurgesiellidae)	Siboga Pygmy Skate *(Fenestraja sibogae*)
Bamboo sharks (Hemiscylliidae)	Raja Ampat Epaulette Shark (*Hemiscyllium freycineti*) Cendrawasih Epaulette Shark (*Hemiscyllium galei*) Halmahera Epaulette Shark (*Hemiscyllium halmahera*) Hooded Carpet Shark (*Hemiscyllium strahani*) Henry's epaulette shark (*Hemiscyllium henryi*)
Guitarfishes (Rhinobatidae)	Jimbaran guitarfish (*Rhinobatos jimbarensis*) Indonesian guitarfish (*Rhinobatos penggali*)
Catsharks (Scyliorhinidae)	Painted swellshark (*Cephaloscyllium pictum*) Pale catshark (*Apristurus sibogae*) Bali catshark (*Atelomycterus baliensis*)
Dogfish (Squalidae)	Indonesian Shortsnout Spurdog (*Squalus hemipinnis*)
Angelsharks (Squatinidae)	Indonesian angleshark (*Squatina legnota*)
Houndsharks (Triakidae)	Indonesian houndshark (Hemitriakis indroyonoi) Whitefin smoothound (Mustelus widodoi)

*Rare but not endemic

Research needs

There are considerable knowledge gaps in for ecological and life history characteristics of chimera (Chimeridae), the skates (Anacanthobatidae, Rajidae, Gurgesiellidae) and bullhead sharks (Heterodontidae), meaning they could not be included in this analysis. This makes them priority species groups for further research. Knowledge gaps also exist for several species of whiptail stingray (Dasyatidae), wedgefish (Rhinidae), bamboo sharks (Hemiscylliidae) gulper sharks (Centrophoridae), catsharks (Scyliorhinidae), wobbegongs (Orectolobidae) and numbfishes (Narcinidae).

Management-relevant characteristics

As well as calculating extinction risk, ecological and life history characteristics can be used to design practical management strategies, tailored towards species groups that exhibit similar characteristics and vulnerabilities (Harry et al. 2011, Dulvy et al. 2017). For example, coastal species which exhibit site fidelity during some or all of their life history can benefit from small, localised marine protected areas, while larger, oceanic wide-ranging species will require collaboration across multiple jurisdictions and fisheries management measures to protect key life history stages (Table 2, Fig. 2).

Table 2. A summary and comparison of management-relevant characteristics of shark and ray species and the primary threats and challenges related to each characteristic

Depth zone	**Shallow** Higher exposure to fishing mortality, including targeted and incidental catch. Most threatened sharks and rays are found in depths of less than 200m. Vulnerable to targeted and incidental catch in all types of fishing gear, particularly longlines and gillnets. **E.g. Guitarfishes**	**Deep** Less susceptible to fishing pressure but generally have higher biological vulnerability such that developing deepwater fisheries could represent a significant threat in the near future. Particularly vulnerable to trawling, set gillnets and bottom longlines. **E.g. Deepwater stingray, gulper sharks**
Distance from shore	**Coastal** Susceptible to fishing pressure in small-scale, inshore, multi-species fisheries, which have limited regulation and make up the majority of fisheries in Indonesia. Also vulnerable to impacts of coastal development and pollution. **E.g. Zebra sharks and butterfly rays**	**Offshore** Susceptible to incidental catch in commercial pelagic fisheries, particularly longline fisheries, and other unregulated high-seas fisheries. Difficult to implement habitat protection/spatial closure measures. **E.g. Thresher and oceanic whitetip sharks**
Range	**Restricted range/endemic** Vulnerable to site-specific disturbances and cumulative fishing pressure at a single location. High extinction risk if populations are small and fragmented. **E.g. Epaulette sharks**	**Widely distributed** Threatened by multiple fisheries and gear-types across multiple locations and jurisdictions. Difficult to protect species throughout their range. **E.g. Bull, tiger sharks and hammerhead sharks**
Movement	**Site fidelity** Vulnerable to site-specific disturbances and cumulative fishing pressure, although easier to protect throughout range and life-history. **E.g. Wobbegongs**	**Highly migratory** Threatened by multiple fisheries and gear-types across multiple locations, jurisdictions and life-history stages. Difficult to protect species throughout their life-history. **E.g. Whale sharks, dusky sharks**
Life history strategy	**Productive** Small, fast-growing, highly productive. Can withstand higher levels of fishing pressures, however may be difficult to implement fisheries management measures for specific life-history stages if similar size to target fish species. **E.g. Blue sharks**	**Conservative** Large, slow-growing, long-lived. Cannot withstand high levels of fishing pressure, and populations have limited rebound potential. May be possible to modify fishing selectivity to take advantage of particular life-histories. **E.g. Manta and devil rays**
Economic value	**Low** Challenging to create market incentives for sustainable management. Food security and ethical issues associated with changing supply and demand, as low economic value species may serve a 'safety net' function, acting as a cheap source of easily accessible protein for coastal communities. **E.g. Stingrays**	**High** Strong incentives to overexploit, with elevated extinction risks for large-bodied animals targeted for economically-valuable, preserved parts. Challenging to influence consumer demand if products have strong cultural and/or status value with limited substitutability. **E.g. Sawfishes**

Fig. 2: Examples of the varied ecological and life-history characteristics of shark and ray species

Sawfishes

Size: Large (up to 700cm TL)
Fecundity: Moderate
Depth: Shallow (<200m)
Habitat: Coastal marine, estuarine and freshwater. Bottom-dwelling.
Range: Widespread in tropical and sub-tropical waters, though distribution is now patchy.
Movement: Evidence of seasonal migration.
Economic value: High – targeted for rostrums.
Key management issues: Targeted and taken incidentally in broad-spectrum fisheries. Highly vulnerable to entanglement in gears due to body morphology. Vulnerable to destruction and degradation of freshwater, estuarine and mangrove habitat.
Comparable species: Guitarfish, wedgefish.

Hammerhead sharks

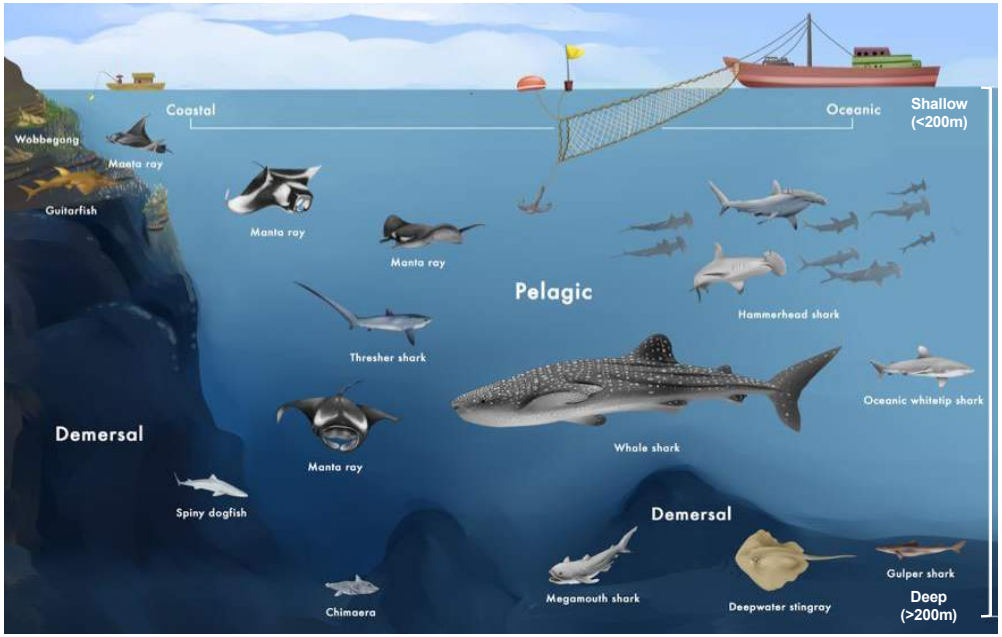
Size: Large (up to 610cm TL)
Fecundity: Moderate
Depth: Mixed
Habitat: Coastal and pelagic
Range: Widespread in tropical waters.
Movement: Migratory; aggregative behaviour.
Economic value: Moderate – targeted for large fins.
Key management issues: Targeted and taken incidentally in both high-seas and coastal fisheries therefore subject to cumulative pressures. Head morphology make all life-history stages vulnerable to capture in net gears.

Thresher sharks

Size: Large (up to 570cm TL)
Fecundity: Moderate
Depth: Mixed
Habitat: Oceanic, pelagic
Range: Widespread
Movement: Highly migratory
Economic value: Moderate – targeted for fins.
Key management issues: Caught in unregulated high-seas fisheries.
Comparable species: Oceanic whitetip (*Carcharhinus longimanus*), mako sharks (*Isurus* sp.)

Bamboo sharks

Size: Small (up to 130cm TL)
Fecundity: High
Depth: Shallow (<200m)
Habitat: Inshore, bottom-dwelling.
Range: Restricted, several species endemic to Indonesia.
Movement: Site-fidelity
Economic value: Low consumptive use value for meat. Could be promoted as a charismatic species for tourism.
Key management issues: Commonly caught in inshore small-scale fisheries. Target for aquarium trade. Vulnerable to degradation of reef habitat.
Comparable species: Wobbegongs (Orectolobus sp.)



Whale sharks

Size: Large (up to 2000cm TL)
Fecundity: High
Depth: Mixed – shallow to very deep.
Habitat: Coastal and oceanic.
Range: Circumtropical
Movement: Highly migratory; aggregative behaviour.
Economic value: High consumptive use value – targeted for meat and large, high-value fins. High non-consumptive use value as charismatic species for marine tourism.
Key management issues: Targeted fishing, bycatch in nets and vessel strikes. Poor tourism management and plastic pollution becoming an increasing issue. Difficult to protect due to large range and migration.

Mobulid rays

Size: Large (up to 700cm DW)
Fecundity: Low
Depth: Mixed
Habitat: Inshore reefs and oceanic.
Range: Widespread in tropical waters.
Movement: Site-fidelity and migratory; aggregative behaviour.
Economic value: Moderate consumptive use value – targeted for gill plates. High non-consumptive use value as charismatic species for marine tourism.
Key management issues: Targeted for gill plates for use in Asian medicinal products. Highly vulnerable to targeted and incidental fishing mortality due to large size, slow swimming speed, aggregative behaviour, and lack of human avoidance.

Reef sharks

Size: Moderate (up to 200cm TL)
Fecundity: Moderate
Depth: Shallow
Habitat: Coastal, reefs.
Range: Widespread in tropical and sub-tropical waters.
Movement: Site-fidelity
Use value: Low consumptive use value for meat. Moderate non-consumptive use value as popular species for dive tourism.
Key management issues: Commonly taken by small-scale, coastal, mixed-species fisheries which are poorly regulated and documented. Vulnerable to degradation of reef habitat.
Comparable species: Coastal whiptail stingrays (Dasyatidae)

Gulper sharks

Size: Small (up to 147cm TL)
Fecundity: Low (small litter size, late age at maturity)
Depth: Deepwater (>200m)
Habitat: Upper continental slopes and outer continental shelves.
Range: Widespread
Movement: Highly migratory, aggregative behaviour.
Use value: Moderate – targeted for liver oil.
Key management issues: Increasing exploitation in developing deep-water fisheries, both as incidental catch and through targeted longline fishing. Migratory and schooling behaviour mean they are threatened across much of their range. Low fecundity makes it difficult for populations to recover.

Sites

Key findings

- Shark and ray sites in Indonesia have a range of conservation values, with different sites being important for different species, life-history stages and ecological functions
- Important shark and ray sites in Indonesia exist under a variety of management regimes, with a high variance in the levels of capacity and systems in place to effectively manage shark populations and habitat
- Different types and levels of investment are required in different provinces and sites according to their conservation value and management capacity:
  - Important sites with good management could benefit from low levels of investment in technical support, and represent 'easy wins' for improving shark and ray conservation and management
  - Important sites with moderate to poor management could benefit from higher levels of investment to develop management plans and put systems and capacity in place for implementation
  - Important sites with no management or protection should be further assessed for their conservation value, and included in to provincial- and national-level spatial planning processes
  - Different approaches will be required for different management regimes and stakeholder groups
- There are significant spatial biases in availability of data, with research effort to date focused around eastern Indonesia and shallow, coastal areas. These data gaps need to be addressed.
- It should be acknowledged that spatial protections will only be effective in certain ecological and socio-economic contexts (e.g. for some species with site fidelity and limited ranges, and to support marine tourism). Marine protected areas must be complimented with other approaches for sustainable management of populations.

Over 100 key sites for sharks and rays in Indonesia were identified through literature reviews and expert-opinion (S2). The identified sites are of varying importance for sharks and rays, ranging from 'occasional sighting' areas to known aggregation points with several critical habitat features including pupping sites, nursery grounds, feeding grounds, migration routes and habitat for limited-range species.

Conservation values and management capacity

The sites are subject to varying degrees of management and protection, from large, well-established national parks to small, poorly known areas with little-to-no management. Our analysis indicates that a total of 13,470 km^2 of Indonesia's protected areas include critical habitat for sharks and rays under a variety of governance arrangements and management categorisations. Of the areas under management just over half are locally-managed MPAs (KKPDs) classified as IUCN Category VI (protected area with sustainable use of natural resources). The rest comprise of national parks, tourism parks and nature reserves under the jurisdiction of national agencies – the Ministry of Marine Affairs and Fisheries (MMAF) or the Ministry of Environment and Forestry (MoEF). 43% of the identified sites are currently not formally protected or under any form of management (Table 3, Fig. 3), with 32 of these including at least one critical habitat feature for sharks and rays. 16 existing MPAs that are home to sharks and rays are currently classified as under poor management (i.e. EKKP3K Level 1; METT<33.3), with 11 of these including several critical habitat features (Table 3, Fig. 3,4).

Table 3: Summary of shark and ray sites in Indonesia. Management ratings based on EKKP3K (Green (Level 3) = good, Yellow (Level 2) = moderate, Red (Level 1) = poor) and METT (>66.6 = good, >33.3 = moderate, <33.3 = poor). Critical habitat features include aggregation sites, pupping/nursery grounds, feeding grounds, migration routes and habitat for limited-range species.

	Existing marine protected areas				No management	Total
	Good management	Moderate management	Poor management	Unreported		
3-4 critical habitat features	2	5	3	-	1	**11**
1-2 critical habitat features	8	9	9	5	31	**62**
Occasional sightings	4	5	4	4	12	**29**
Total	**14**	**19**	**16**	**9**	**44**	**102**

Geography

By province, West Papua, Maluku, East Nusa Tenggara, West Nusa Tenggara and North Maluku have the highest overall habitat value. While largest management gaps - in terms of absolute numbers of key sites with poor or no management - include Maluku and North Maluku, East Java and West Nusa Tenggara and West Papua (Fig. 3). There is a clear bias in sampling towards coastal areas, and areas with established dive operations and tourism. For example, no sites were identified in Central or West Kalimantan and very few sites were identified in North Sulawesi and South and West Sumatera, while many sites were identified in West Papua (Fig. 4). This is likely due to biases in monitoring as opposed to a lack of shark and ray populations in these areas, and highlights these areas as priorities for further research.

Examples of critical habitat areas with good management, as classified by METT and EKKP3K, include Komodo National Park, East Nusa Tenggara; Misool, West Papua; and Nusa Penida, Bali, which also benefit from high levels of tourism. Despite their high management effectiveness scores, challenges still remain in many of these sites for effectively implementing management plans and ensuring sustainable tourism development. These sites could represent potential 'easy wins' for improving shark conservation and management, with small investments in strengthening existing capacity and systems potentially leading to significant conservation outcomes.

Examples of established MPAs that could benefit from more significant investment in management support include Aceh Jaya in Aceh and Lunyuk in West Nusa Tenggara, which are both nursery ground sites for hammerhead sharks and Morotai in North Maluku, which is a feeding ground and aggregation site for several species of sharks and rays. These areas require more concerted efforts for developing management plans and putting systems and capacity in place for implementation.

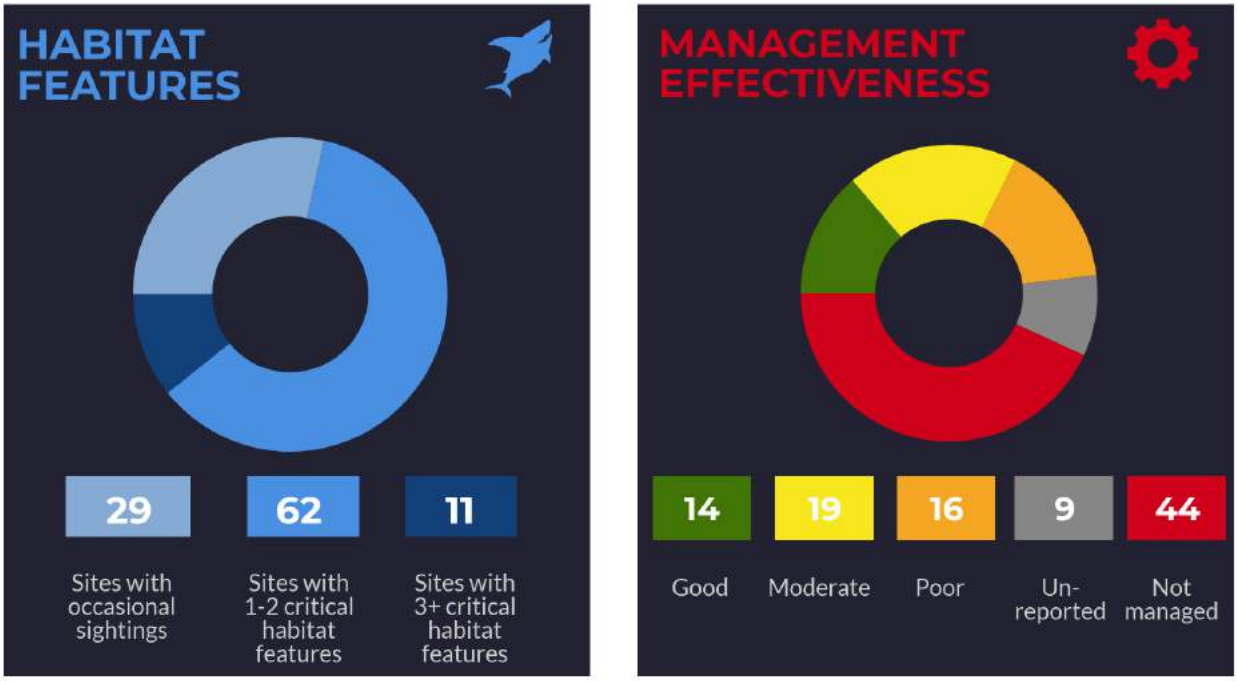
Belongas in West Lombok and Botubarani Beach in Gorontalo both serve as critical aggregation sites for priority species (hammerheads sharks and whale sharks, respectively), but currently receive no management or protection (Fig. 4).

FIG. 3 SITES SUMMARY

102
Key sites for sharks and rays identified

72%
With several critical habitat features

43%
Not protected or managed



c) HABITAT VALUE BY PROVINCE

Top 5 provinces by habitat value

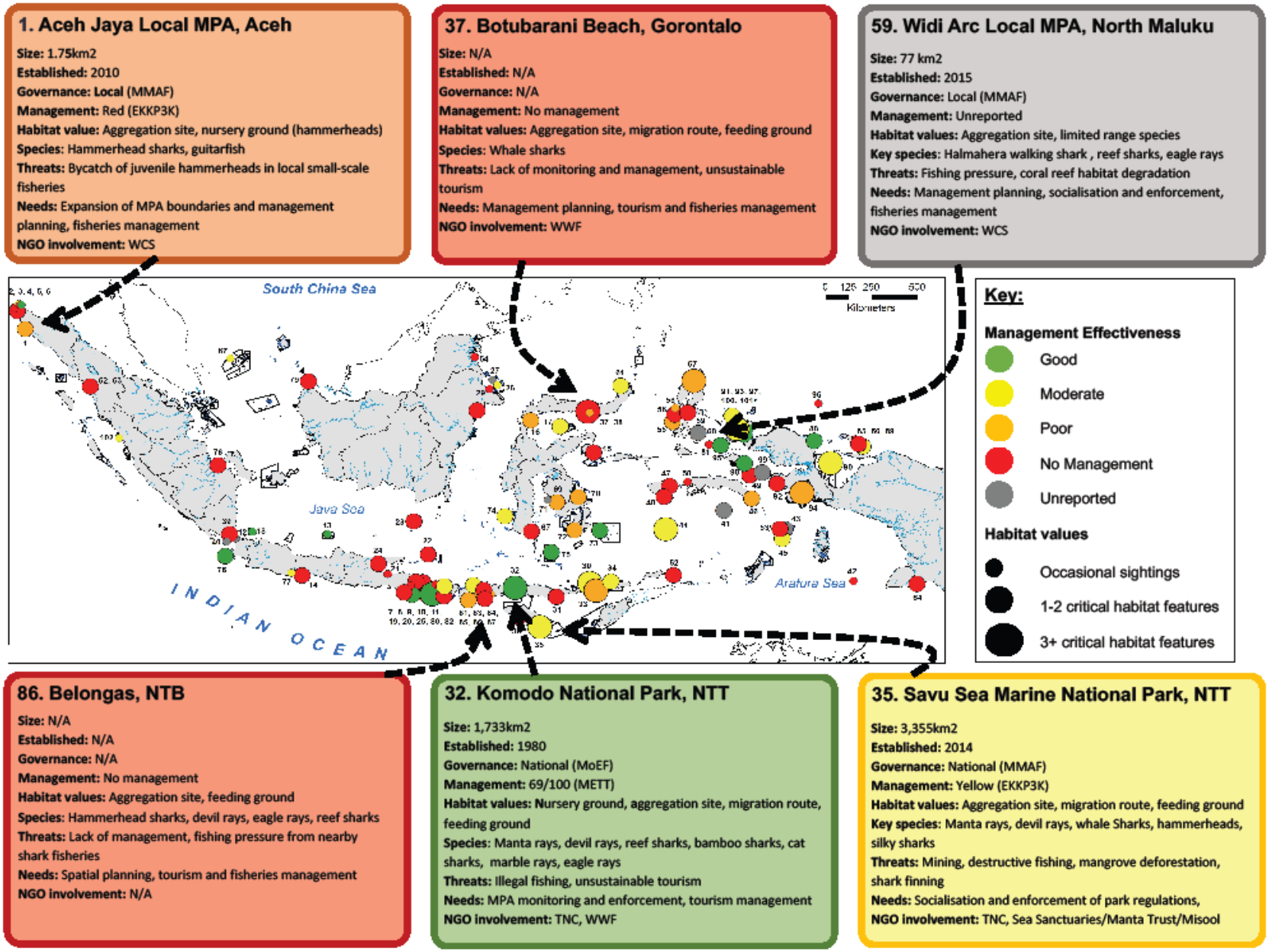
1. West Papua
2. Maluku
3. East Nusa Tenggara
4. West Nusa Tenggara
5. North Maluku

d) MANAGEMENT GAP BY PROVINCE

Top 5 provinces by management gap

1. Maluku
2. West Nusa Tenggara
3. East Java
4. North Maluku
5. West Papua

Fig 4. The distribution, habitat value and management effectiveness of identified shark and ray sites, with 6 case study examples



Utilisation

According to government production statistics, approximately 120,000 tons of sharks and rays are landed in Indonesia every year, across almost 200 fisheries (Table 4, Fig. 5, 6). This figure is likely an underestimate due to a prevalence of illegal, unreported and unregulated (IUU) fishing, but still makes Indonesia the largest shark producer in the world, responsible for approximately 13% of global catch. This is more than twice the reported annual capture production of China and five times the annual capture production of Malaysia, the second two largest producers in the region. Based on customs and United Nations ComTrade data only roughly 3-4% of this volume (3,015-4,532 tons) is internationally exported in the form of dried fins and frozen or chilled meat (Fig. 7). From fishery to consumer the trade chains are diffuse and complex. Products move through several layers of buyers and middlemen before reaching consumers, with different trade chains for different products, and both domestic and international demand.

Fisheries

Key findings

- Shark and ray fisheries in Indonesia are diffuse and diverse, with multiple factors driving over exploitation in different contexts
- The majority of fisheries landing sharks in Indonesia are classified as small-scale (<10GT). However, the small-scale sector is not necessarily the largest in terms of total production. Due to significantly larger capacity and more consistent fishing effort, the commercial sector likely constitutes a major proportion of total production even from a small number of fisheries. The relative contributions of the different types of fisheries to total production/fishing mortality remains difficult to quantify due to a lack of comprehensive landings data.
- Different types of interventions are required for different types of fisheries. Significant investments should be made in researching and incentivising by-catch reduction measures in non-target fisheries and reducing mortality of priority species, while also improving the sustainability of targeted fisheries.
- The role sharks and ray fisheries in food security, nutrition and human well-being should not be understated. The interactions between shark conservation and management and human well-being must be better understood in order to design policies that are both effective and ethical.
- There are considerable geographic biases in availability of data, with research effort to date focused around Aceh, Java and some parts of Eastern Indonesia. Data gaps in Sumatera, Kalimantan and Papua need to be addressed.

Shark and ray fishing effort in Indonesia is diffuse, and highly fragmented. Fisheries range from small-scale to industrialised operations, and from fisheries that are highly targeted (i.e. species-specific) to those that primarily catch sharks incidentally (Table 3, Fig. 5, S3). The volume, species composition and numbers of fishers and vessels engaged varies across fisheries, as does the total value and relative importance of sharks and rays for each fishing community's livelihoods and food security.

Scale and type

In terms of number of fisheries catching sharks and rays (targeted and incidental), the majority of the fisheries identified are small-scale. For fisheries where data on vessel size is available 85% operate vessels <10 GT (Table 4). This is not surprising given that it is estimated that more than 90% of all fisheries in Indonesia are small scale (based on government classifications).

Most shark and ray fisheries catch sharks incidentally, with 86% of the fisheries where data is available classified as either incidental or a mixture of targeted and incidental. Incidental catch exists on a spectrum, from unintentional by-catch, to valuable retained secondary catch, to opportunistic targeted catch in mixed-species fisheries (Box 3). Of the fisheries that are classified as incidental, the majority are small-scale, therefore sharks are likely to be retained catch with some value as opposed to true by-catch (Table 4).

It should be emphasised that due to limited availability of landings data these figures and comparisons of scale and type are based on the absolute number of identified fisheries, not the levels of capacity, effort or exploitation of each fishery. Therefore, while the majority of fisheries landing sharks in Indonesia are classified as small-scale (<10GT), the small-scale sector is not necessarily the largest in terms of total production. Due to significantly larger capacity and more consistent fishing effort, the commercial sector likely constitutes a major proportion of total production, even from a small number of fisheries. The relative contributions of small-scale vs commercial fisheries and targeted vs incidental catch to total shark production remains difficult to quantify due to a lack of comprehensive landings data.

Box 3. What is incidental catch?

By-catch can be defined as the unintentional catch of non-target species or sizes. Sharks are caught as 'by-catch' in many fisheries throughout the world, however our research indicated that the term by-catch is ambiguous and often misused to describe shark fisheries in Indonesia. Given that international trade in shark fins is highly valuable, and there is a large domestic market for shark meat, it is rare for sharks to be caught as unwanted by-catch and discarded. Instead we use the term 'incidental catch' to encompass any fishery where sharks were not the primary target species group. Incidental catch in Indonesia's shark fisheries exists on a spectrum, from unwanted by-catch; to desirable, retained secondary catch; to opportunistically targeted catch in mixed-species fisheries.

Since many of Indonesia's fisheries are small-scale and mixed-species, fishing behaviour can be highly-fluid depending on seasons, labour markets, and other fishery-related and external factors. As such, a single fishery can fluctuate between targeted and incidental depending operational and environmental factors, or external socio-economic drivers.

In some fisheries in Indonesia incidental shark catch is treated differently to target species. For example, the crew may be permitted to retain and trade any sharks caught, as opposed to the catch belonging to the boat owner or investor. In some cases this may create incentives for fishers to target sharks even in 'non-target' fisheries.

Examples of highly targeted small-scale fisheries include Lamakera and Lamalera in East Nusa Tenggara, which directly target mobulid rays and whale sharks, respectively, and Dobo in Maluku, where some fishers specifically target guitarfishes, while others focus on gulpers and spurdogs for liver oil. Other small-scale targeted fisheries include Tanjung Luar in West Nusa Tenggara, Muncar in East Java and Mano in North Maluku, which target pelagic sharks with long-lines. Incidental catch is a significant issue throughout Indonesia's small-scale gillnet fisheries, which is the country's largest fishery-type by participation, yet is largely overlooked by monitoring and management systems due to its informal nature. For example, in Rigaih, Aceh Jaya, large numbers of juvenile hammerhead sharks are caught in the small-scale coastal gillnet fishery, and retained and sold locally as a cheap source of animal protein (Fig. 6).

In the commercial sector, the Blimbing fishery in Malang, East Java, operates a fleet of10-30 GT vessels which specifically targets sharks and rays on extended fishing trips, with vessels spending months at sea in a single trip. Commercial fisheries that incidentally catch sharks include the Bitung (North Sulawesi) and Benoa (Bali) longline commercial tuna fisheries (Fig. 6)

Table 4: Summary of catch type and scale of identified shark and ray fisheries in Indonesia

	Highly targeted	Targeted	Incidental	Targeted & incidental	Unclear	Total
Commercial	-	1	8	4	-	**13**
Small scale	2	12	29	36	27	**106**
Commercial & small scale	-	1	11	13	9	**34**
Unclear	-	-	5	2	34	**41**
Total	**2**	**14**	**53**	**55**	**70**	**194**

Gears

In terms of gear types, many shark fisheries use a mixture of gears, with the most common being longline and gillnet. Most targeted fisheries use longlines to target pelagic sharks, while a number of demersal gillnet fisheries target reef sharks. Sharks are also caught incidentally in both longline and gillnet fisheries, with trawl, seine and hand line fisheries also catching sharks incidentally (Table 5).

Table 5: Summary of the top five gear types used in identified shark and ray fisheries in Indonesia

Gear type	No. fisheries deploying gear type	% fisheries deploying gear type	Fishery type	Fishery scale	Shark survivability
Longline	97	67%	Several targeted, mostly incidental	Several commercial, mostly small-scale	Moderate
Gillnet	72	50%	Some targeted, mostly incidental	Several commercial, mostly small-scale	Low
Trawl	30	21%	Mostly incidental	Some commercial, mostly small-scale	Low
Handline	29	20%	Mostly incidental	Mostly small-scale	Low
Seine	25	17%	Mostly incidental	Several commercial, mostly small-scale	Low

Species

Relatively little species-specific fisheries data exists for shark catch in Indonesia. Of the fisheries for which any species composition data is available, it is often aggregated to the family level. According to available data, almost 70% of identified fisheries catch species from at least one species group of conservation concern. Requiem sharks and hammerhead sharks are the most frequently caught family across all fisheries, primarily as incidental catch, followed by whiptail stingrays and thresher sharks (Table 6).

Table 6: Summary of the main taxonomic groups of conservation concern that are caught in Indonesia's shark and ray fisheries

Family	% of fisheries landing species	Notes on regulatory status
Requiem sharks *Carcharhinidae*	90%	*C. longimanus and C. falciformes* on CITES Appendix II
Hammerhead sharks *Sphynidae*	59%	*S. lewini, S. mokarran and S. zygaena*on CITES Appendix II
Whiptail stingrays *Dasyatidae*	41%	-
Thresher sharks *Alopidae*	29%	Whole family on CITES Appendix II and stipulations for management in RFMOs
Manta and devil rays *Mobulidae*	24%	Whole family on CITES Appendix II
Mako sharks *Lamnidae*	13%	-
Dogfish sharks *Squalidae*	9%	

Geography

In terms of geographic distribution, Aceh has the highest document number of shark fisheries based on available data, although the scale and type of these fisheries is mostly mixed or unclear. Most small-scale shark fisheries are concentrated in eastern Indonesia, particularly in South Sulawesi, Maluku, North Maluku, East Nusa Tenggara, and West Papua while most commercial fisheries are found in East Java, Jakarta and North Sulawesi (Fig. 5, 6).

For the fisheries for which fishing ground data is available, the most frequently used Fisheries Management Area (FMA) for the identified shark fisheries is FMA 573 (Indian Ocean). FMAs 712, 713, 714 and 718 are also frequently used as fishing grounds for catching sharks, with 712 and 718 primarily used by commercial vessels and 573, 714 and 718 primarily used by small-scale vessels (Fig. 5).

As with the sites data, it should be acknowledged that there are biases in sampling effort towards certain provinces, particularly where there is a strong NGO presence. Areas with very few identified shark fisheries likely represent gaps in knowledge and research as opposed to an absence of shark fishing.

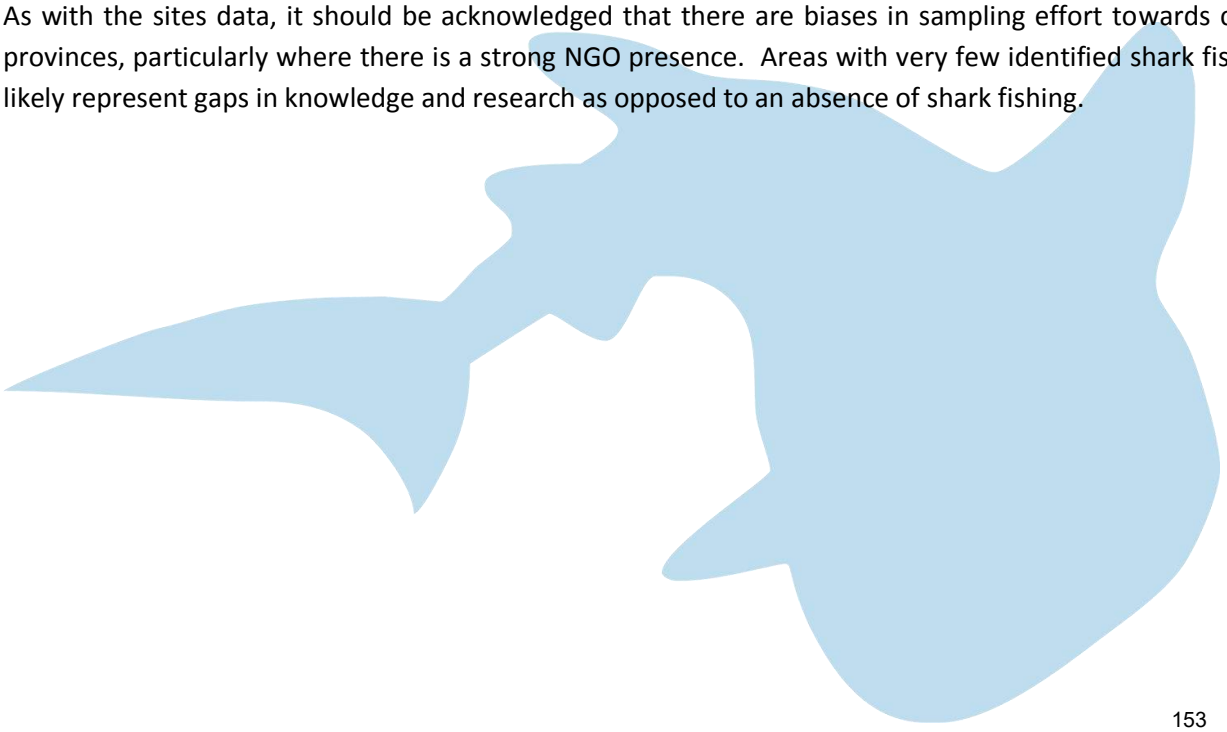
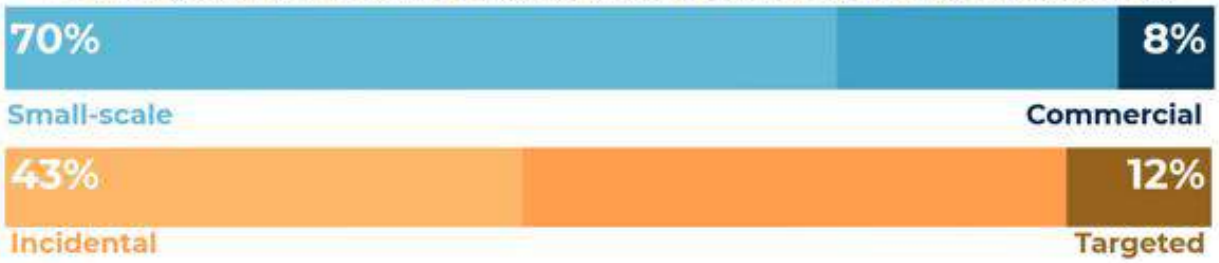


FIG. 5 FISHERIES SUMMARY

OVER 200 FISHERIES FOR SHARKS AND RAYS IN INDONESIA



MAJOR FISHING PROVINCES

TOP PROVINCES BY SCALE

Small-scale

1. South Sulawesi
2. Maluku
3. East Nusa Tenggara
4. North Maluku
5. West Papua
6. West Nusa Tenggara

Commercial

1. East Java
2. North Sulawesi
3. Jakarta

TOP PROVINCES BY TYPE

Targeted

1. East Nusa Tenggara
2. Maluku

Incidental

1. North Maluku
2. Aceh
3. Bali
4. Maluku
5. West Nusa Tenggara

FISHERIES MANAGEMENT AREAS

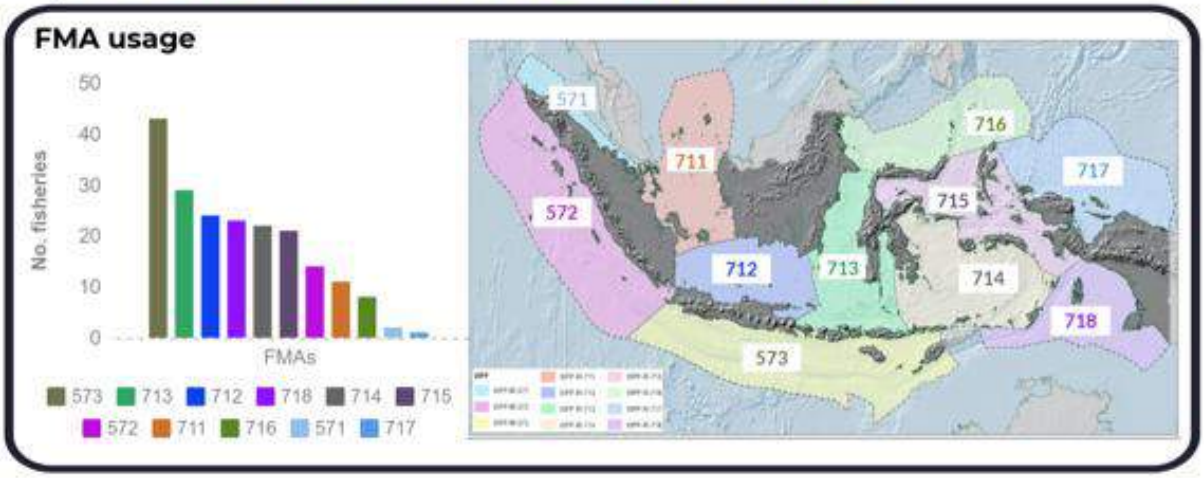
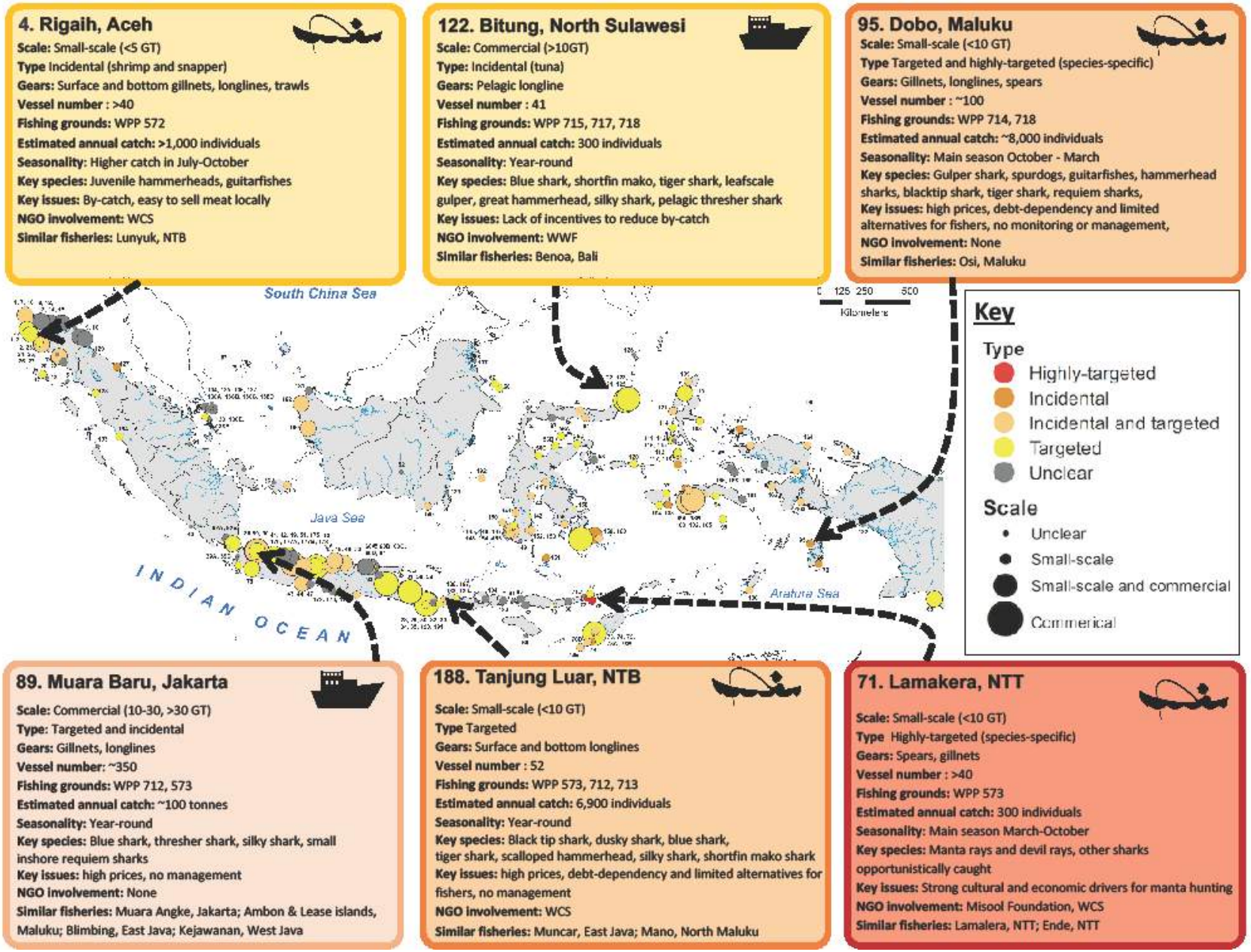


Fig 6. The distribution, type and scale of identified shark and ray fisheries in Indonesia, with 6 case study examples



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Trade

Key findings

- According to available data, only a small proportion of sharks and rays caught in Indonesia are exported (3-4%), and in turn only a small proportion of total exports consist of dried shark fins (10%). While these figures are by weight, and fin weight only represent 6-16% of total body weight (e.g. Cortés et al. 2006), there is still a considerable gap between total recorded production and total recorded exports. These findings imply several conclusions, which warrant further attention:
  - High domestic use of shark products. While this is likely the case for shark meat, it is unlikely that domestic consumption of fins is large enough to warrant this gap.
  - Harmonised System (HS) codes create loopholes and ambiguity in customs data, meaning that shark and ray products are leaving the country under commodity codes that are not specific to sharks and rays.
  - Shark and ray products are leaving the country via unofficial channels, and therefore not being recorded

- There are several strategic 'pinch points' within the domestic trade chain (aggregation points, trading hubs, exporting companies) where resources should be invested to improve monitoring, verification and enforcement capacity, and implement trade chain traceability

- There are a small number of priority importing countries, with which strategic inter-governmental collaborations and data sharing could significantly improve monitoring, verification and enforcement.

Legal trade

According to ComTrade and customs data from 2014-2016, at least 3,000 tons of shark and ray products are exported from Indonesia annually in the form of frozen and chilled rays, frozen and chilled sharks and dried shark fins.

Trade chains for shark and ray products from fisher to export are diffuse and fragmented, with different pathways for different products. At the local level, products pass through various collectors, processors and traders, depending on the nature and quality of the product, before reaching larger traders in major trading cities. Jakarta and Surabaya are the largest known domestic trading hubs, with the majority of shark and ray products then internationally exported from five ports in four cities: Tanjung Priok seaport and Soekarno-Hatta airport in Jakarta; Pangkal Balam seaport in Bangka, Bangka-Belitung; Tanjung Emas seaport in Semarang, Central Java; and Tanjung Perak seaport in Surabaya, East Java. Most shark and ray products (68%) leave the country via Tanjung Priok seaport, although Tanjung Perak in Surabaya handles the largest share of shark fin exports (33%; Fig. 7).

There are six government offices acting as monitoring and verification points for shark and ray products transiting through the country, located in Padang, West Sumatra; Serang, Banten; Denpasar, Bali; Pontianak, West Kalimantan; Makassar, South Sulawesi; and Sorong, West Papua (Fig. 7). These offices are managed by the Ministry of Marine Affairs and Fisheries *Badan Pengelola Sumber daya Pesisir dan Laut* (Coastal and Marine Resource Management Bodies, BPSPL) and are responsible for checking marine product shipments paperwork, verifying that the volumes, products and species on the paperwork are correct, and approving that shipments are legal for trade and export. The BPSPL offices therefore function as priority aggregation points for shark and ray product traceability.

FIG. 7

TRADE SUMMARY

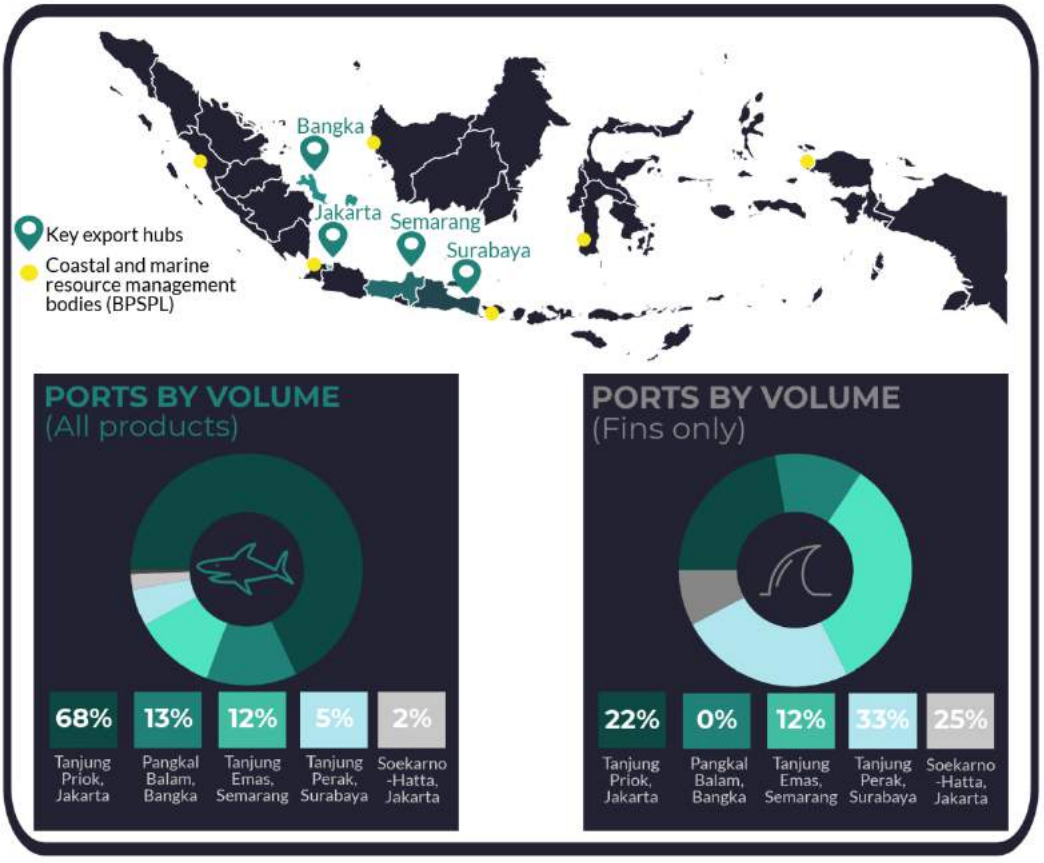
120,000 TONNES OF SHARKS & RAYS LANDED EACH YEAR

3-4,000 TONNES OF SHARK & RAY PRODUCTS EXPORTED EACH YEAR

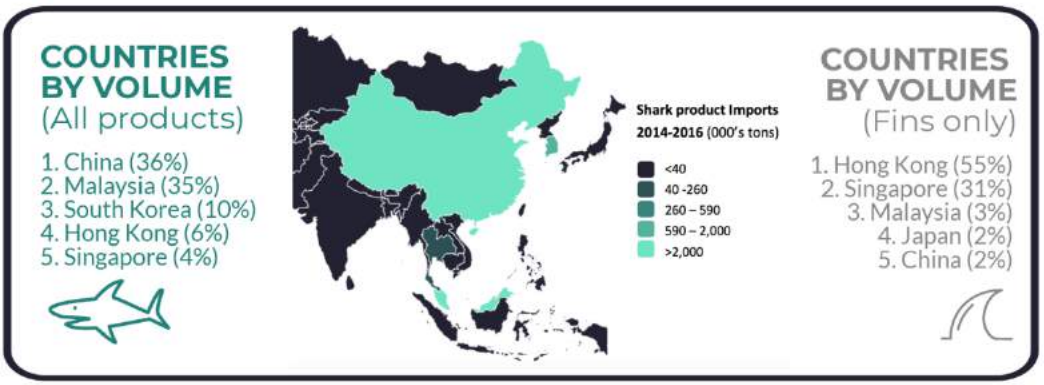
Frozen and chilled sharks and rays

Dried fins

4 KEY TRADING HUBS



5 MAJOR IMPORTING COUNTRIES



Sources: FAO 2017, UN ComTrade 2012-2016; Indonesian customs data October 2016-March 2017

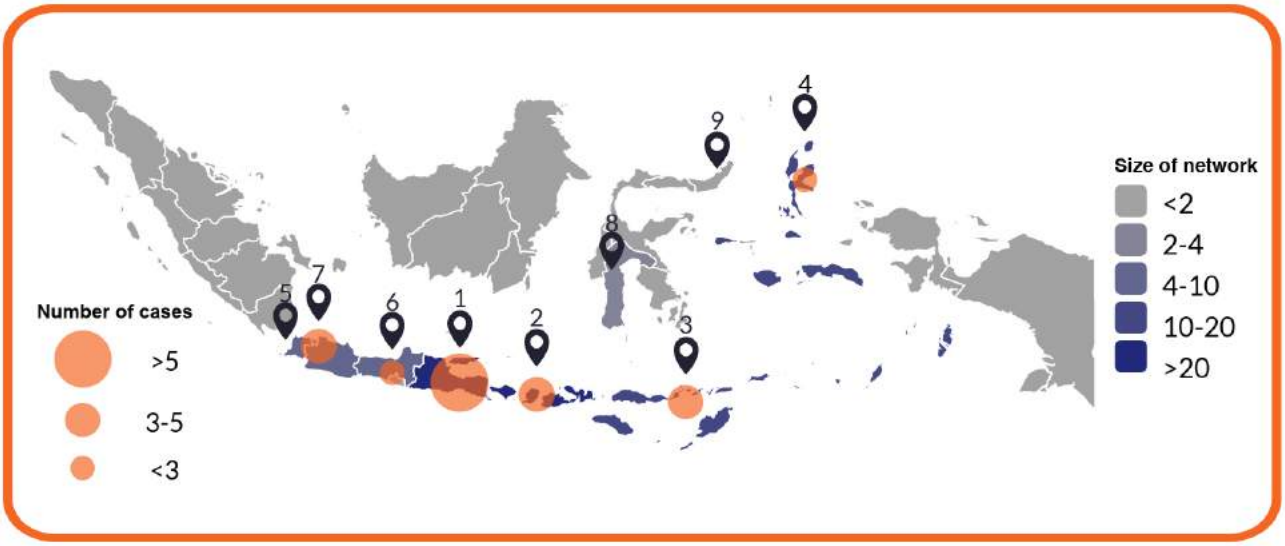
Illegal

For illegal trade, intelligence and law enforcement data collected between April 2014 and July 2017 identified 125 illegal trade suspects linked to nine major, geographically-clustered, trading syndicates. Available data highlights East Java, Bali, West Nusa Tenggara, East Nusa Tenggara, and Jakarta as the top five hubs for illegal trade (Fig. 8), however it should be noted that the information is highly biased towards locations with higher investigations and law enforcement capacity, and towards cases involving fully protected species which are relatively easy to visually identify. The lack of information for Sulawesi, Papua, Kalimantan and Sumatera likely reflect a lower investigation and enforcement effort rather than an absence of illegal trade networks.

Most cases between April 2014 and July 2017 have involved illegal domestic trade of fully protected species, although there have been several cases of attempting to smuggle shark products out of the country, either fully or partially protected species, or non-protected species without the necessary paperwork and permits. The majority of cases against illegal traders of shark and ray products have involved trading of manta ray products (19 cases) and whale shark products (6 cases), which is not surprising given these are both fully protected species and the products are relatively easy to visually identify. For species with limited protection in Indonesia (i.e. export bans and zero quotas) there have been two cases of illegal smuggling: one involving oceanic whitetip shark fins and the other involved hammerhead shark fins (Fig. 8). The most illegally traded species by approximate volume of seizures is whale sharks (60%), however this seizure volumes are skewed, due to whale sharks being a much larger species and one single case involving the smuggling of two live whale sharks (Fig. 8).

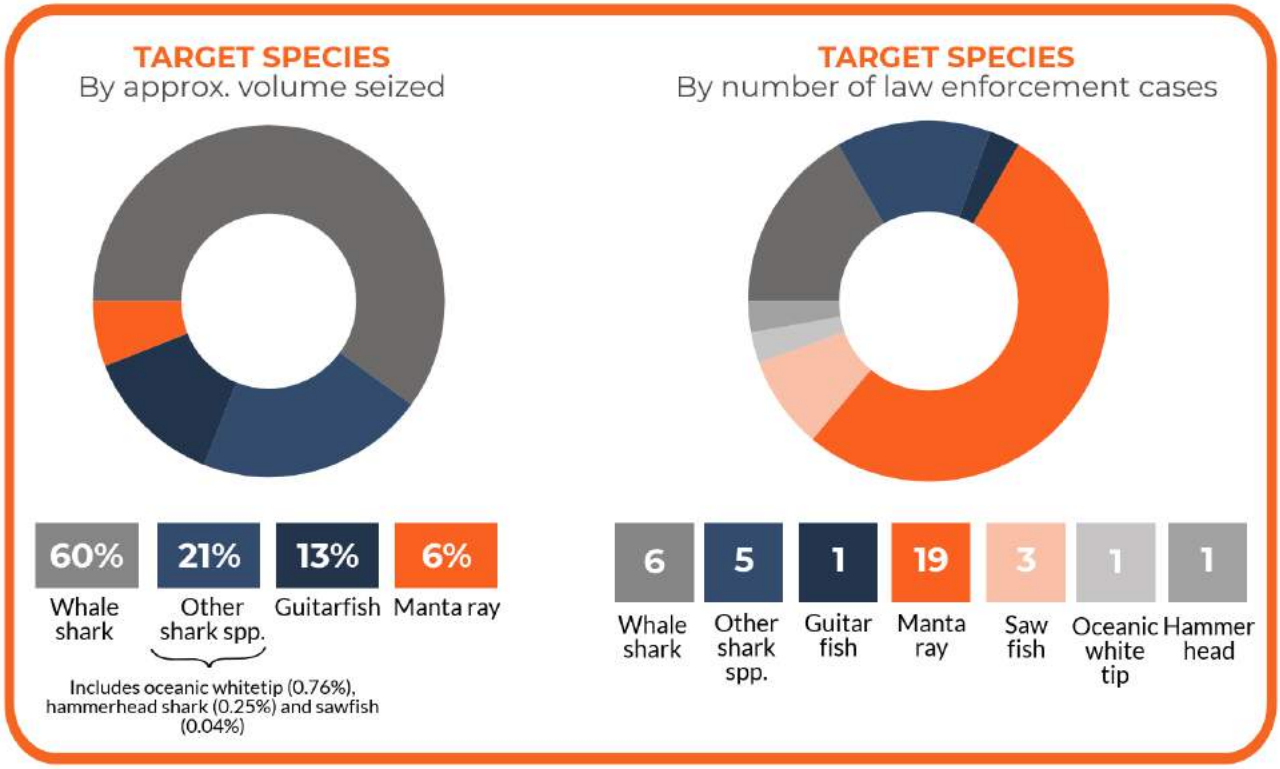
FIG. 8 ILLEGAL TRADE SUMMARY

9 geographically-clustered Illegal trading networks



1. East Java Group; 2. Bali and West Nusa Tenggara group; 3. East Nusa Tenggara group; 4. Maluku and North Maluku group; 5. West Java and Banten group; 6. Central Java group; 7. Jakarta group; 8. South Sulawesi group; 9. North Sulawesi group

>70,000 kg of illegal shark and ray products seized



Sources: WCS Wildlife Crime's Unit (WCU), case and prosecutions documents, i2 wildlife crimes intelligence database

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Consumption

Key conclusions

- Levels of domestic consumption of shark and ray products in Indonesia are likely to be significant, but the drivers of consumption vary across different products, geographies and demographics, with the largest domestic market focused around meat
- The magnitude, distribution and drivers of domestic consumption need to be better understood to guide the design of future conservation interventions. In particular, more information is required on the role of shark products in domestic food security, it's substitutability for other forms of seafood and animal protein, and the interactions between domestic and international markets

Given the large gap between total production and exports, domestic consumption of sharks and rays in Indonesia is likely to be significant. There is considerable qualitative and anecdotal evidence of domestic consumption but limited quantitative data on the magnitude of the domestic market. Available information suggests that there are at least three types of consumers of shark and ray products in Indonesia, depending on the product, geography and demographic group. Broadly, these groups are: luxury consumers, traditional consumers and passive consumers. Total volumes and values of these market segments are still not well understood.

Luxury consumption

There are documented sales of shark fin soup in several big cities, notably Jakarta, Surabaya and Makassar (Ariyogagautama et al. 2015). These products are high value and tend to be sold in luxury hotels and seafood restaurants in big cities, particularly where there are high numbers of east Asian ethnic communities or tourists.

Traditional consumption

Shark and ray meat is consumed in coastal communities across Indonesia, often as salted or smoked fish (Table 7). This type of consumption is generally associated with sharkfishing communities, either where sharks are targeted and the meat is sold as a by-product to the fin trade, or in mixed-species fisheries where shark is caught incidentally or opportunistically. In these areas, shark meat provides a source of cheap, easily available animal protein and micronutrients, and therefore plays a crucial role in food security. In some locations there are also strong cultural drivers for consuming shark and ray meat, such as mobulid ray consumption in Lamakaera, and shark meat consumption in traditional curries in Aceh. The underlying motivators of consumption are not well understood, but seem to be tied to traditional practices, beliefs that shark and ray meat confers strength, and taste preferences. It is likely that high volumes are consumed within this market segment, but the industry is of limited economic value.

Passive consumption

There is anecdotal evidence that shark meat is also sold as generic *ikan asin* (salted fish) in seafood markets and supermarkets across the country, notably Bogor and Jakarta fish (Table 7). Consumers within this group are likely unaware that they are consuming shark products due to lack of detailed food labelling. The magnitude of this trade is also unclear.

Table 7: Summary of know shark consumption hotspots in Indonesia

Type of consumption	Province	Known hotspots	Product(s)
Luxury	Jakarta	Jakarta city	Shark fin soup
	East Java	Surabaya	Shark fin soup
	South Sulawesi	Makassar	Shark fin soup
Traditional	West Nusa Tenggara	East Lombok	Dumplings, salted fish, smoked meat, crackers (made from skin)
	West Kalimantan	Pontianak	Salted fish, smoked fish
	East Kalimantan	Balikpapan	Salted fish
	South Sulawesi	Makassar	Salted fish, smoked fishes
	East Nusa Tenggara	Maumere, Kupang, Solor	Salted fish, smoked fish, mobulid meat
	West Java	Ciamis, Garut, Pangandaran, Ciamis, Cirebon, Indramayu	Salted fishes
	South Kalimantan	Muara Kintap – Tanah Laut	Salted fishes
	Papua	Biak, Sorong, Kaimana	Salted fish, smoked fish
	Banten	Lebak, Tangerang	Salted fish
	Aceh	Banda Aceh, Aceh Besar, Aceh Jaya, Aceh Selatan, Aceh Barat	Traditional curry, salted fish, meatballs
	Central Java	Semarang, Demak, Probolinggo, Lamongan, Pati, Cilacap	Salted fish, smoked fish, meatballs
	East Java	Probolinggo, Muncar, Banyuwangi	Salted fish, smoked fish
Passive	Jakarta	Jakarta	Salted fish
	West Java	Bogor	Salted fish

Tourism

Key findings

- Tourism has the potential to create considerable economic incentives for shark and ray conservation, however it is only a useful approach for a limited number of charismatic species, and in locations that are accessible and well-suited to tourism. Further, for a range of practical and socioeconomic reasons, it is rare for the benefits of tourism to reach fishing communities and provide alternative livelihoods/create strong local incentives for conservation.
- Protection of sharks and rays for tourism will need to work alongside sustainable use, and measures must be put in place for sustainable tourism development to avoid unintended ecological and socioeconomic consequences.

There are 22 sites across Indonesia with established shark and ray tourism operations. The majority of these sites involve scuba diving or snorkelling with sharks and rays, with an estimated total expenditure of shark and ray tourists in Indonesia between USD 130 million - USD 195 million per year, and an estimated value of USD 28 million to USD 43 million specifically attributed to sharks and rays. Manta rays are the primary species attraction at many of these sites, although other valuable species include reef sharks, devil rays, whale sharks, schooling hammerheads, and rare species such as the Halmahera epaulette shark. If well managed, the total expenditures of shark and ray tourists could exceed USD 570 million per year by 2027, while estimated economic losses due to poor management of shark and ray populations could be up to USD 126 million per year (Mustika and Booth 2017).

The sites vary from well-established, highly profitable tourism destinations to less well-known areas. Some of the more established and profitable sites include Nusa Penida, Bali; Raja Ampat, West Papua; Komodo National Park, East Nusa Tenggara, and the Gili Islands, West Nusa Tenggara. In these locations there are at least 20 operators offering shark and ray tourism products, which generated estimated annual values attributed to shark and ray tourism of more than US$1 million per year and in the case of Nusa Penida more than US$ 8 million (Fig. 9). Other less established sites include Morotai Island, North Maluku; the Banda Islands, Maluku and Rote Island in East Nusa Tenggara, which have fewer than three shark and ray tourism operators. These sites currently generate much lower tourism revenue, but if well managed offer potential for creating sustainable economic growth and local incentives for shark and ray conservation in the future, as Indonesia's tourism industry continues to grow. This is particularly promising for some of the government's ten priority destinations for tourism, including Labuan Bajo (access point for Komodo National Park), East Nusa Tenggara; Morotai, North Maluku; and Wakatobi, Southeast Sulawesi.

Fig. 9. Shark and ray tourism sites in Indonesia

Shark and ray tourism sites by province

Aceh:
1. Weh Island

Bali
2. Nusa Penida
3. Tulamben
4. Padang Bai

Central Sulawesi
5. Togian Islands

East Kalimantan
6. Derawan Archipelago/Sangalaki
7. Talisayam

East Nusa Tenggara
8. Komodo National Parl
9. Rote Island

Gorontalo:
10. Botubarani Beach

Maluku:
11. Banda Islands

North Maluku
12. Morotai Island
13. Ternate
14. Weda Bay

North Sulawesi
15. Bunaken National Park

South Sulawesi
16. Selayer Island

South East Sulawesi
17. Wakatobi National Park

West Nusa Tenggara
18. Gili Matra
19. Moyo Island
20. Belongas Bay

West Papua
21. Raja Ampat
22. Cendrawasih Bay

Number of shark and ray tour operators in province

<4
4-7
7-18
18-25
>25

$ Sites earning >$US 1 million per year from shark and ray tourism

Existing conservation and management efforts

Key findings

- There are synergies between international policy frameworks for fisheries management, marine conservation, and development goals, such that Indonesia can contribute to multiple policy targets through effective conservation and management of shark populations
- Overlapping mandates of different government agencies and polices frameworks leads to duplication, loopholes and unclear accountability. Streamlining policy frameworks, clarifying roles and responsibilities, and improving inter-agency collaboration and accountability will be key for effective implementation of policy measures
- The efforts of NGOs tend to be concentrated around particular geographies, topics, and charismatic species. More could be done to direct investment towards locations and species with research and capacity gaps, and topics of strategic importance for the government, such as sustainable fisheries management, socioeconomic issues, and trade monitoring and traceability for CITES implementation.

Stakeholders

Government

The Ministry of Marine Affairs and Fisheries (MMAF) is the government ministry responsible for marine and fisheries development in Indonesia with jurisdiction over coastal areas, small islands, and seas. The Minister of Marine Affairs and Fisheries has authorization, under the Fisheries Laws, to define and decide protected species, quotas, and conservation areas for fisheries resources. Under MMAF, there are nine Directorate Generals (DGs), which in turn have several subsidiary Directorates. The primary Directorate Generals and bodies responsible for shark and ray management include:

The Directorate General of Capture Fisheries is responsible for the development and implementation of policies relating to the status and management of fisheries. This DG evaluates fisheries resources through the collection of landings data, and formulates criteria, standards and procedures to regulate capture, including fleet management, gear regulations and oversight of Fisheries Management Areas (FMAs/WPPs).

The Directorate General of Marine Spatial Management – responsible for the development and implementation of policies, procedures, standards and criteria relating to marine protected areas and fish species protection, including CITES-listed fish species.

The Coastal and Marine Resource Management Bodies (BPSPL) are technical implementation units underneath the DG of Marine Spatial Management responsible for the protection, preservation and utilization of coastal, marine and small island resources, and their ecosystems. BPSPL implements habitat and species conservation, and the monitoring and control of protected fish species trade. BPSPL functions through six decentralised offices in Padang, West Sumatra; Serang, Banten; Denpasar, Bali; Pontianak, West Kalimantan; Makassar, South Sulawesi; and Sorong, West Papua.

The Directorate General for Surveillance of Marine and Fisheries Resources is responsible for combating illegal, unreported, and unregulated fishing activities (including destructive fishing). The unit conducts monitoring and surveillance of fisheries and fish resources, and investigations and law enforcement for marine and fisheries crimes, including fishing of protected species.

The Research Body for Fisheries and Marine Affairs is responsible for research and development of science and technology for fisheries and marine management. The centre acts as a scientific institution, conducting applied research on species, fisheries, and marine protected areas to inform the development of policies and plans through policy briefings.

The Fish Quarantine, Quality Control and Fish Product Safety Body is responsible for monitoring and quarantine of fish products in trade. This directorate formulates and implements monitoring programs to verify and guarantee quality of fish products, prevent outbreak of pests and disease, and prevent trade of illegal marine products.

MMAF Civil investigators (PPNS) are trained officers licensed by the Ministry of Justice to carry out criminal investigations and file criminal cases in accordance with the Acts and jurisdictions under which they operate (i.e. fisheries crimes).

MMAF Provincial offices are responsible for formulating and implementing aquaculture, capture fisheries, coastal and marine affairs, fisheries extension and fishery business policies as the provincial level, especially in coastal areas within 1 – 12 nautical miles offshore.

The Ministry of Environment and Forestry (MoEF) is the government ministry responsible for managing and conserving the nation's forests. MoEF's authority overlaps with MMAF's on islands and coastal regions with respect to granting land use rights if the land is forest area, and in conservation areas that consist of both land/island and sea. Specifically regarding sharks and rays, MoEF is responsible for several mixed-forest-and-sea National Parks and Tourism Parks, which are important sites for sharks and rays (e.g. Komodo National Park, Cendrawasih National Park). The Ministry of Agrarian Affairs and Spatial Planning**,** Indonesia's national land authority, also play a role here through their authority over spatial planning and categorising land into cultivation and non-cultivation (i.e. protected and forest) areas. MoEF also plays a role in species protection, acting as Indonesia's management authority for the Convention on the International Trade of Endangered Species (CITES) with the Indonesian Institute of Sciences (LIPI) as the scientific authority. MoEF and LIPI oversee Indonesia's Law (UU) No.5/1990 on Conservation of Natural Resources and its Ecosystems, which provides the overarching legal framework for the preservation and utilisation of species in Indonesia, and Indonesia's protected species list.

There are a number of additional institutions at national, provincial and regency levels, which are directly or indirectly involved in shark and ray conservation and management, particularly with respect to wildlife crimes and law enforcement:

Law Enforcement: National Police, the Attorney General's Office, Ministry of Justice, and Supreme Court (adjudication) for criminal offences.

Environment Sectors: Provincial Natural Resources Conservation Agency (BKSDA), and Regional Environment Agencies

Trade and Industry Institutions: Ministries of Industry and Trade, customs and quarantine

Tourism Institutions and private sector: Ministry of Tourism, Coordinating Ministry for Economic Affairs

Transportation Institutions: Ministry of Transportation, and Port Administration

Research Institutions: Indonesia Institute of Science (LIPI), Ministry of Research and Technology

Coordinating Agencies: Coordinating Ministry of Politics and Security, and Ministry of National Planning.

Non-governmental organisations

shark and ray conservation and management issues in Indonesia, across multiple sites, scales, and species (SI4). The majority of these organisations focus on species protection, with a significant focus on mobulid rays and whale sharks.

Legal frameworks

International commitments

Several international regulations and agreements create the overarching international policy framework directing and driving Indonesia's national laws for protecting and managing sharks and rays, and their habitats. In particular:

The United Nations Convention on the Law of the Sea (UNCLOS) seeks to establish a comprehensive set of rules for governing the world's oceans. Indonesia formally ratified UNCLOS under Law No. 17/1985, and is required to undertake necessary steps for the conservation and protection of ocean resources within its Exclusive Economic Zone, and cooperate with other states on sustainable fisheries management.

Related to UNCLOS, the UN Fisheries and Aquaculture department (FAO) developed a voluntary Code of Conduct for Responsible Fisheries, certain parts of which are based on relevant rules of international law under UNCLOS. The code provides global principles and standards applicable to the conservation, management and development of all fisheries. It also covers the capture, processing and trade of fish and fishery products, fishing operations, aquaculture, fisheries research and the integration of fisheries into coastal area management.

The United Nations Convention on the International Trade of Endangered Species of Wild Fauna and Flora (CITES) aims to ensure that international trade of animals and plants is not detrimental to the survival of wild populations. Indonesia ratified CITES through Government Regulation No. 43/1978, and is obliged to put in place domestic measures for implementing CITES decisions. Species listed under CITES Appendix I are threatened with extinction and not permitted for international trade. Species listed under CITES Appendix II are not necessarily threatened with extinction, but may become so unless trade in specimens of such species is subject to strict regulation (Table 8). Indonesia is obliged to develop traceability and quota system to ensure that international trade in Appendix II species is non-detrimental to wild populations of those species.

Table 8. CITES-listed shark and ray species

Appendix	Species common name	Species scientific name	Year listed
I	Sawfish	*Pristidae* spp.	2007
II	Whale sharks	*Rhincodon typus*	2003
	Basking sharks	*Cetorhinus maximus*	2005
	Great white sharks	*Carcharhodon carcharias*	2007
	Oceanic Whitetip sharks	*Carcharhinus longimanus*	2013
	Scalloped hammerhead sharks	*Sphyrna lewini*	2013
	Great hammerhead sharks	*Sphyrna mokarran*	2013
	Smooth hammerhead sharks	*Sphyrna zygaena*	2013
	Mackerel sharks	*Lamna nasus*	2013
	Manta ray	*Manta* spp.	2013
	Silky sharks	*Carcharhinus falciformis*	2016
	Thresher sharks	*Alopias* spp.	2016
	Devil rays	*Mobula* spp.	2016

The United Nations Convention on Biological Diversity (CBD) seeks to conserve biodiversity and ensure the sustainable use of its components and the fair and equitable sharing of benefits arising from genetic resources. Although not legally binding, Indonesia has ratified the CBD and is therefore obliged to develop and implement domestic measures for achieving the Aichi Biodiversity Targets. These targets include safeguarding species, ensuring sustainable management of fish stocks, expanding marine area under protection, enhancing benefits of biodiversity and ecosystems for people, and enhancing participation of communities in planning and implementation.

Regional Fisheries Management Organisations (RFMOs) seek to promote international cooperation among parties to ensure the conservation and optimum utilisation of priority fish stocks. Indonesia is a Contracting Party Country (CPC) of the Indian Ocean Tuna Commission (IOTC) and the Western and Central Pacific Fisheries Commission (WCPFC). Indonesia has also ratified the Commission for the Conservation of Southern Bluefin Tuna (CCSBT) and is a non-cooperating member of the Inter-American Tropical Tuna Commission (IATCC). Under these commissions Indonesia is required to implement several measures for conserving and managing sharks, including various stipulations relating to:

- Prohibition of the removal, retention, transportation, storage and trade of shark fins that are not naturally attached to the shark carcass before the first landing.
- Prohibition of the detaining, transportation, storage and trade of thresher shark species from the Alopiidae family
- Measures to encourage live-release of incidentally caught sharks, with a particular focus on juveniles, pregnant sharks and thresher sharks from the Alopiidae family
- Measures to encourage full utilisation of retained shark catches
- Implementation of the FAO International Plan of Action for Sharks (IPOA Sharks), including developing, implementing and reporting on National Plans of Action (NPOA) for conservation and management of sharks
- Measures to obtain, maintain and report data on shark catch, including live-releases and catch that is retained and discarded
- Research and development to reduce shark catch/improve shark conservation and management

The Coral Triangle Initiative on Coral Reefs, Fisheries and Food Security (CTI-CFF) is a non-binding multilateral partnership of six countries (Indonesia, Malaysia, Papua New Guinea, Philippines, and Solomon Islands, Timor Leste) working together to sustain marine and coastal resources by addressing crucial issues such as food security, climate change and marine biodiversity. CTI established a regional plan of action, with five overarching goals focusing on designation and effective management of priority seascapes and marine protected areas, ecosystem-based approaches to fisheries management, climate change mitigation and improving the status of threatened species, with sharks specifically listed as a key species group.

The United Nations Sustainable Development Goals (SDGs) of the United Nations 2030 Agenda for Sustainable Development aims to “end all forms of poverty, fight inequalities and tackle climate change, while ensuring that no-one is left behind”. Sustainable development is intrinsically linked to use and management of marine resources, shark conservation and management directly linked to Goal 14: Life Below Water, and indirectly linked to several other goals relating to food security, human health and well-being and industry (SDG Goals 2, 3 and 9).

Domestic regulations

Indonesia’s existing regulatory frameworks cover several aspects of shark and ray species protection, species utilisation and habitat protection. All existing regulations fall under Act (UU) No. 32/2009 on Environmental

Management and Protection, which is umbrella law for the majority of natural resource-related laws in Indonesia, and is implemented through a range subsidiary Acts and government regulations. The key legal frameworks for shark and ray conservation and management are Act (UU) No.5/1990 on Conservation of Natural Resources and Their Ecosystems and Fisheries Acts UU No.31/2004 and UU No.45/2009. These Acts and their subsidiary regulations have related and overlapping mandates on the preservation and utilisation of species, and the conservation and management of habitat (Fig. 10). In particular, they confer full and partial protection to several shark and ray species, alongside legal provisions covering species trade, protected areas and destructive fishing. Six species are currently fully protected at the national level, including reef and oceanic manta rays (*Manta spp*.)[1], whale sharks (*Rhincodon typus*), and three species of sawfish (*Pristis spp*.). Hammerhead sharks (*Sphyrna spp*.) and oceanic whitetip sharks (*Carcharhinus longimanus*) are currently subject to export bans, with further regulations being established for all other species listed on CITES Appendix II at the 17th Conference of the Parties (i.e. thresher sharks, silky shark and devil rays) (Table 9).

Conservation laws

Act (UU) No.5/1990 on Conservation of Natural Resources and Their Ecosystems provides the overarching legal framework for the preservation and conservation of species and ecosystems, and the sustainable use of natural resources. This act aims to ensure the use of natural resources to support long-term human welfare and quality of life. It is implemented via a number of wildlife- and area- focused subsidiary regulations and includes provisions for penalties relating to destruction or degradation of protected areas, and possessing, transporting or trading protected species.

Government Regulations (PP) No.7/1999 on the Preservation of Wild Flora and Fauna defines protected species and their habitats, outlining Indonesia's protected species list, and rules for preventative and suppressive preservation efforts, controls and monitoring. According to PP No.7/1999, the Ministry of Environment and Forestry (MoEF) and the Ministry of Marine Affairs and Fisheries (MMAF) may assign a species to the protected species list and/or revoke such a decision when the criteria for inclusion are no longer met. Such decisions and revocations must be based on recommendations from the Indonesian Institute of Science (LIPI). Currently all three species of sawfish in Indonesia (Green Sawfish (*Pristis zijsron*), Dwarf sawfish (*Pristis clavata*), Largetooth sawfish (*Pristis Pristis*, listed as synonym, *Pristis microdon*)), are on the protected species list. This regulation is of particular importance for high priority or critically endangered species and CITES Appendix I species.

Government Regulation (PP) No.8/1999 on the Utilization of Wild Flora and Fauna outlines rules on implementing (UU) No.5/1990 with respect to the breeding, trade, commercial exhibition, and research use of species, including classifications, quotas, and penalties. This regulation is of particular importance for CITES Appendix II species.

Government Regulation (PP) No.28/2011 on the Management of Sanctuary Reserves and Nature Conservation Areas regulates the preservation and utilization of wildlife and its ecosystems in conservation areas. It includes criteria and procedures to define, delineate, and regulate conservation areas. This regulation provides a framework to link species protection with habitat conservation. It is only applicable to conservation areas under MoEF.

[1] Note that recent taxonomic revisions to the mobulid family now places manta rays in the genus mobula, such that manta alfredi and manta birostris have been renamed to mobula alfredi and mobula birostris, respectively. For the purposes of this strategy we maintain the original nomenclature, as manta and mobula are still classified as separate genera under Indonesian law. The regulations will need to be revised to reflect this change in due course.

Act (UU) No.16/1992: Plant, Fish and Animal Quarantine is designed to address quarantine requirements with regard to natural resources, with a focus on reducing the risk of transferring invasive species, pests, and disease.

Marine and Fisheries laws

Act (UU) No.31/2004 and Act (UU) No.45/2009 on Fisheries and Government Regulation (PP) No.60/2007 on the Conservation of Fish Resources act as independent legal frameworks for the protection of aquatic habitats and species, including marine and freshwater areas. This framework formally designates authority to MMAF to declare protected fish species, control fish trade, and to manage aquatic conservation areas. A direct reference to CITES is stated in the definition and criteria of protected fish, enabling further protections of fish species not covered by the existing protected species list. The fisheries acts also regulate commercial aspects of Indonesian fisheries including the declaration fisheries management measures; protocols for fisheries monitoring, including vessel licencing, logbooks and observer systems; protocols for enforcing fisheries laws; and provisions for establishing a dedicated Fisheries Court for the prosecution of fishery crimes. UU No. 31/2004 also outlines penalties for hunting or trading protected species, fishing without a licence and shipping, distributing or keeping fish that inflict financial costs on communities.

Under this, MMAF has also issued a series of Ministerial Decrees to confer full and partial protected to specific priority shark and ray species not covered under the protected species list including whale sharks (*Rhincodon typus*)., manta rays (*Manta* spp.), oceanic white tip sharks (*Carcharhinus longimanus*) and hammerhead sharks (*Sphyrna* spp.). MMAF Ministerial Regulation No. 12/2012 also outlines measures for dealing with shark bycatch in tuna capture fisheries on the high seas. This regulation prohibits catch of juvenile and pregnant female sharks and states that shark bycatch should landed whole. Article 43 further describes measures for bycatch species that are ecologically related to tuna fisheries, including thresher shark (*Alopias* spp.), which must be released alive, and outlines sanctions for fishing vessels that catch, transport, land, store, and/or trade sharks from the Alopiidae family, either whole or in parts.
The introduction of a new Ministerial Decree concerning the Limited Protection of All Shark Species in Indonesian Waters is also underway. The Decree includes stipulations to protect specific life history states and marine areas for all shark species, including:

1. Prohibition to catch juvenile sharks
2. Prohibition to catch pregnant sharks
3. Prohibition to catch shark in all marine conservation zones (therefore making all of Indonesia's marine protected areas 'shark sanctuaries')

Act (UU) No. 27/2007 and Act (UU) No. 1/2014 on the Management of Coastal Areas and Small Islands aims to protect, preserve, and utilise coastal areas and small islands and their ecosystems, and ensure the existence, availability and sustainability of coastal and small island resources while maintaining and enhancing the quality of values and its diversity. The law defines specific characteristics of protected areas in coastal areas and small islands. It includes provisions to empower coastal and island communities, and enables MMAF and local government to designate conservation areas in coastal areas and small islands under Ministerial Regulation No. 17/2008. These Acts covers the criteria of conservation area, and the types of criminal offences including penalties for damaging coral reefs and using destructive fishing practices. There is some overlapping mandate with these Acts under MMAF and Act No.5/1990 under MoEF.

Act (UU) No. 32/2014 on Marine covers the ocean in accordance with Indonesian sovereignty to the continental shelf, and transfer authority to MMAF for all marine, coastal, and fisheries resources. This Act covers marine spatial planning and management and protection of the marine environment, including

aspects of defence, security, law enforcement, and safety at sea. The Act mandates subsidiary government regulations to cover implementation, which have yet to be approved, and marine spatial planning, zoning in small islands and coastal and marine areas. The Act also establishes the Maritime Security Agency as a coordinating agency.

Presidential Regulation No. 16/2017 on Indonesia's National Sea Policy establishes overarching guidelines for marine policy and its implementation in Indonesia, and a 5-year action plan for the implementation, based on national development targets. This regulation includes pillars on management of maritime resources and human resources development, and maritime spatial management and environmental protection. It also provides a framework for inter-ministry coordination, stating that the implementation, monitoring and evaluation of the Indonesia's National Sea Policy is coordinated by the Coordinating Ministry of Maritime Affairs while the implementation will be conducted by each ministry/institution (including the Coordinating Ministry of Politics, Law and Security; the Coordinating Ministry for Economic Affairs and the Coordinating Ministry of Culture and Human Development) according to their respective duties and authorities.

Fig. 10. Key legal frameworks for conserving and managing shark and ray species and their habitat in Indonesia

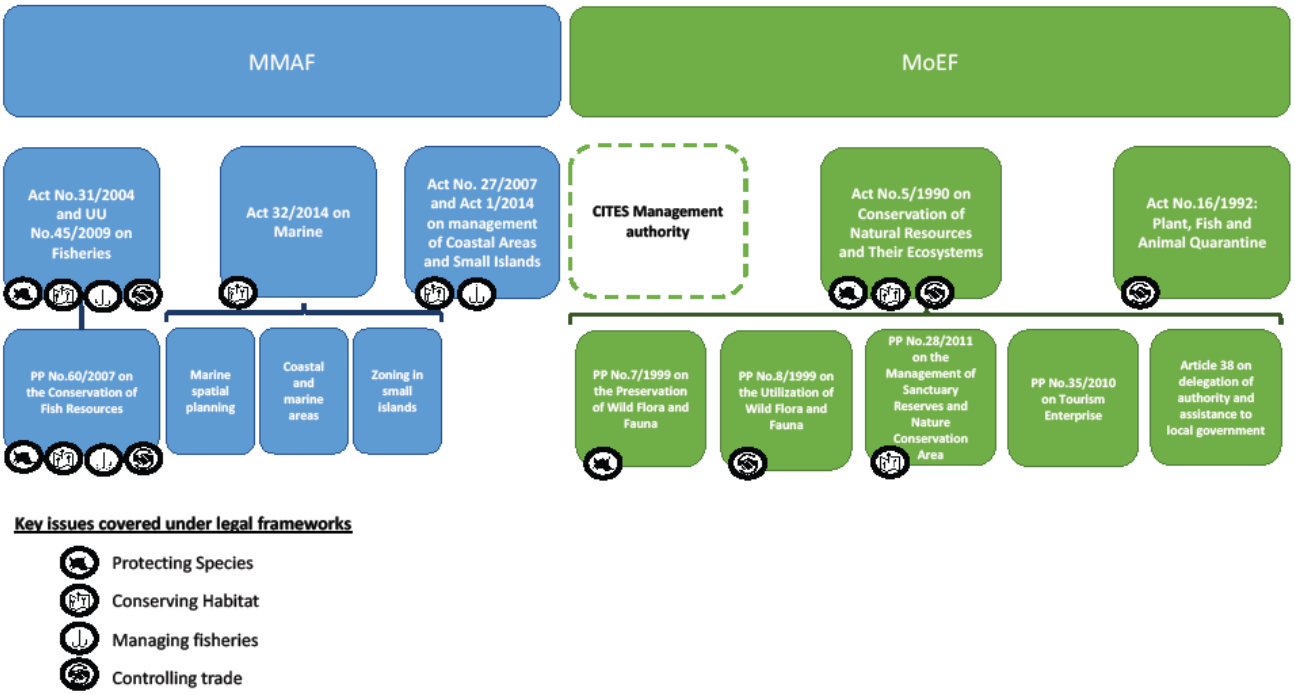

Table 9. A summary of existing species protection policies for sharks and rays in Indonesia

Legal framework	Species protected	Protection status	Types of crimes listed under framework
Conservation of Natural Resources and its Ecosystems (UU No.5/1990and subsidiary regulations)	Green Sawfish (*Pristis zijsron*), Dwarf sawfish (*Pristis clavata*), Largetooth sawfish (*Pristis pristis*, listed as *Pristis microdon*)	All fully protected under the protected species list	Hunting, cutting, destroy protected species Transportation protected species Possession/rearing of protected species without permit
Fisheries laws (UU No.31/2004, UU No.45/2009 and subsidiary regulations)	Whale shark (*Rhincodon typus)* Manta rays (*Manta spp*.)	Fully protected under Ministerial Decrees	Hunting or trade of protected species Not having a fish trading license Shipping, distributing or keeping fish that inflict financial costs on the community
	Oceanic whitetip sharks (*Carcharhinus longimanus*) and hammerhead sharks (*Sphyrna spp*.)	Partially protected (export ban) under Ministerial Decrees	
	Thresher sharks (*Alopias spp*.)	Partially protected in tuna capture fisheries on the high seas	

Act (UU) No. 23/2014 on Regional Government provides the most recent framework for the decentralisation of authority over coastal resources. It states that regions within Indonesia with a territorial sea are authorised to manage their own marine resources, and that this authority lies with provincial governments. Several previous Acts and Government Regulations (e.g. Act 32/2004) had transferred authority of coastal resources to district government, which prompted some regions - for example Berau, Raja Ampat and Klungkung - to develop Regent's Regulations for establishing marine protected areas for sharks and rays. However, some of these regulations have been superseded by Act 23/2014, resulting in the legal status of these marine protected areas to come in to question. According to Act 23/2014 the authority of district government to manage coastal resources must now be transferred to provincial government. District and provincial governments with marine jurisdiction are working on putting relevant legal frameworks in place and transferring authority as needed.

National Plans of Action

Under several international regulatory framework Indonesia is obliged to develop National Plans of Action (NPOA) for sharks as per the United Nations Food and Agriculture Organization (FAO) International Plan of Action for Sharks (IPOA Sharks). To meet these commitments Indonesia has developed two 5-year NPOAs:

1. *NPOA Konservasi Pari Manta (2016-2020)* – NPOA for the Conservation of Manta Rays (2016-2020)
2. *NPOA Konservasi dan Pengelolaan Hiu dan Pari (2016-2020*) – NPOA for the Conservation and Management of Sharks and Rays (2016-2020)

The priority programs of the two NPOAs include aspects of applied research, regulations and policy, trade management, sustainable fisheries management, marine spatial planning, law enforcement, community empowerment, awareness-building and institutional capacity building (Table 10). Sustainable management, and strengthening data and statistics to support sustainable management, are priorities for MMAF. MMAF has specifically requested NGO support for implementing several of these priority programs, which are mapped on to the strategic opportunities for conservation investment herein. It should be noted that these NPOAs gave not yet been enacted via Ministerial Decree.

Table 10. ***Summary of priority programs for National Plans of Action for sharks and rays, and mantas (2016-2020)***

NPOA Sharks and Rays	NPOA Mantas
S1. Formulation of regulations to support sustainable management	*M1. Increased research on population abundance and migration patterns*
S2. Reviewing status of shark and ray fisheries and populations at national, regional and international levels	*M2. Accelerating the mapping of manta distributions in Indonesia*
S3. Strengthening data and fisheries statistics	*M3. Empowering regional (local) government in habitat protection*
S4. Strengthening research on biological, ecological, fisheries and socio-economic issues	*M4. Educating general public on manta conservation*
S5. Conserving threatened species and critical habitat	*M5. Improving law enforcement of manta protection regulation*
S6. Strengthening internal management mechanisms	*M6. Involving local communities in manta-based tourism*
S7. Building public awareness of management and conservation	*M7. Preparing SOP and standards for limited export of live mantas for aquarium trade*
S8. Institutional capacity development and empowerment	
S9. Human resources capacity development	

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Threats

Overfishing through targeted, opportunistic, and incidental fisheries, and habitat destruction and degradation due to destructive fishing and coastal and offshore development are the greatest threats to sharks and rays in Indonesia. A range of indirect economic, cultural, societal, and institutional factors allow or enable these threats to occur.

Market forces create strong incentives for shark and ray fishing and trade

International demand, primarily for high-value, processed body parts, particularly fins, creates a high market value for shark products. This is the primary economic driver of targeted fishing pressure, and creates strong incentives for fishers to retain sharks caught as bycatch. This acts alongside domestic demand for non-fin commodities, particularly shark meat, which serves as a cheap and easily accessible source of protein for coastal communities and some cities. Together, these interacting market forces make shark fishing and trading an accessible and profitable industry, with a lack of market-based incentives for responsible sourcing and trading.

Limited data on shark and ray population status and fisheries constrains the development of targets and management measures for sustainability

Monitoring the status of shark and ray populations is practically and technically challenging, particualry with a huge diversity of species, Indonesia's extensive coast line, large ocean area, and shared stocks. A paucity of management-relevent data on the status of stocks and fishieries precludes the development of indicators and mechanisms for sustainable management and CITES implementation. Other major practical knowledge gaps include: limited understanding of the impacts of different gear-types and fishing practices on priority shark and ray species, and limited data on critical habitats and distributions.

Lack of fisheries and trade regulation leads to overexploitation

Current legal and regulatory frameworks are insufficient to maintain exploitation within sustainable limits. No management plans are in place for shark and ray fisheries, with a prevalence of non-selective fishing gears and high volumes of sharks and rays taken in mixed-species and non-target fisheries. Regulatory mechanisms for species-specific and volume-based control of catch and trade remain limited, primarily hindered by limited monitoring data. Penalties for wildlife and fisheries crimes are typically low, therefore acting as a minimal deterrent. There are few mechanisms in place to support local ownership and control of marine resources or accommodate local customary laws to incentivise stewardship of shark and rays.

Limited spatial planning and protection of marine areas leads to destruction, degradation and overutilization of critical habitat for sharks and rays

There is insufficient coverage of Indonesia's MPA network for protecting shark and ray populations at critical sites and life-history stages, and information on the locations of critical sites – particularly pupping and nursery grounds – remains relatively limited. Existing MPA regulations and management are also not entirely effective for protecting sharks and rays. For example, MPAs are too small to protect most species throughout their range, shark and ray fishing can still take place in MPAs, and management plans aren't effectively socialised or enforced. Few systems are in place to support local stewardship of marine resources and/or use of customary laws and practices to regulation use of marine resources and enact local restrictions. Unsustainable coastal and off-shore development and pollution further degrades habitat, with no legal conservation of habitat association with species protection.

Insufficient human and financial resources limits capacity to implement regulations and systems

Indonesia is a large, disparate country with an extensive coastline and marine territory. Since shark fisheries are diffuse and fragmented throughout fishing grounds and coastlines, effectively monitoring fisheries and tracing trade is challenging and resource intensive. This hinders efforts to enforce regulations, and results in weak disincentives against IUU fishing. Further, overlapping mandates between different ministerial authorities and between national and provincial authorities with respect to species protection, area management, and CITES-authority creates loopholes and inconsistencies in implementation. In some cases, there is inadequate collaboration between ministries, civil investigators, police, and judiciaries, such that laws and regulations are not effectively upheld. Overlapping responsibilities and mandates in turn limits accountability for achieving conservation and management objectives.

Socio-economic constraints create barriers to sustainability

For many shark fishers, there is a lack of other legal, sustainable marine-based alternatives that offer comparable financial returns to shark fishing, and are adapted to existing capacities and aspirations. At the same time, there are insufficient market-based incentives to drive sustainability. Complex social relations, such as prevalence of patron-client relationships between shark fishers and boat owners/traders, can create power asymmetries and debt-dependency, which further push shark fishers to remain in the industry.

Similarly, there are insufficient incentives for bycatch mitigation and sustainability in non-target fisheries. In many cases, fishers are incentivised to secondarily target and retain sharks, as opposed to improving escape and survival.

Sharks and rays also play a role in food security and nutrition, with the meat providing a source of easily accessible, low-cost animal protein. With a large and growing human population size, pressure on marine resources is high and increasing. This creates a conflict between shark and ray conservation, and human health and well-being, which must be better understood and addressed.

Prevailing attitudes and norms towards fishing, trading and consuming sharks and rays are not conducive to responsible resource use

There are strong cultures and traditions driving international demand for shark and ray products in Asia, either as luxury consumers goods associated with wealth and power (e.g. shark fin soup), or in some cases as part of traditional chinese medicene markets (e.g. mobulid gill plates). In domestic markets, shark meat is widely consumed, either passively as a cheap source of protein or actively in some coastal communities, where there is a preference for the taste and a belief that shark meat provides strength. More broadly, there is limited support and understanding of sustainable use of marine resoruces, which further hinders conservation efforts.

Sharks and rays are a large and diverse species group, both in terms of their intrinsic vulnerability to extinction based on life history traits and ecological sensitivity, and the nature and severity of the threats they face based on susceptibility to fishing mortality and socio-economic drivers of exploitation. As such, the severity, scope and irreversibility of different types of threats will be different based on different species characteristics, and management interventions will need to take these in to account (Fig. 1, Table 1, S1).

STRATEGIC PRIORITIES FOR CONSERVATION AND MANAGEMENT

The priorities in this document were set through a strategic planning process, incorporating extensive data analysis and synthesis, as summarised in the Status section of this document, as well technical workshops on data validation and threat mapping, and on-going stakeholder consultation and review (see Methods).

Effective shark and ray conservation necessitates multiple interventions, focusing on both use and non-use values, and at different levels of the trade chain from point of exploitation to point of consumption (Fig. 11). Recognising the need for a multi-faceted approach, the strategic priorities herein are intended to outline a comprehensive set of interventions at different levels. They are designed to meet the vision, goal and priorities articulated in the GSRI Global Priorities for Conserving Sharks and Rays (Bräutigam et al. 2015, Box 4), as adapted to the Indonesian context and NPOAs for sharks and rays, and mantas.

Box 4. The Global Sharks and Rays Initiative and Global Priorities for Conserving Sharks and Rays

The Global Sharks and Rays Initiative (GSRI) is a partnership between several international conservation organisations - Shark Advocates International, the Shark Trust, TRAFFIC, Wildlife Conservation Society (WCS), and World Wide Fund for Nature (WWF) International, with technical advise from the IUCN Shark Specialist Group. In 2015 GSRI launched the Global Priorities for Conserving Sharks and Rays: A 2015-2025 Strategy, and announced their commitment to implementing the strategy and its shared goals. The global vision, goal and priorities of the GSRI are as follows:

Vision:

Sharks and rays throughout the world are fulfilling their ecological roles, sustaining well-managed fisheries, and are valued by all for their critical contribution to ecosystem health and human well-being.

Goal:

By 2025, the conservation status of the world's sharks and rays has improved – declines have been halted, extinctions have been prevented, and commitments to their conservation have increased globally.

Priorities:

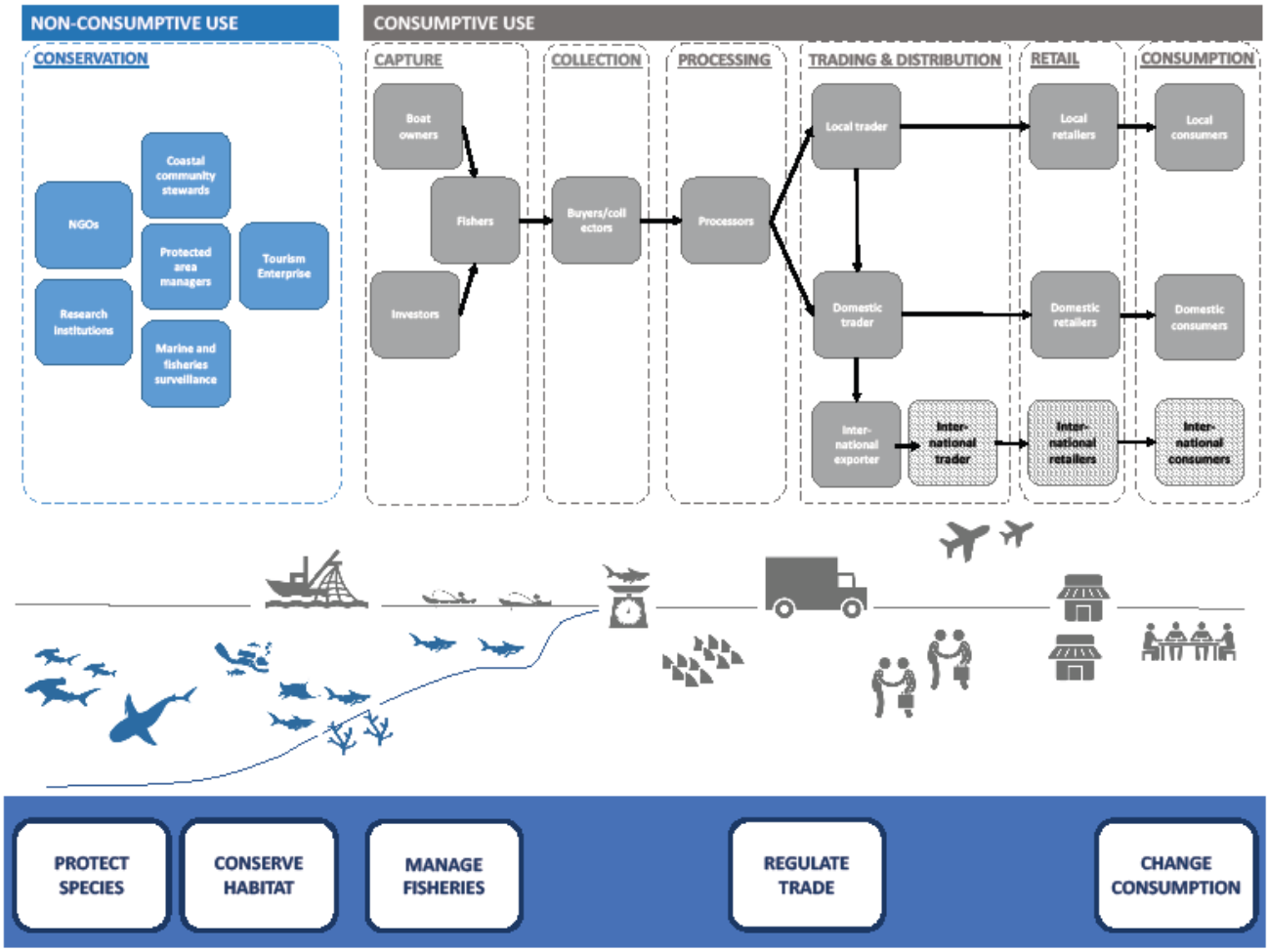
- Saving Shark and Ray Species
- Managing Shark and Ray Fisheries for Sustainability
- Ensuring Responsible Trade in Shark and Ray Products
- Encouraging Responsible Consumption of Shark and Ray Products

For shark and ray conservation and management in Indonesia, strategic priorities include:

1. **Protecting species** –developing and implementing species-specific policies and regulations to protect the most vulnerable shark and ray species
2. **Conserving habitat** – building a functional and effective marine protected area network and spatial planning legislation, to conserve critical habitat for sharks and rays

3. **Managing fisheries** – developing and implementing legal frameworks and practical approaches to keep targeted catch within sustainable limits, mitigate incidental catch, and limit catch of vulnerable shark and ray species and critical life-history stages
4. **Controlling trade** – developing and implementing systems and incentives to improve the transparency, traceability, legality and sustainability of shark and ray trade chains
5. **Changing consumption** – encouraging responsible consumption to shift market forces towards demand for sustainable and responsibility-sourced shark and ray products

Fig. 11. Simplified shark and ray trade chain, with strategies highlighted at key points of intervention



However, sharks and rays are a large and diverse species group, and the threats they are facing are varied and context specific. Implementing these strategies requires a combination of approaches, tailored towards the specific threats to and vulnerabilities of priority species groups, and the socioeconomic context of the priority places and people targeted for conservation action. Each strategic area requires a multi-faceted approach, including aspects of:

Policy – legal frameworks for regulation, monitoring and control
Law enforcement – Implementation of legal frameworks through effective monitoring and control
Outreach and incentives – Changing attitudes and norms, voluntary and motivational mechanisms
Applied research – to improve availability of policy-relevant data and inform science-based management
Capacity building– to improve implementation of strategies, and management and governance of resources

Protecting species

Of the shark and ray species described in Indonesia, 80 are threatened with extinction according to the IUCN Red List of threatened species, with 133 classified as highest priority in Indonesia due to their high susceptibility to fishing mortality and ecological vulnerability (See Species section). This necessitates strengthening of the legal framework for the species at highest risk of extinction, and development of practical measures to enable these legal frameworks to be effectively implemented.

- **Policy:** confer greater legal protection to species at highest risk of extinction, particularly those with strong economic drivers for exploitation (Fig. 1, S1) through revisions to the protected species list (UU No.5/1990) or revisions to fisheries laws (UU No.31/2004, UU No.45/2009, PP No.60/2007). Revisions should also be made such that species protection is in association with habitat conservation, to penalise destruction and degradation of habitats associated with protected species. Review the process for adding species to the protected species list to ensure decisions are based on the best available science, and linked to international treaties and processes (e.g. CITES, CMS, IUCN Red List), and consider revising the classification system for the protected species list to cover several protection statuses. For example, including 1) full protection for the highest national/regional priority species, and CITES Appendix I-listed species; 2) partial protection/exploitation and trade controls for moderate priority, CITES Appendix II and CMS-listed species; 3) 'watch list' status for species that are lower priority but should be monitored to ensure utilisation does not become detrimental to their populations. Address CITES management arrangements and implementation regulations to designate MMAF as the CITES Management Authority (MA) for marine species. It will also be important to ensure streamlining and coordination between the NPOA Sharks and Rays and NPOA Mantas to avoid overlap or duplication.

- **Law enforcement**: increase penalties for illegal exploitation and trade of protected shark and ray species, with standard penalties that are in proportion to the threat level and economic value of the species, and scaled according to the volume being traded. Penalties and prosecution should be standardised across all judiciaries to create strong disincentives against exploitation and trade.

- **Outreach and incentives**: develop locally-appropriate, targeted communication materials in hotspot fishing and trade areas to build awareness of regulations and build pride in Indonesia's rare and charismatic shark and ray species. Reduce negative impacts on the coastal communities most affected by new regulations by collaborative development of tailored livelihood-focused interventions, which build on existing institutions and/or customary practices. Develop existing legal frameworks, particularly UU No. 5/1990 and/or UU 31/2004 and 45/2009 to accommodate local customary laws or practices for regulating the ownership and use rights of species. For example the *Sasi* system in Maluku and North Maluku and the *Panglima Laot* in Aceh could be used to control species harvesting and empower coastal communities. Establish mechanisms for incentivising the adoption of proven bycatch mitigation measures for priority species in non-target fisheries, including reducing capture and increasing escape and survival.

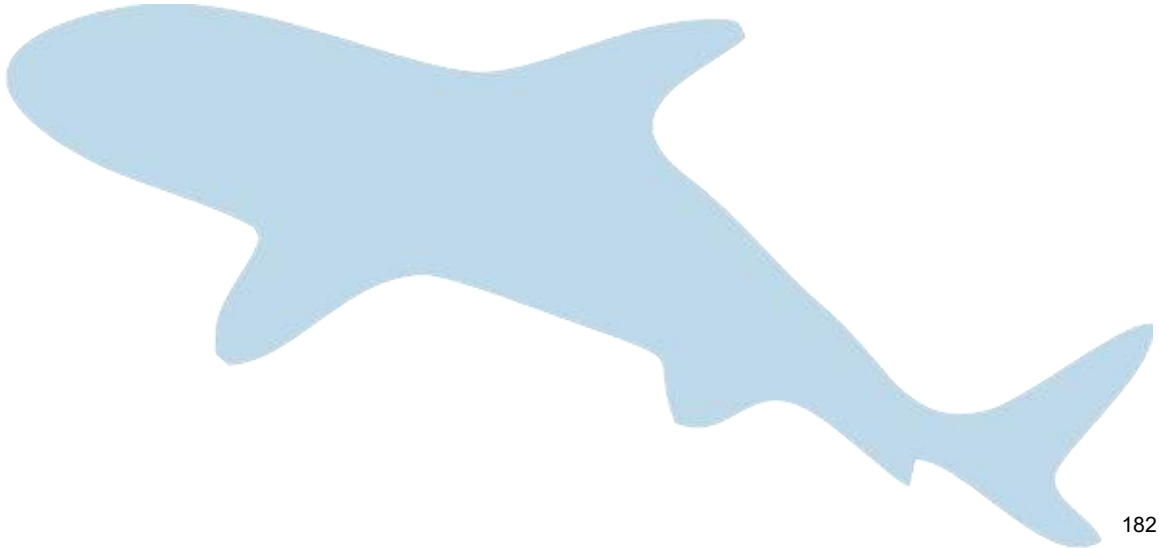
- **Applied research**: Invest in better understanding the impacts of different fishing gears and practices on priority shark and ray species, which can in turn inform practical measures, such as gear restrictions and spatio-temporal closures, for reducing species-specific fishing mortality in target and non-target fisheries. Collect data on hotspots for exploitation and trade of threatened and protected species to direct monitoring and law enforcement resources to priority locations. Conduct targeted socio-economic research to better understand the impacts of species protections on the livelihoods and well-being of affected communities, and inform the design of appropriate mitigation and compensation measures.

- **Capacity building**: build capacity of fishers, fisheries officers and marine protected area managers to identify priority species and their derivative products, and develop clear protocols for reducing and handling catch of threatened and protected species, including training in live-release for accidental by-catch. Build capacity in the justice sector, particularly civil investigators, judiciaries, and prosecutors, with a focus on improving awareness of the economic impacts of marine wildlife crimes and fostering technical capacity for effective case building and appropriate sentencing. Improve collaboration and data sharing between different wildlife and law enforcement ministries and units, and build understanding and integration of different legal frameworks that can be used to prosecute wildlife crimes, such as customs, corruption, and money laundering acts, for which penalties are larger.

Case studies:

Protecting mantas through enforcement and incentives: *Species protection is likely to be most effective for species that are highly-targeted in fisheries and trade due to their high economic value. In particular, where there are clear practical measures that can be adopted by fishers and managers to significantly reduce fishing mortality, such as gear modifications, changing fishing grounds, changing target species and applying live-release measures, and where suitable systems of control and motivation can be put in place, such as through law enforcement and livelihood-focused interventions, to incentivise fishers and traders to change their practices. For example, targeted manta ray fishing has significantly declined in Indonesia since 2014, and this has been made possible through an integrated approach of policy reform, strict site-based enforcement, trade enforcement, and outreach and incentives in the communities most significantly impacted by resource restrictions (WCS and Misool Foundation, unpublished data). These interventions have been particularly effective as manta rays are primarily caught in highly-targeted coastal fisheries using specific boats and gears, and their high-value parts are easily identifiable.*

Reducing fishing mortality for priority species: *For priority species that are subject to high-levels of fishing mortality in non-target fisheries, mechanisms should be established for incentivising the adoption of by-catch mitigation measures to avoid capture, increase escape and increase survival. For example, adoption of circle hooks, monofilament leaders and improved handling practices have been shown to have positive outcomes on shark survivability in tuna longline fisheries (Patterson et al. 2014). Gallagher et al. (2014) found species-specific differences in survivability under different operational and environmental variables. For example, deeper hook settings significantly increased survival of scalloped hammerhead sharks, while silky sharks exhibited reduced survival with increased soak time. Harry et al. (2011) also found species-specific differences in susceptibility to catch in gill-net fisheries based on morphology and life-history patterns. Differences in ecological and biological traits can therefore be harnessed for designing species-specific mortality reduction strategies for priority species.*



Priorities for Protecting Species

Outcome:

Exploitation and trade of priority species has significantly declined by 2023

Priority activities:

- Identify the most vulnerable and highest priority shark and ray species
- Confer greater authority to MMAF for the management and protection of marine species, in particular through developing a split CITES Management Authority arrangement between MoEF and MMAF
- Develop legal and/or customary mechanisms for conferring protected status to priority species, and their habitat
- Train, equip and motivate law enforcement officers and judges to accurately identify protected species and their derivative products, build legal cases and appropriately prosecute offenders
- Implement locally-adapted incentive and outreach programs in communities most significantly impacted by species protection regulations
- Review, increase and standardise penalties for shark and ray wildlife crimes

Priority species and species groups include:

Sawfish, guitarfish and wedgefish (Rhinopristiformes), manta and devil rays (Mobulidae), hammerhead sharks (Sphyrnidae), thresher sharks (Alopiidae), nurse sharks (Ginglymostomatidae), pelagic eagle rays (Aetobatidae, bamboo sharks (Hemiscylliidae), whiptail stingrays (Dasyatidae), whale shark (*Rhincodontus typus*), zebra shark (*Stegostoma fasciatum*), silky shark (*Carcharhinus falciformis*), oceanic white tip shark (*Carcharhinus longimanus*).

Geographic priorities include:

- Nationwide

Corresponding priority programs for NPOA for sharks and mantas:

S1, S2, S4, S7, S8, S9, M4, M5, M6, M7

Conserving habitat

There are more than 100 sites that are important for shark and ray conservation in Indonesia (Table 3, Fig. 3, S2). Of these, almost half have no management or protection measures in place and more than one third currently have moderate to poor management capacity. Marine protected areas (MPAs) are one of the most common methods for protecting marine habitats in Indonesia, but habitat conservation can be achieved through any measure that reduces physical threats to the physical environment. We focus on the roles of MPAs here because of their ubiquity throughout Indonesia and the Indonesian government's strong commitment to establishing MPAs under its CBD commitment. This necessitates investment in existing MPAs, to improve management effectiveness, and establishment of new MPAs to protect critical habitat and life history stages from fishing pressure.

Alongside MPAs, spatio-temporal fisheries management measures are also crucial for protecting sharks in specific areas and at key life-history stages, particularly species that are oceanic and/or highly mobile in nature. Acknowledging this, time-area closures to protect or replenish important aggregations are noted as key part of the Managing Fisheries strategy.

- **Policy**: Establish all marine protected areas as no-take zones for sharks and rays through a ministerial decree or updates to MMAF laws on fisheries and the conservation of fish resources (UU No.31/2004, UU No.45/2009, PP No.60/2007). Ensure that national- and provincial-level marine spatial planning takes critical shark and ray habitat in to account when developing new marine protected areas. This could be achieved through establishing stronger links between the legal frameworks for species protection and habitat conservation, such that species protection is automatically in association with their habitat. For example, revisions to UU No.5/1990 on Conservation of Natural Resources and Their Ecosystems and/or the Fisheries Acts
  (UU No.31/2004 and UU No.45/2009) could prohibit and penalise destruction and degradation of habitats and protected species both inside and outside of protected areas. Develop the legal framework to strengthen the role and authority of local customary practices in managing marine and coastal resources. Strengthen cross-sector collaboration to ensure stronger communication and coordination in developing spatial plans. Resolve overlapping mandates of MMAF and MoEF, and provincial- and district-level governments, with respect to management and protection of coastal and island areas. Improve coordination between MMAF and the Ministry of Tourism, and strengthen legal frameworks for ensuring adherence to best-practice guidelines for shark and ray tourism. Shark and ray tourism operators should be required to adopted practices that are safe, environmentally sustainable, and socially responsible.

- **Law enforcement**: Strengthen monitoring of marine protected areas to improve detection of illegal activity. This could be achieved through the development of government 'marine rangers' under MMAF (e.g. equivalent to forest rangers and rapid response units (*Satuan Polhut Reaksi Cepat*, SPORC) under MoEF) and through investing in, and devolving authority to, local or customary stewards of marine resources (e.g. POKMASWAS, *Panglima Laut*, *Sasi*). Improve coordination between local stewards of marine resources and government enforcement agencies such that illegal activities can formally and effectively responded to. Increase penalties associated with illegal fishing in marine protected areas and destruction of shark and ray habitat.

- **Outreach and incentives**: Build awareness of and support for marine protection through targeted outreach programs. Improve local ownership and control over marine resources through co-management regimes and community-based monitoring, which empower of community groups and build on existing institutions and customary practices. Ensure displaced fishers have access to legal, sustainable alternatives of income and subsistence, to maintain livelihood benefits, reduce conflict and

mitigate the any negative impacts of resource restrictions. Engage the tourism industry and coastal communities to develop voluntary and non-voluntary mechanisms to better distribute the economic benefits of shark and ray tourism. Ensure that coastal and fisher communities directly or indirectly receive tangible benefits from shark and ray conservation, and are therefore incentivised to protect and maintain populations in the long-term. This could be achieved through implementing local permit schemes (e.g. Barr et al. 2017), strengthening existing Corporate Social Responsibility policies within the tourism sector, developing industry standards for community engagement, and/or revisions to regulations on utilisation of species (e.g. PP. No.8/1999, PP. No. 60/2007) to include provisions for non-consumptive use. Promote industry standards and certification schemes for responsible, sustainable shark and ray tourism (e.g. Responsible Shark and Ray Tourism – A Guide to Best Practice and UNEP Green Fins). In key sites for shark and ray tourism, engage the Ministry of Tourism and private sector tourism operators to build awareness of established best practice, and create stronger incentives for their adoption.

- **Applied research**: Conduct research to better understand the impacts of marine protected areas on shark and ray species and people. In particular, improve understanding of the spatial usage of priority species, particularly segregation by size, sex, habitat and key life history stages, and the location and role of key sites, to use in systematic conservation planning and the designation of spatial and temporal closures. Critically evaluate the effectiveness of marine protected areas for priority species. Better understand the positive and negative impacts of marine protected areas on coastal communities, particularly links with food security, nutrition and health.

- **Capacity building**: Build capacity of provincial-level protected area managers for management and coordination, and train and motivate local governments and community groups to monitor and protect their marine resources through developing local institutions for ownership and control.

Case study:

Implementing shark sanctuaries for coastal species: *Habitat conservation can help to protect shark species from fishing pressure across some or all of their range. Marine spatial protection is likely to be most effective for species with relatively small ranges or species that exhibit some degree of site-fidelity or aggregating behaviour in coastal areas during one or more critical life history stages. Species that are either fully or partially coastal or reef-associated are also more likely to benefit from habitat conservation, since marine protected areas are most commonly near-shore. Habitat conservation may also be more tractable for charismatic, shallow-water species with high non-use value associated with marine tourism. For example, the establishment shark-specific no-take zones (NTZs) in Raja Ampat, where sharks have high monetary value as a tourism attraction, was shown to have a positive impact on the relative abundance of grey reef and blacktip reef sharks. It is likely that NTZ's being sufficiently large to protect the home ranges of reef sharks and their prey is a key factor in the delivery of conservation outcomes for these species, and they may serve a dual purpose to reduce fishing mortality in the protected area and act as a refuge from fishing pressure in the surrounding area (Jaiteh et al. 2016). Marine protected areas for sharks and rays are likely to be more effective when implemented with high levels of enforcement alongside strong community outreach and incentives to encourage compliance and reduce displacement. Local communities should be involved in the planning process, with marine protected areas recognising traditional ownership rights and providing direct support for food security and livelihoods to replace or compensate for resource restrictions. For example, NTZ's in Raja Ampat that were established in combination with payments for ecosystem service (PES) schemes for communities, which provided direct, tangible benefits in the form of lease payments and employment opportunities, were established more efficiently and effectively.*

Priorities for Conserving Habitat

Outcome:

Area of critical shark and ray habitat under effective protection and management has significantly increased by 2023

Priority activities:

- Declare all marine protected areas no-take zones for sharks and rays
- Invest in improving data on the spatial usage of priority species to identify critical habitat, and conduct systematic conservation planning to prioritise new areas for habitat protection
- Increase area of critical shark and ray habitat under protection and management, ensuring appropriate protection of coastal and oceanic habitats and critical life history stages
- Improve management effectiveness of existing priority marine protected areas, with a focus on achieving at least "moderate" management effectiveness across the most important sites
- Empower and motivate coastal communities to protect and manage shark and ray resources through locally-appropriate co-management and incentive systems
- Engage the tourism sector to ensure the development of environmentally sustainable, socially responsible shark and ray tourism, with increased adherence to established best-practice standards across the industry

Priority species and species groups include:

- **Coastal MPAs**: Sawfish, guitarfish and wedgefish (Rhinopristiformes), bamboo sharks (Hemiscylliidae), hammerhead sharks (Sphyrnidae), nurse sharks (Ginglymostomatidae), manta and devil rays (Mobulidae), whiptail stingrays (Dasyatidae), reef-associated requiem sharks (Carcharhinidae), zebra shark (*Stegostoma fasciatum*).
- **Oceanic MPAs/spatio-temporal closures**: hammerhead sharks (Sphyrnidae), thresher sharks (Alopiidae), oceanic requiem sharks (Carcharhinidae),migration routes for manta and devil rays (Mobulidae) and whale sharks (*Rhincodus typus*).

Geographic priorities include:

- **Protecting new habitat and strengthening current protection**: Maluku, North Maluku, West Nusa Tenggara, East Nusa Tenggara, West Papua, East Java
- **Ensuring sustainable, responsible shark and ray tourism**: Bali, North Sulawesi, West Nusa Tenggara, East Nusa Tenggara, South East Sulawesi, West Papua, East Kalimantan, Gorontalo, North Maluku
- **Research on shark and ray habitat**: West Kalimantan, Central Kalimantan, West Sumatera, Bengkulu, Lampung, West Sulawesi

Corresponding priority programs for NPOA for sharks and mantas:

S1, S4, S5, S8, S9, M1, M2, M3, M5, M6

Managing Fisheries

There are more than 190 fisheries in Indonesia currently catching sharks and rays either as targeted or incidental catch (Table 4, Fig. 5, S3). Fishing effort is diffuse and highly fragmented, with many small-scale mixed species fisheries throughout Indonesia's coastline and several industrial fleets with high levels of targeted and incidental catch. A range of mechanisms are required to improve fisheries data collection and mitigate the risk of over exploitation across different spatial scales, fisheries typologies and species characteristics.

- **Policy**: Build regulations for sharks and rays into national-level fisheries laws (UU No.31/2004, UU No.45/2009, PP No.60/2007), with specific provisions for targeted and incidental, and small-scale and commercial fisheries. Develop and implement FMA and sub-FMA shark and ray fisheries management plans, with clear delegation of authority and appropriate coordination at FMA and provincial-levels. Management plans should adopt a risk-based approach to mitigate overfishing and reduce catch of protected species, with measures adapted to the characteristics of different types of fisheries (i.e. targeted versus incidental, small-scale versus commercial, demersal versus pelagic) and the life-history traits and vulnerabilities of different types of species (i.e. small coastal sharks versus large oceanic sharks). Management measures should focus on implementing international and regional policies commitments under CITES and relevant tuna RFMOs, including:

    - Strengthening on-board and landing site monitoring systems such that fishing effort can be effectively monitored and controls can be enforced
    - Capacity controls, such as vessel licencing/permit systems
    - Harvest controls, such as catch quotas, trip limits and size restrictions
    - Time-area closures to protect or replenish important aggregations
    - Gear restrictions, such as bans on destructive gears
    - Gear modifications, such as controls on mesh size, material, fishing depth and hook-type and/or the use of electromagnetic deterrents
    - Finning regulations, such as setting fin-to-carcass ratios or necessitating landings of whole animals only
    - Species-specific restrictions and/or by-catch mitigation measures for priority species (see Protecting Species)

  Implementing many of these management measures will also fundamentally depend upon robust stock data and population status data for setting sustainable management targets (See Applied Research).

- **Law enforcement**: Invest in fisheries surveillance systems, and develop mechanisms for penalising infringements of fisheries management regulations, for example through fines and taxation for overfishing or using problematic gears. Build capacity and motivation of fisheries managers and community groups to monitor and enforce fisheries management regulations at the FMA and sub-FMA level.

- **Outreach and incentives**: Build awareness and understanding of the importance of sustainability and environmental management in fishing communities. Develop local institutions, such as fisheries associations, to improve cooperation and coordination between fishers, and develop and implement collective, rights-based management of shark and ray resources at the local level. Improve coordination between local stewards and managers of marine resources and fisheries managers at the FMA and sub-FMA level, such that communities can be involved in fisheries monitoring and management planning processes. Develop voluntary financial and/or market-based mechanisms, such as tax reductions and

compensation schemes, for reducing fishing effort and adopting sustainable practices, particularly in targeted fisheries and the commercial sector. Engage key players in other fishing sectors, particularly the tuna industry, to collaboratively design by-catch reduction programs through a combination of joint research and development, and market-based mechanisms. These efforts could capitalise on growing international demand for sustainable seafood, and build on existing industry standards and market-based schemes such as the Marine Stewardship Council and Fair Trade, to create economic and reputational incentives for investing in by-catch mitigation measures.

- **Applied research**: Invest in building long-term, low-cost systems for robust population monitoring for key species - information on the status of resources will be critical for informing sustainable fisheries management. This could be achieved through a combination of fisheries and fisheries-independent data collection for sharks and rays, through training and deploying government fisheries officers and engaging fisher communities in community-based monitoring programs. Data should be species-specific, and accessible to fishers, fisheries scientists and managers across management units and scales to support stock size estimated, better understanding of population demographics and data-driven management of exploitation rates. Further research should be conducted on the impact and effectiveness of different fisheries management measures, such as gear restrictions and time-area closures, for improving shark and ray fisheries sustainability. In particular, a better understanding is required of the effects of different fisheries and fishing practices, particularly longline and gillnet fisheries, on priority species and life-history stages, and the implications of developing deep-water fisheries. Explore the application of new technologies, such as electromagnetic deterrents and underwater robotics, for improving fishing selectivity. Research should be conducted collaboratively with fishers and industry to foster the development of practical, collaborative solutions. Conduct socio-economic research to better understand the impacts of fisheries management interventions on the livelihoods and well-being of fishers and coastal communities.

- **Capacity building**: build capacity of fisheries scientists, managers and fishing communities to collect species-specific data, and use the data for managing exploitation rates and assessing sustainability. Support the development and management of a national-level database for shark and ray fisheries monitoring. Explore opportunities to facilitate and strengthen research partnerships and collaborations with national and international universities, as a cost-effective measure for strengthening capacity and improving information availability.

Case study:

Identifying practical fisheries management interventions using applied research: *Fisheries management approaches are necessary for reducing fishing mortality of high priority species as well as mitigating the risk of overfishing for moderate and lower priority species. Fisheries management approaches are likely to be most effective when they include policies that can be easily implemented, with consideration of practical measures that can be adopted by fishers and effectively monitored and enforced by fisheries managers. Measures should be adapted to the characteristics of specific fisheries, such as scale and fishing gear, and the life-history traits of species of conservation concern. For example, minimum mesh size regulations in multispecies gillnet fisheries can generate a 'gauntlet' effect, in which only juveniles of the largest and least productive shark species are captured, while the fishing mortality of mature and more fecund age-classes is reduced (Prince 2005, Harry et al. 2011). Approaches are likely to be more readily adopted when there are clear benefits or incentives for fishing communities and commercial companies, such as improvements in catch per unit effort, rewards for adopting sustainable or environmentally-friendly practices, and fines and taxation for infringements. For example, analysis of catch data from the Tanjung Luar longline shark fishery in East Lombok indicates that there is a negative relationship between catch per unit effort and several*

indicators of fishing effort (number of hooks, trip length, engine size, number of gear deployments) indicating diminishing returns above relatively low levels of fishing effort. Capacity controls could help to maximise the overall catch per unit effort of the fishery, reduce mortality of threatened and protected species and reduce operational costs for fishers, making shark fishing in Tanjung Luar more sustainable and more cost effective *(Yulianto et al. 2017). It should be recognised, however, that due to the low reproductive rate of most shark species in comparison to other spawning fish, fully sustainable shark fisheries can likely only be achieved at very low levels of offtake for the majority of species. This will require the development of conservative and closely monitored management measures. Market-based certification schemes, such as Fair Trade and the Marine Stewardship Council, also offer opportunities for incentivising improved management in commercial and small-scale fisheries where sharks are caught incidentally, particularly tuna fisheries (e.g. Duggan and Kochen 2016), through generating price premiums for fisheries adopting responsible and sustainable practices.*

Priorities for Managing Fisheries

Outcome:

Incidental catch of sharks and rays in commercial fisheries has significantly reduced, and the number of targeted shark and ray fisheries that are under active management has increased by 2023

Priority activities:

- Improve fisheries and fisheries independent data collection for estimation of stock sizes, monitoring of stock status and development of sustainability indicators
- Develop and implement FMA and sub-FMA shark and ray fisheries management plans, designed to mitigate the risk of overfishing and reduce fishing mortality of priority species.
- Build on existing fisheries laws, local/customary fishing institutions and industry standards to establish voluntary and non-voluntary mechanisms for enforcing fisheries management plans and improving fisheries sustainability (e.g. taxation and fines, compensation and incentives, fisheries cooperatives).
- Engage the commercial sector and non-target fisheries, particularly the tuna industry, to collaboratively design by-catch reduction programs which build on existing international regulations and market-based sustainability schemes.
- Improve understanding of the effects of different fishing gears on priority species and life-history stages and explore the application of new technologies for improving fishing selectivity and mitigating mortality

Priority species and species groups include:

Requiem sharks (*Carcharhinidae*), hammerhead sharks (*Sphyrnidae*), thresher sharks (*Alopiidae*), whiptail stingrays (*Dasyatidae*), mako sharks (*Lamnidae*), gulper sharks (*Centrophorus granulosus*)

Geographic priorities include:

- Overall: Aceh, East Nusa Tenggara, South Sulawesi, Maluku, Central Java
- Small-scale fisheries: South Sulawesi, Maluku, East Nusa Tenggara, North Maluku, West Papua, West Nusa Tenggara
- Commercial fisheries: East Java, North Sulawesi, Jakarta
- FMAs: 573, 712

Corresponding priority programs for NPOA for sharks and mantas:

S1, S3, S4, S8, S9

Controlling Trade

Shark and ray trade chains in Indonesia are diffuse and fragmented, with a wide range of individuals and companies engaged in the industry, specialising in different products and markets. There are several major known trading hubs, with five exit ports responsible for more than 99% of recorded shark and ray exports, five major companies responsible for over 80% of the export market share, and 5 key importing countries (Figure 7). CITES provides the over-arching legal framework for driving trade controls for sharks and rays in Indonesia. In order to effectively implement CITES, and ensure trade is not detrimental to wild shark populations, systems and capacity need to be developed for gathering species-specific fisheries and trade data; developing and implementing quotas at FMA-, provincial- and national-levels; ensuring full supply chain traceability; and incentivising sustainable trade.

- **Policy**: Develop national and provincial-level trade regulations for controlling trade in shark and ray products, through ministerial decrees and/or revisions to fisheries and marine species utilisation laws (level fisheries laws(UU No.31/2004, UU No.45/2009, PP No.60/2007). Develop standard operating procedures for monitoring shark and ray products with a focus on key aggregation points and export hubs. Develop a registration and licensing system for shark and ray trading companies, and trade controls, such as quotas, which are linked to fisheries management plans at relevant spatial scales.

- **Law enforcement**: Develop strong penalties for species-based and volume-based infringements of trade controls. Invest resources in strategic locations and institutions, such as major trading hubs and exit ports (Figure 8), to increase the probability of detecting infringements, and capitalise on new technologies, such as in-situ DNA barcoding field kits, machine learning for photographic recognition and blockchain technology to improve the efficiency and transparency of trade monitoring and enforcement. Build strategic inter-agency and international collaboration between priority government authorities (e.g. MMAF and customs) and with priority importing destinations (e.g. China, Hong Kong) to strengthen coordination and information-sharing.

- **Outreach and incentives**: Collaborate with key investors and domestic and international trading companies to promote responsible and sustainable trading practices and develop industry standards. Explore mechanisms which incentivise the adoption of sustainable shark and ray trading standards, for example through strengthening corporate social responsibility policies, developing eco-labelling and certification schemes, and building relationships between Indonesian exporters and responsible buyers/retailers in consumer countries. Build collaborations with shipping companies and airlines to strengthen their transportation policies regarding shark and ray products.

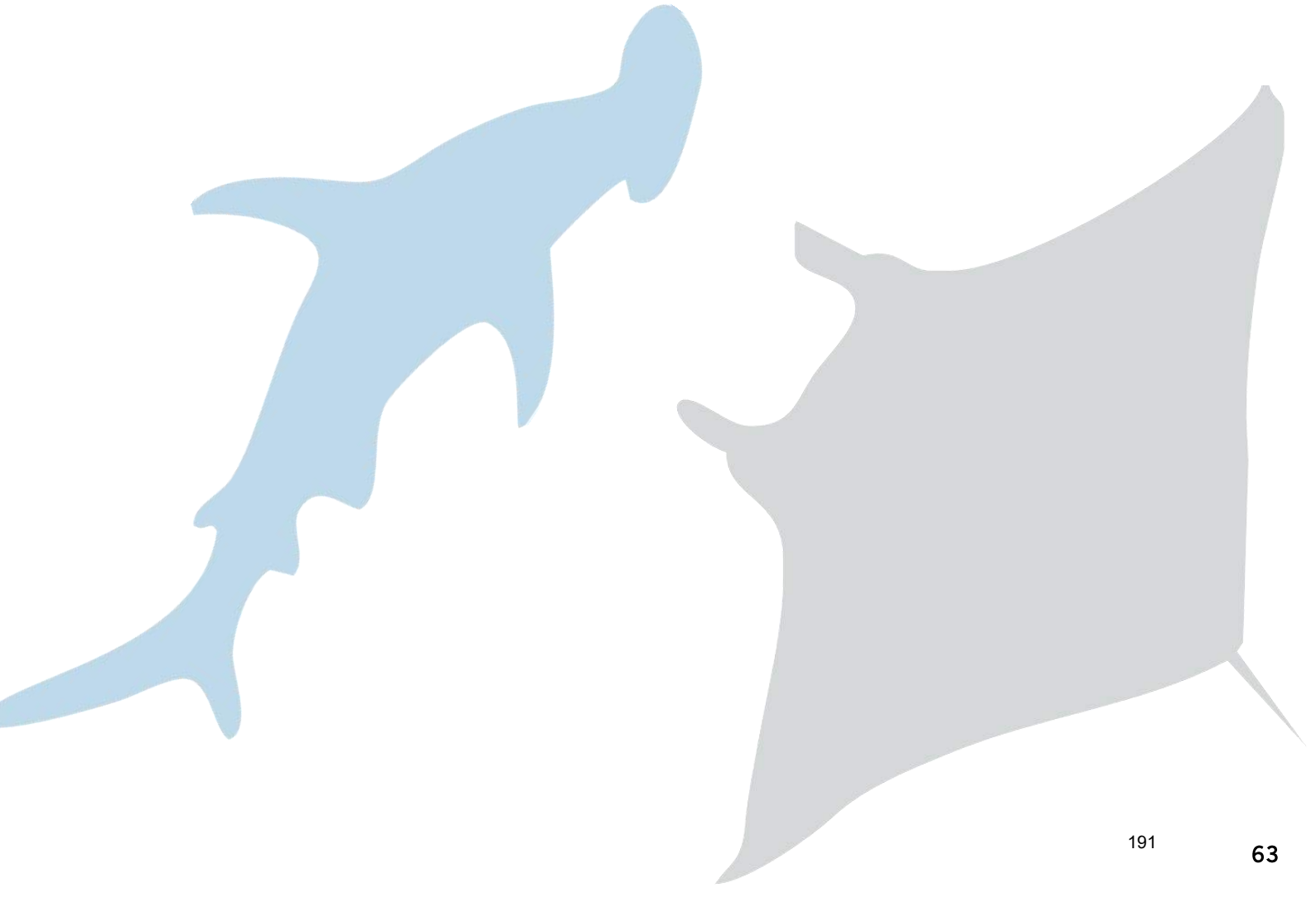
- **Applied research**: Improve nation-wide collection of species-specific fisheries, trade and export data for shark and ray products. This can inform the development of Non-Detriment Finding (NDF) studies for CITES-listed species, and appropriate trade controls and quotas and FMA-, provincial- and national-levels. Test the application of new technologies for improving traceability and trade management, such as DNA barcoding field kits for rapid, in-situ genetic testing of shark and ray products and blockchain technologies for product traceability from point of landing to point of export.

- **Capacity building**: Assist the government to establish additional monitoring, verification and enforcement capacity at key ‘pinch points’ in the trade chain, particularly export hubs. Invest in improving species identification capacity of fisheries and customs officers through training in visual identification and trialling of new technologies for species ID, such as machine learning and genetic testing. Develop new standard operating procedures for checking and verifying product provenance, and

a nation-wide database for species-specific trade monitoring and traceability. Build capacity of MMAF and LIPI to carry out NDF studies and set sustainable quotas for CITES-listed species.

Case study:

Improving supply chain transparency through certification schemes and technology: *Trade regulation is particularly important for commercially valuable species traded in high quantities, and all threatened and CITES-listed species. Regulating trade is likely to be most effective when there is fully transparent supply chain traceability, with registered aggregators and traders incentivised to comply to industry standards or regulations. This enables the verification of product provenance and sustainability claims, ensures companies comply with standards and regulations, tackles fraudulent reporting and wildlife crime, and creates an overall framework to drive the development of a responsible industry. For example, an end-to-end traceability system has been piloted for Fair Trade certified tuna fisheries in Maluku. The system used mobile phones, smart tags and blockchain technology to track products from fishermen to factory to point of sale, with social and environmental claims verified through a registration and audit system for participating fishers. Data was efficiently and effectively captured and shared, retailers and consumers were able to verify social and environmental claims of tuna products on sale, and fishers benefited from receiving price premiums associated with complying to Fair Trade standards (Project Provenance Ltd. 2017). For sharks and rays, similar measures could be adopted by exploring options for fisheries certifications that incentivise responsibility and traceability. There are examples of sustainable fisheries for some species in the USA, Australia, New Zealand and Canada (Simpfendorfer and Dulvy 2017), and the US Atlantic Spiny Dogfish has been Marine Stewardship Council (MSC) certified since 2012 (Marine Stewardship Council 2017). Verification of legality and sustainability claims of products could be further supported by innovations in DNA barcoding technology for rapid, in-situ species identification, enabling species-specific trade monitoring and detection of products derived from protected species.*



Priorities for Controlling Trade

Outcome:

Traceability and export controls for shark and ray trade are in place and functioning, and illegal trade is significantly reduced by 2023.

Priority activities:

- Build on existing fisheries and protected species laws to develop regulations and controls for shark and ray trade, with measures including:
  - Registration and licencing of shark product collectors, aggregators and exporters
  - Species-specific trade quotas at local, provincial and national-levels, linked to FMA and sub-FMA fisheries management plans
  - Strong penalties for infringements of trade regulations
- Develop and implement a full supply chain traceability system for shark and ray products, from fishery to point of export
- Explore voluntary mechanisms to incentivise private sector actors to implement sustainability measures
- Build capacity and systems for relevant stakeholders (e.g. fisheries managers, quarantine, customs) to effectively monitor trade in shark and ray products and detect infringements of trade controls
- Train, equip and motivate law enforcement officers and judges to apprehend and prosecute offenders individuals and companies for infringements of trade regulations

Priority species and species groups include:

- **Ensuring legal, sustainable trade:** requiem sharks (Carcharhinidae), hammerhead sharks (Sphyrnidae),thresher sharks (Alopiidae), mako sharks (Lamnidae), giant guitarfish (Glaucostegidae), wedgefish (Rhinidae), whiptail stingrays (Dasyatidae), spurdogs (*Squalus* spp.) and gulper sharks (*Centrophorus granulosus*)
- **Combatting illegal trade**: sawfish (Pristidae), manta rays (*Manta spp.*), whale sharks (*Rhinocondus typus*).

Geographic priorities include:

- Monitoring legal trade: Tanjung Priok and Soekarno-Hatta, Jakarta; Tanjung Perak; Surabaya, Tanjung Emas, Semarang; Pangkal Balam, Bangka Belitung.
- Controlling illegal trade: East Java, Bali, West Nusa Tenggara, East Nusa Tenggara.

Corresponding priority programs for NPOA for sharks and mantas:

S1, S3, S4, S6, S8, S9, M5, M7

Changing Consumption

While there is a great deal of anecdotal evidence on domestic consumption of shark products in different locations and for different demographic groups (Table 7), the nature, magnitude and importance of the domestic market remains poorly understood. There is a need to better understand domestic markets for fin and non-fin commodities and interactions between domestic and international trade chains:

- **Policy**: Build the legal framework for improving sustainability and traceability of domestic shark retailers, particularly large seafood restaurants and hotels. This could include a registration, licencing and auditing system for retailers. Strengthen food labelling standards to increase consumer awareness of the contents and sources of retail products.

- **Applied research**: Gather data on the nature and magnitude of domestic demand for shark and ray products and consumers, and better understand the interaction between domestic and international trade. This should include the identification of key locations and consumer groups, the products and volumes being consumed, and the motivations and social norms driving demand. This will provide baseline data for designing targeted behaviour change campaigns to influence demand for shark and ray products. Conduct socioeconomic research on the role of shark and ray meat in food security, nutrition, and health; the cultural aspects of shark and ray consumption; and the substitutability of shark and ray products for other types of seafood and animal protein. Improve information and understanding of food safety issues surrounding shark and ray products, such as heavy metal content and hygiene.

- **Outreach and incentives**: Invest in national-level constituency building for shark and ray conservation, to build pride in ocean resources and support for shark and ray conservation. Conduct targeted behaviour change interventions for key consumer groups, based on findings of research, to reduce demand for shark and ray products and/or promote responsible and sustainable consumption. Collaborate with the food and beverage industry to strengthen company policies for sourcing and sales of shark and ray products, and explore voluntary and market-based mechanisms to incentivise adoption of sustainable policies, through, for example, corporate social responsibility commitments or sustainable seafood associations such as Bali Sustainable Seafood and the Marine Stewardship Council. Explore opportunities for harnessing cultural practices and traditions for shark consumption to develop local, sustainable management mechanisms based on traditional rights and community-based management.

Case study:

Behaviour change through targeted interventions: *Consumer change is necessary to shift the market forces that currently drive shark and ray overexploitation towards a legal and sustainable path. Influencing consumption will require an interdisciplinary approach to understand key behavioural drivers and leverage points, and design targeted behaviour change campaigns in collaboration with consumer groups and the retail industry. For example, the Worldwide Fund for Nature (WWF) has been calling for food and beverage industries to remove shark products from their menus, with at least 18,000 hotels agreeing to take action and an estimated 20% decline in restaurant sales in Jakarta between 2015 and 2016 (WWF, 2017), while consumer change campaigns to reduce rhino horn consumption in Vietnam focused on addressing social drivers of demand within specific user groups. A better understanding of consumer groups and the drivers of consumption in Indonesia will be required to inform targeted interventions.*

Priorities for Changing Consumption

Outcome:

Domestic demand for shark and ray products has significantly declined by 2023.

Priority activities:

- Explore mechanisms for strengthening the legal framework for controlling domestic retail of shark and ray products
- Develop a better understanding of the nature and magnitude of demand for shark and ray products in Indonesia, and how to influence consumption
- Conduct targeted outreach and behaviour change campaigns to reduce demand for shark and ray products/promote demand for legal and sustainably sourced products
- Explore mechanisms for engaging and incentivising the retail and food and beverage industry to commit to sustainable sourcing of shark and ray products

Priority species and species groups include:

- High value luxury or TCM products: Manta and devil rays (Mobulidae), sawfishes (Pristidae), whale sharks (*Rhinocondus typus)*
- Fin products: requiem sharks (Carcharhinidae), hammerhead sharks (Sphyrnidae),thresher sharks (Alopiidae), mako sharks (Lamnidae)
- Liver oil products: Spurdogs (*Squalus spp*.) and gulper sharks (*Centrophorus granulosus*)

Geographic priorities include:

- Big cities: Jakarta, Surabaya, Makassar, Medan, Manado, Semarang
- Coastal communities: Aceh, Central Java, East Java, West Java, West Nusa Tenggara, East Nusa Tenggara

Corresponding priority programs for NPOA for sharks and mantas:

S1, S6, S7

A 5-YEAR ROAD MAP

Strategic investment area	Objective	Approaches	Outcome	Example priority species/species groups	Example priority geographies	Corresponding programs for NPOA sharks and mantas
Protect species	*Develop and implement species-specific regulations to protect the most vulnerable shark and ray species*	- Identify the most vulnerable and highest priority shark and ray species - Develop legal and/or traditional mechanisms for conferring protected status to priority species - Train, equip and motivate law enforcement officers and judges to accurately identify protected species and their derivative products, build legal cases and appropriately prosecute offenders - Implement locally-adapted incentive and outreach programs in communities most significantly impacted by species protection regulations - Review, increase and standardise penalties for shark and ray wildlife crimes	Exploitation and trade of priority species has significantly declined by 2023	Sawfishe, guitarfish and wedgefish (Rhinopristiformes), manta and devil rays (Mobulidae), hammerhead sharks (Sphyrnidae), thresher sharks (Alopiidae), nurse sharks (Ginglymostomatidae), pelagic eagle rays (Aetobatidae, bamboo sharks (Hemiscylliidae), whiptail stingrays (Dasyatidae), whale shark (*Rhincodontus typus*), zebra shark (*Stegostoma fasciatum*), silky shark (*Carcharhinus falciformis*), oceanic white tip shark (*Carcharhinus longimanus*).	Nationwide	S1, S2, S4, S7, S8, S9, M4, M5, M6, M7
Conserve habitat	*Build a functional and effective marine protected area network and spatial planning legislation to conserve critical habitat for sharks and rays*	- Declare all marine protected areas no-take zones for sharks and rays - Increase area of critical shark and ray habitat under protection and management, ensuring appropriate protection of coastal and oceanic habitats and critical life history stages - Improve management effectiveness of existing priority marine protected areas, with a focus on achieving at least “moderate” management effectiveness across the most important sites - Empower and motivate coastal communities to protect and manage shark and ray resources through locally-appropriate co-management and incentive systems	Area of critical shark and ray habitat under effective protection and management has significantly increased by 2023.	Coastal MPAs: Sawfish, guitarfish and wedgefish (Rhinopristiformes), bamboo sharks (Hemiscylliidae), hammerhead sharks (Sphyrnidae), nurse sharks (Ginglymostomatidae), manta and devil rays (Mobulidae), whiptail stingrays (Dasyatidae), reef-associated requiem sharks (Carcharhinidae), zebra shark (*Stegostoma fasciatum*). Oceanic MPAs: hammerhead sharks (Sphyrnidae), thresher sharks (Alopiidae), oceanic requiem sharks (Carcharhinidae), migration routes for manta and devil rays (Mobulidae) and whale sharks (*Rhincodus typus*).	Protecting new habitat and strengthening current protection: Maluku, North Maluku, West Nusa Tenggara, East Nusa Tenggara, West Papua, East Java Ensuring sustainable, responsible tourism: Bali, North Sulawesi, West Nusa Tenggara, East Nusa Tenggara, South East Sulawesi, West Papua, East Kalimantan, Gorontalo, North Maluku Research: West Kalimantan, Central Kalimantan, West Sumatera, Bengkulu, Lampung, West Sulawesi	S1, S4, S5, S8, S9, M1, M2, M3, M5, M6

Manage fisheries	*Develop and implement regulation and practical approaches to keep targeted catch within sustainable limits, mitigate incidental catch, and limit catch of vulnerable shark and ray species and critical life-history stages*	- Improve fisheries and fisheries independent data collection for estimation of stock sizes and development of sustainability indicators - Develop and implement FMA and sub-FMA shark and ray fisheries management plans, designed to mitigate the risk of overfishing and reduce catch of protected species. - Build on existing fisheries laws, local/customary fishing institutions and industry standards to establish voluntary and non-voluntary mechanisms for enforcing fisheries management plans and improving fisheries sustainability (e.g. taxation and fines, compensation and incentives, fisheries cooperatives) - Improve understanding of the effects of different fishing gears on priority species and life-history stages and explore the application of new technologies for improving fishing selectivity.	Incidental catch of sharks and rays in commercial fisheries has significantly reduced, and the number of targeted shark and ray fisheries that are under active management has increased by 2023.	Requiem sharks (Carcharhinidae), hammerhead sharks (Sphyrnidae), thresher sharks (Alopiidae), whiptail stingrays (Dasyatidae), mako sharks (Lamnidae), gulper sharks (*Centrophorus granulosus*).	Overall: Aceh, East Nusa Tenggara, South Sulawesi, Maluku, Central Java Small-scale fisheries: South Sulawesi, Maluku, East Nusa Tenggara, North Maluku, West Papua, West Nusa Tenggara Commercial fisheries: East Java, North Sulawesi, Jakarta FMAs: 573, 712	S1, S3, S4, S8, S9
Control trade	*Develop and implement systems and incentives to improve the transparency, traceability and responsibility of shark and ray trade chains*	- Build on existing fisheries and protected species laws to develop regulations and controls for shark and ray trade - Develop and implement a full supply chain traceability system for shark and ray products, from fishery to point of export - Explore voluntary mechanisms to incentivise private sector actors to implement sustainability measures - Build capacity and systems for relevant stakeholders and institutions (e.g. fisheries managers, quarantine, customs) to effectively monitor trade in shark and ray products and detect infringements - Train, equip and motivate law enforcement officers and judges to apprehend and prosecute offenders individuals and companies for infringements of trade regulations	Traceability and export controls for shark and ray trade are in place and functioning, and illegal trade is significantly reduced by 2023.	Ensuring legal, sustainable trade: requiem sharks (Carcharhinidae), hammerhead sharks (Sphyrnidae), thresher sharks (Alopiidae), mako sharks (Lamnidae), giant guitarfish (Glaucostegidae), wedgefish (Rhinidae), whiptail stingrays (Dasyatidae), spurdogs (Squalus spp.) and gulper sharks (*Centrophorus granulosus*) Combatting illegal trade: sawfish (Pristidae), manta rays (*Manta* spp.), whale sharks (*Rhinocondus typus*).	Monitoring legal trade: Tanjung Priok and Soekarno-Hatta, Jakarta; Tanjung Perak; Surabaya, Tanjung Emas, Semarang; Pangkal Balam, Bangka Belitung. Controlling illegal trade: East Java, Bali, West Nusa Tenggara, East Nusa Tenggara.	S1, S3, S4, S6, S8, S9, M5, M7
Change consumption	*Encourage responsible consumption to shift market forces towards demand for sustainable and responsibility-sourced shark and ray products*	- Strengthen the legal framework for controlling domestic retail of shark and ray products - Develop a better understanding of the nature and magnitude of demand for shark and ray products in Indonesia, and how to influence consumption - Conduct outreach and behaviour change campaigns to reduce demand for shark and ray products - Explore mechanisms for engaging and incentivising the retail and food and beverage industry to commit to sustainable sourcing of shark and ray products	Domestic demand for shark and ray products has significantly declined by 2023.	High value luxury or TCM products: Manta and devil rays (Mobulidae), sawfishes (Pristidae), whale sharks (Rhinocondus typus) Fin products: requiem sharks (Carcharhinidae), hammerhead sharks (Sphyrnidae), thresher sharks (Alopiidae), mako sharks (Lamnidae) Liver oil products: Spurdogs (Squalus spp.) and gulper sharks (*Centrophorus granulosus*)	Big cities: Jakarta, Surabaya, Makassar, Medan, Manado, Semarang Coastal communities: Aceh, Central Java, East Java, West Java, West Nusa Tenggara, East Nusa Tenggara	S1, S6, S7

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