



# **Sri Lanka National Plan of Action For the Conservation and Management of Sharks**

**(SLNPOA–Sharks 2018 - 2022)**

**MINISTRY OF FISHERIES AND AQUATIC RESOURCES DEVELOPMENT  
AND RURAL ECONOMY**

**DEPARTMENT OF FISHERIES & AQUATIC RESOURCES**

**NATIONAL AQUATIC RESOURCES, RESEARCH AND DEVELOPMENT AGENCY**

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## Abbreviations

|               |  |
|---------------|--|
| BEEZ          | Beyond the Exclusive Economic Zone   |
| BOBLME        | Bay of Bengal Large Marine Ecosystem (Project)   |
| BOBP-IGO      | Bay of Bengal Programme-Intergovernmental Organization   |
| BRD           | Bycatch Reduction Device   |
| BRT           | Blue Resources Trust   |
| CA            | Competent Authority  |
| CBO           | Community Based Organization   |
| CCRF          | Code of Conduct for Responsible Fisheries  |
| CFHC          | Ceylon Fisheries Harbours Corporation  |
| CITES         | Convention on International Trade in Endangered Species of Wild Fauna & Flora                                |
| CMS           | Convention on Migratory Species  |
| CPUE          | Catch per Unit Effort  |
| DFAR          | Department of Fisheries and Aquatic Resources  |
| DWC           | Department of Wildlife Conservation  |
| EAF           | Ecosystem Approach to Fisheries (Management)   |
| EEZ           | Exclusive Economic Zone  |
| FAO           | Food and Agriculture Organization of the United Nations  |
| FARA          | Fisheries & Aquatic Resources Act, No. of 1996   |
| FFBA          | Fisheries (Regulation of Foreign Fishing Boats) Act, No. 59 of 1979  |
| FFPO          | Fauna & Flora Protection Ordinance   |
| FMD           | Fisheries Management Division  |
| GEF           | Global Environment Facility  |
| GPS           | Global Positioning System  |
| IOTC          | Indian Ocean Tuna Commission   |
| IPOA - Sharks | International Plan of Action for Conservation & Management of Sharks   |
| IUCN          | International Union for Conservation of Nature   |
| IUU Fishing   | Illegal, Unreported & Unregulated Fishing  |
| MCS           | Monitoring, Control & Surveillance   |
| MFARD&RE      | Ministry of Fisheries & Aquatic Resources Development & Rural Economy  |
| NARA          | National Aquatic Resources Research & Development Agency   |
| nei           | Not Elsewhere Included   |
| NGO           | Non-Governmental Organization  |
| NIFNE         | National Institute of Fisheries and Nautical Engineering   |
| NPOA-Sharks   | National Plan of Action for the Conservation & Management of Sharks  |
| OFRP          | Outboard Engine Fibre Reinforced Plastic Boats   |
| RFMO          | Regional Fisheries Management Organization   |
| RPOA-Sharks   | Regional Plan of Action for the Conservation & Management of Sharks  |
| Shark(s)      | All species of sharks, skates, rays and chimaeras (Class <i>Chondrichthyes</i> ),                            |
| Shark Catch   | All directed, non-directed, commercial, recreational forms of taking Sharks                                  |
| SLC           | Sri Lanka Customs  |
| SLCG          | Sri Lanka Coast Guard  |
| SLN           | Sri Lanka Navy   |
| SLNPOA-Sharks | Sri Lanka National Plan of Action for the Conservation & Management of Sharks                                |
| SLNPOA-IUU    | Sri Lanka National Plan of Action to Prevent, Deter & Eliminate Illegal, Unreported, and Unregulated Fishing |
| SLTDA         | Sri Lanka Tourism Development Authority  |
| UNCLOS        | United Nations Convention on the Law of the Seas   |
| UNFSA         | United Nations Fish Stocks Agreement   |
| VMS           | Vessel Monitoring System   |

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## Executive Summary

- 1) The development objectives and policies of the Government of Sri Lanka for fisheries and aquaculture over the next eight years, including highly migratory species within Sri Lanka's Exclusive Economic Zone (EEZ) and beyond the EEZ (BEEZ), are set out in the National Fisheries and Aquaculture Policy (NFAP) 2018 – 2025. The NFAP (2018-2025) is being prepared with technical assistance from the Government of Norway.
- 2) The United Nations Convention Law of the Seas has made provisions for coastal States and other States whose nationals' fish in the region for highly migratory species to cooperate directly or through appropriate international organizations / regional fisheries management organizations (RFMO). The Indian Ocean Tuna Commission (IOTC) is the RFMO established for the conservation and management of straddling and highly migratory fish stocks in the Indian Ocean region.
- 3) In 1999 the Food and Agriculture Organization of the United Nations (FAO) has developed an International Plan of Action for the Conservation and Management of Sharks (IPOA-Sharks) within the framework of the Code of Conduct for Responsible Fisheries (CCRF) to address global concerns about the management of Sharks.
- 4) In 2013 the Bay of Bengal Large Marine Ecosystem Project provided assistance to Ministry of Fisheries & Aquatic Resources to prepare Sri Lanka's first National Plan of Action for the Conservation and Management of Sharks (SLNPOA-Sharks 2013 - 2017). The SLNPOA-Sharks (2013 – 2017) proposed new conservation and management measures for Shark resources in Sri Lanka waters and on the high-seas and set out a number of actions under *Priority Areas* to achieve the *Priority Objectives* of IPOA-Sharks by 2017.
- 5) An evaluation of progress made to implement actions under each of the seven Priority Areas proposed and agreed by stakeholders in the SLNPOA-Sharks 2013-2017 was undertaken as part of the preparation of the SLNPA-Sharks 2018-2022. The feedback, comment, information, data, reports and publications gathered during the internal assessment revealed that 22 of the 28 actions proposed under the SLNPOA-Sharks 2013 – 2017 (79%), have been completed or are being implemented by stakeholders.
- 6) When the evaluation examined the actions completed in respect of the four Priority Objectives, it was observed that seven out of the seven actions had either been completed (four) or were still on-going (three).
- 7) The results of the internal assessment were presented at the 2<sup>nd</sup> National Steering Committee of the SLNPOA-Sharks held at the Ministry of Fisheries and Aquatic Resources Development and Rural Economy on 19<sup>th</sup> of October 2018. Comments and observations made by the members of the National Steering Committee of the SLNPOA-Sharks on the results of the internal assessment and suggestions made by members of the committee, contributed directly to the formulation of the new action plan to further improve the conservation and management of Sharks set out herein.

- 8) A historical overview of the Shark Catch in Sri Lanka from the 1950s up to 2013 is contained in the first SLNPOA (2013 – 2017). The description of the Shark Catch in Sri Lanka presented herein is based on an analysis of data collected by NARA's large pelagic marine fishery survey for EEZ and BEEZ fisheries and monthly catch estimates for coastal fisheries submitted by the Fisheries Inspectors (FI) of DFAR for their FI Divisions reported between 2014 and 2016.
- 9) The data analysis is presented in two parts. The first part reviews and analyses information and data pertaining to directed Shark fisheries in Sri Lanka. Directed Shark fisheries are those fisheries where Sharks are the target species. There are a very small number of directed Shark fisheries located on all four coasts in Sri Lanka.
- 10) Directed fishing for sharks is restricted mainly to a small number of motorized vessels (<7.0 m) are engaged in directed fisheries for little gulper shark (*Centrophorus uyato*) at several locations around the island. Directed fishing for rays occurs at a number of landing centers in the districts bordering the Palk Bay (Jaffna, Kilinochchi and Mannar districts) and in the Gulf of Mannar (Mannar and Puttalam districts).
- 11) Section part of the analysis reviews and analyses information and data pertaining to non-directed Shark fisheries in Sri Lanka. Non-directed fisheries are fisheries where Sharks are ***not*** the target species. Handline fisheries, trolling and beach seine fisheries, together with ring net, gillnet and small scale (<24 m) and industrial (>24 m) longline fisheries are the main non-directed fisheries associated with accidental Shark Catch in Sri Lanka. These fisheries operate within and beyond Sri Lanka's EEZ off the western, southern, eastern and northeastern coasts of Sri Lanka.
- 12) IOTC target species comprised around 70% of the total catch of the EEZ and BEEZ fisheries between 2014 and 2016. The percentage contribution of IOTC target species to the total catch ranged from 65.4% (82,918.2 mt) in 2016 to 80.5% (100,415.0 mt) in 2014. The average annual target species catch from Sri Lanka's EEZ and BEEZ fisheries over the same period was 90,257.3 mt, equivalent to 72.6% of the total EEZ and BEEZ catch from all gears.
- 13) Retained bycatch species comprised 27.6% (102,884.1 mt) of the total catch from the EEZ and BEEZ fisheries during the same period. The percentage contribution of retained bycatch species ranged from 19.5% (24,389.5 mt) in 2014 to 34.7% (43,873.0 mt) in 2016. The average annual bycatch from Sri Lanka's EEZ and BEEZ fisheries over the same period was 34,135.8 mt, equivalent to 27.4% of the total EEZ and BEEZ catch from all gears.
- 14) Fish species (>87 species) comprised on average 25.5% (31,750.3 mt) of the total catch landed by vessels fishing in the EEZ and BEEZ between 2014 and 2016, ranging from 17.3% (21,628.50 mt) in 2014 to 32.5% (41,101.60 mt) in 2016.
- 15) Shark species ( $\approx$  87 species) contributed the balance 1.9% of the total catch landed by vessels fishing in Sri Lanka's EEZ and BEEZ fisheries. The percentage contribution of Sharks to the total catch ranged from 1.7% (2,131.10 mt) in 2015 to 2.2% (2,759.00 mt) in 2014.

- 16) None of the Shark species recorded from Sri Lanka's EEZ and BEEZ fisheries were present at more than 1.0% of the total catch from the EEZ and BEEZ fisheries. The commonest Shark species observed in the catch, silky shark (FAL *Carcharhinus falciformis*) comprised only 0.54% of the total EEZ and BEEZ fish catch. Blue shark (BSH *Prionace glauca*) was the second most common Shark species observed in the EEZ and BEEZ catch, contributing 0.21% of the total catch.
- 17) Species belonging to the IOTC category Devil Rays (RMM) and Rays, Stingrays and Manta Rays nei (SRX) contributed 0.41% of the total Shark catch. Five species of devil ray and several species of rays, stingrays and manta rays are commonly caught in Sri Lanka's EEZ and BEEZ fisheries.
- 18) According to the IOTC, the total Shark Catch from the Indian Ocean between 2014 and 2016 was 318,079 mt. The total Shark Catch in the Indian Ocean ranged from 94,932 mt in 2014 to 112,053 mt in 2016. The average Shark Catch in the Indian Ocean during this period was 106,026 mt. Sri Lanka's contribution to the Indian Ocean Shark Catch was 7,663.3 mt between 2014 and 2016, equivalent to 2.4% of the total Shark Catch in the Indian Ocean over the three year period. More than 80% of Sri Lanka's total shark catch was landed from Sri Lankan waters (*i.e.* within the EEZ) between 2014 and 2016.
- 19) Gillnets were the predominate gear associated with Shark landings from Sri Lanka's EEZ and BEEZ fisheries between 2014 and 2017. 51.1% of the total Shark Catch from Sri Lanka's EEZ and BEEZ fisheries was landed by vessels operating gillnets between 2014 and 2017. Rays comprised 63.3% of the total Shark Catch from the EEZ and BEEZ gillnet fisheries, amounting to nearly two thirds of the gillnet Shark Catch (3,570.8mt) over the four year period.
- 20) EEZ and BEEZ vessels operating longlines caught 34.8% of Sharks landed during the period. 79.9% of the longline Shark Catch comprised of shark species. These two gears combined – gillnet and longlines - accounted for 84.0% of Sri Lanka's total non-directed Shark Catch from the EEZ and BEEZ fisheries between 2014 and 2017.
- 21) To move beyond the broad-based measures for the general, overall conservation and management for Sharks outlined and successfully implemented under the SLNPOA – Sharks 2013 – 2017, it is necessary to identify both the key Shark species and the key fisheries that contribute to the Shark catch from directed and non-directed Shark fisheries in Sri Lanka. Only after having identified both the key species and key fisheries, can species specific / fishery specific conservation and management measures can be formulated and implemented under the SLNPOA-Sharks (2018 – 2022).
- 22) **Key Species for Conservation:** Five shark species, belonging to three families are protected by existing in laws in Sri Lanka. Three species of thresher shark (*i.e.* *Alopius vulpinus*, *A. superciliosus* and *A. pelagicus*) are protected under the Shark Fisheries Management Regulation, 2015 (Gazette No. 1938/2 of 26 October 2015). The gazette also prohibits fishing operations in Sri Lankan waters for the oceanic white-tip shark (*Carcharhinus longimanus*) and the whale shark (*Rhincodon typus*).



- 23) Conservation measures will be monitored for compliance for the following key species / key fisheries, under the SLNPOA-Sharks (2018 – 2022).

| Species  | Code | Key Fisheries | Key Gears          |
|--|------|---------------|--------------------|
| <b>I. Common thresher shark</b><br><i>Alopius vulpinus</i>           | THR  | EEZ / BEEZ    | Gillnet / Longline |
| <b>II. Bigeye thresher shark</b><br><i>A. superciliosus</i>          | BTH  | EEZ / BEEZ    | Gillnet / Longline |
| <b>III. Pelagic thresher shark</b><br><i>A. pelagicus</i>            | PTH  | EEZ / BEEZ    | Gillnet / Longline |
| <b>IV. Oceanic white-tip shark</b><br><i>Carcharhinus longimanus</i> | OCS  | EEZ / BEEZ    | Gillnet / Longline |
| <b>V. Whale shark</b><br><i>Rhincodon typus</i>                      | RHN  | EEZ / BEEZ    | Gillnet / Longline |

- 24) **Key Species for Management (Directed Fisheries):** Several species of stingray (*e.g.* pale-edged stingray (*D. zugei*), blue-spotted stingray (*D. kuhlii*), whiptail stingray (*D. brevis*), honeycomb ray (*Himantura uarnak*), manta, devil and eagle rays (Myliobatidae), Rhinoptera (cownose rays) are targeted by fishermen, operating motorised boats off the northwestern coast. Little gulper shark (*Centrophorus uyato*) is targeted by a very small number of very small fisheries in several locations around the island.
- 25) In view of the absence of data on any of the Shark species targeted by Sri Lankan fishermen in several fisheries around the country, it is proposed that data be collected to permit management measures to be designed, developed and implemented for one or more key Shark species targeted by one or more fishery, under the second SLNPOA-Sharks (2018 - 2022).
- 26) **Key Species for Management (Non-Directed Fisheries):** Silky shark (FAL) was the main species observed in the total non-directed Shark Catch from the EEZ and BEEZ fisheries (28.7%). Devils rays (RMM – 23.1%) were the next most important component of the non-directed Shark Catch, followed by rays, stingrays & mantas *nei* (SRX – 21.2%), blue shark (BSH – 15.7%), Sharks various *nei* (SKH - 3.8%) and Scalloped hammerhead (SPL - 2.4%).
- 27) None of the other Shark species were present above 1.7% of the total Shark Catch. There is no data on the stock status of devils rays (RMM) or rays, stingrays & mantas in Sri Lanka, or on the IUCN's *Red List* or on *FishBase*. It is proposed that data and information be collected to enable management measures to be designed, developed and implemented for the following key species and key non-directed fisheries, under the SLNPOA-Sharks (2018 - 2022).

| <b>Main Species</b>  | <b>Code</b> | <b>Key Fisheries</b> | <b>Key Gears</b>              |
|--|-------------|----------------------|-------------------------------|
| <b>Silky Shark</b><br><i>Carcharhinus falciformis</i>        | FAL         | EEZ                  | Longline / Gillnet            |
| <b>Blue Shark</b><br><i>Prionace glauca</i>                  | BSH         | EEZ                  | Longline / Gillnet / Trolling |
| <b>Devil Rays</b><br>Mobulidae                               | RMM         | EEZ                  | Gillnet / Longline            |
| <b>Rays/Stingrays/Manta nei</b><br>Mobulidae / Myliobatoidei | SRX         | EEZ                  | Gillnet / Longline            |

- 28) The utilization of Sharks caught from directed and non-directed fisheries in Sri Lanka complies with the guidelines set out in the IPOA-Sharks, which encourages *full use of dead Sharks* and *to minimize waste and discards from shark catches in accordance with article 7.2.2. (g) of the CCRF (e.g. utilization of carcasses of sharks from which fins are removed)*.
- 29) Sharks caught from directed and non-directed fisheries are consumed locally as both dry (small rays and sharks) and fresh (large rays and sharks) products. Fresh and dried Shark products play an important role in meeting the nutritional requirements for daily dietary protein for vulnerable and marginalized groups in both urban and rural areas. As many as six species of Shark are used to produce shark liver oil in Sri Lanka. Shark fins are exported mainly to Hong Kong, Korea, China, Singapore and Taiwan. Silky shark (FAL) and blue shark (BSH) are the main species from which fins are extracted.
- 30) Marine eco-tourism activities commenced operations in Sri Lanka after 2009, focusing on dolphin and whale watching tours. A number of dive schools are in operation around the country, but none specifically offer tours promoting diving with Sharks.
- 31) The long term goal, strategic and immediate objectives of the SLNPOA-Sharks (2018-2022) are based on the ten objectives of the IPOA-Sharks, taking into consideration the goals and objectives of the Government of Sri Lanka's fisheries policy and the livelihoods of Sri Lankan fishermen. The long term goal of the SLNPOA-Sharks (2018-2022) is *to ensure the conservation and the sustainable management of key Shark species from directed and non-directed fisheries in Sri Lankan waters and BEEZ, by 2029.*

- 32) A series of Actions to conserve and manage Sharks will be implemented by stakeholders through the SLNPOA-Sharks (2018 - 2022), under the following three headings

**Activity 1 Conservation Measures for Protected Shark Species**

*Action 1.1 Conservation of Protected Species*

**Activity 2 Management Measures for Directed Shark Fisheries**

*Action 2.1 Directed Shark Fisheries*

*Action 2.2 Directed Ray Fisheries*

*Action 2.3 Directed Thresher Shark Fisheries:*

**Activity 3 Management Measures for Non Directed Shark Fisheries**

*Action 3.1 Prohibition of Wire Traces*

*Action 3.2 Establish a Maximum Length for Gillnet Fishing*

*Action 3.3 A Management Plan and Regulation for Fish Aggregating Devices*

*Action 3.4 New HS Codes for the Export & Import of Sharks*

*Action 3.5 A new Schedule for the Export & Import of Sharks*

*Action 3.6 Explore the possibility of introducing 'Introduction from the Sea' certificates for CITES listed Shark species*

*Action 3.7 Catch Data Collection*

*Action 3.8 Scientific Catch Data Collection*

*Action 3.9 Silky Shark Research*

*Action 3.10 Blue Shark Research*

*Action 3.11 Mobulid Research*

*Action 3.12 Other Ray Research*

- 33) The second SLNPOA - Sharks will continue to be implemented as an integral part of the Sri Lanka National Fisheries and Aquatic Resources Management Plan.

- 34) A coordinating committee comprising representatives of the respective organizations under the Chair of the Director General of the DFAR and Director of the Fisheries Management Division of DFAR as the Secretary will continue to review the progress of the implementation of the second NPOA – Sharks. The NPOA Sharks Implementation Coordinating Committee will meet once in six months.
- 35) The second SLNPOA–Sharks is intended to have a duration of five years (2018 - 2022) focused on establishment of the necessary capacity, systems and databases while managing the fishing effort on the directed and non-directed Shark fisheries based on an active and progressive precautionary approach in consultation with stakeholders.
- 36) Upon the conclusion of this period the overall progress and the impacts of implementation will again be evaluated against the new goals and objectives, using identified indicators with a view to revision of SLNPOA–Sharks taking into account the changes in fisheries in the future.

**Colombo**  
**29<sup>th</sup> November 2019**

## 1.0 Introduction

- 37) The development objectives and policies for fisheries and aquaculture of the Government of Sri Lanka over the next eight years are set out in the National Fisheries and Aquaculture Policy (NFAP) 2018 – 2025. Accordingly, *the Government of Sri Lanka envisages a knowledge based social market economy built on principles of social justice and has commenced on a comprehensive development programme covering all economic sectors and all geographical areas of the country. It has been recognized that for the development of the fisheries and aquaculture sector a new national policy, which is consistent with the country's overall economic and social development policy is required.*
- 38) The NFAP (2018 – 2025) is expected to *ensure the sustainability of the fisheries and aquaculture industry, build confidence of local and foreign investors to undertake investments in the sector, effectively take advantage of the ever expanding domestic and overseas markets for fisheries and aquatic products and conform to requirements stipulated under international conventions and agreements on conservation and management of fisheries resources.*
- 39) The Government of Sri Lanka envisages achieving the following ten objectives in the development of the sector
1. Sustainable resource management
  2. Science-based resource management
  3. Compliance with regional and international obligations
  4. Increased marine and brackish-waters fisheries production
  5. Increased aquaculture and inland fisheries production
  6. Minimized post-harvest losses and increased value addition
  7. Increased per-capita consumption of fish
  8. Increased export earnings
  9. Improved opportunities for leisure, employment and enterprise development
  10. Improved socio-economic conditions for fisher communities.

- 40) A series of policies were developed in consultation with different stakeholder groups and organizations to give the direction as to how to achieve the above objectives. The policies were grouped under five areas i.e. marine fisheries, aquaculture and inland fisheries, consumers and markets, blue economy and other areas. A master plan will be prepared with activities to be implemented and investments to be made for the period 2018 – 2025 for the realization of the envisaged objectives. The policies that direct the development of the sector are set out in the draft National Fisheries and Aquaculture Policy 2018 – 2025.
- 41) The NFAP (2018-2025) is being prepared with technical assistance from the Government of Norway.

### **1.1 International Initiatives for the Conservation & Management of Sharks**

- 42) The United Nations Convention Law of the Seas (UNCLOS) has made provisions for coastal States and other States whose nationals fish in the region for highly migratory species to cooperate directly or through appropriate international organizations / regional fisheries management organizations (RFMO), with a view to ensuring conservation and promoting the objective of optimum utilization of those species throughout the region both within and beyond the exclusive economic zones (EEZ& BEEZ). The highly migratory shark species included in these provisions include
- Bluntnose sixgill shark (*Hexanchus griseus*)
  - Basking shark (*Cetorhinus maximus*)
  - Thresher sharks (Alopiidae)
  - Whale shark (*Rhincodon typus*)
  - Requiem sharks (Carcharhinidae)
  - Hammerhead sharks (Sphyrnidae)
  - Mackerel sharks (Isuridae)
- 43) UNCLOS has also made several other provisions with a view to conservation and management of living resources in exclusive economic zones and BEEZ. The United Nations Fish Stocks Agreement (UNFSA) has been formulated and adopted for the purpose of implementation of all provisions made in UNCLOS for conservation and management of both straddling and highly migratory fish stocks, which include among other species the shark species listed in Annex I to UNCLOS. Several Regional Fisheries Management Organizations (RFMOs) have been established as provided for in UNFSA for States to act in cooperation with each other for the conservation and management of straddling and highly migratory fish stocks occurring in different regions.
- 44) The Indian Ocean Tuna Commission (IOTC) is the RFMO established for the conservation and management of straddling and highly migratory fish stocks in the Indian Ocean region. Among the actions initiated by IOTC concerning the conservation of Sharks caught in association with fisheries managed by IOTC are

- Resolution 12/09** On the conservation of thresher sharks (family Alopiidae) caught in association with fisheries in the IOTC area of competence
- Resolution 13/05** On the conservation of whale sharks (*Rhincodon typus*)
- Resolution 13/06** On a scientific and management framework on the Conservation of sharks species caught in association with IOTC managed fisheries
- Resolution 17/05** On the conservation of Sharks caught in association with fisheries managed by IOTC

- 45) The Food and Agriculture Organization of the United Nations (FAO) has developed an International Plan of Action for the Conservation and Management of Sharks (IPOA-Sharks) within the framework of the Code of Conduct for Responsible Fisheries (CCRF) to address global concerns about the management of Sharks. This has been adopted by the FAO Committee on Fisheries at its 23<sup>rd</sup> Session held in February 1999 and endorsed by the FAO Council in June 1999 (FAO 1999).
- 46) For the purposes of this document, the term ‘Shark’ and the term ‘Sharks’ are taken to include all species of sharks, skates, rays and chimaeras (Class Chondrichthyes). The term “Shark Catch” is taken to include directed, non-directed, commercial, recreational and other forms of taking Sharks, unless otherwise stated.
- 47) IPOA - Sharks is a voluntary instrument which encourages States to adopt a National Plan of Action for the Conservation and Management of Sharks (NPOA - Sharks), if their vessels conduct directed shark fishing or if their vessels regularly catch sharks in non-directed fisheries. The overarching goal of the IPOA-Sharks is to ensure the conservation and management of Sharks and their long-term sustainable use. The IPOA-Sharks identifies principles and objectives for Shark management at the national level to be implemented through the development of NPOA-Sharks.
- 48) The IPOA - Sharks is the only international initiative that is specifically dedicated to the conservation and management of Sharks. The IPOA - Sharks states that a NPOA - Sharks should aim to:
- i. *Ensure that Shark Catches from directed and non-directed fisheries are sustainable;*
  - ii. *Assess threats to Shark populations, determine and protect critical habitats and implement harvesting strategies consistent with the principles of biological sustainability and rational long-term economic use;*
  - iii. *Identify and provide special attention, in particular to vulnerable or threatened Shark stocks;*

- iv. *Improve and develop frameworks for establishing and coordinating effective consultation involving all stakeholders in research, management and educational initiatives within and between States;*
  - v. *Minimize unutilized incidental catches of Sharks;*
  - vi. *Contribute to the protection of biodiversity and ecosystem structure and function;*
  - vii. *Minimize waste and discards from Shark Catches in accordance with article 7.2.2. (g) of the CCRF (e.g. utilization of carcasses of Sharks from which fins are removed);*
  - viii. *Encourage the full use of dead Sharks;*
  - ix. *Facilitate improved species-specific catch and landings data and monitoring of Shark Catches;*
  - x. *Facilitate the identification and reporting of species-specific biological and trade data.*
- 49) The issue of Shark conservation and management has also been addressed by two other global biodiversity-related Conventions, namely, the Convention on the International Trade in Endangered Species (CITES) and the Convention on Migratory Species (CMS). Sri Lanka signed the convention on 6<sup>th</sup> June 1990. The Memorandum of Understanding on the Conservation of Migratory Sharks is an international instrument for the conservation of migratory species of Sharks under this convention. Sri Lanka signed this MOU on 1st March 2010.

## **1.2 National Initiatives for the Conservation & Management of Sharks**

- 50) Sri Lanka is a party to UNCLOS, UNFSA, CITES and several other international treaties that concern the conservation and management of living resources and biodiversity, and a member of IOTC. Sri Lanka has developed several national instruments such as policy guidelines, laws and regulations, and plans of action to guide the process of implementation of the commitments made under the above treaties. More than 60 species of Sharks belonging to at least 7 orders and more than 20 families have been reported in marine fish landings in Sri Lanka (Appendix I). An overview of the Shark species that are commonly most commonly caught by Sri Lanka fisheries is given in Section 2.0.



- 51) In 2013 the Bay of Bengal Large Marine Ecosystem (BOBLME) Project, a GEF-funded regional cooperation project for the management and conservation of the marine environment and fisheries provided assistance to Ministry of Fisheries & Aquatic Resources to prepare Sri Lanka's first National Plan of Action for the Conservation and Management of Sharks (SLNPOA-Sharks 2013 - 2017). The SLNPOA-Sharks (2013 – 2017) was prepared considering the guidelines stipulated in the CCRF and IPOA-Sharks, in consultation with fishery managers, fisheries researchers, academics, fishing industry and trade, as well as NGOs and CBOs representing the interests of the environment and fishing communities.
- 52) The first SLNPOA-Sharks (2013 – 2017) included information on the historical and current status of Sharks in Sri Lanka and set out the regulatory and administrative frameworks pertaining to directed and non-directed shark catch shark fishing. The SLNPOA-Sharks (2013 – 2017) emphasized the measures that were already being implemented to conserve and manage Sharks and highlighted the key issues that needed to be addressed in the future to improve the conservation and management of Sharks.
- 53) The SLNPOA-Sharks (2013 – 2017) proposed new conservation and management measures for Shark resources in Sri Lanka waters and on the high-seas and set out a number of actions under **Priority Areas** to achieve the **Priority Objectives** of IPOA-Sharks by 2017. The on-going and proposed conservation and management measures were set out under seven priority areas as follows:

|                        |  |
|------------------------|--|
| <b>Priority Area 1</b> | Improvement of data acquisition and reporting (Catch, discards, landing, effort and trade) |
| <b>Priority Area 2</b> | Strengthening of data acquisition on biological aspects and habitats                       |
| <b>Priority Area 3</b> | Effective conservation and management  |
| <b>Priority Area 4</b> | Strengthening of enforcement & compliance  |
| <b>Priority Area 5</b> | Measures to address socioeconomic issues   |
| <b>Priority Area 6</b> | Capacity building  |
| <b>Priority Area 7</b> | Communication & awareness  |

- 54) These seven priority areas were expected to deliver the following four Priority Objectives.
- Priority Objective 1** Ensure that shark catches from directed and non-directed fisheries are sustainable.
- Priority Objective 2** Assess threats to shark populations determine and protect critical habitats and implement harvesting strategies consistent with the principles of biological sustainability and rational long-term economic use.
- Priority Objective 3** Identify and provide special attention, in particular to vulnerable or threatened shark stocks.
- Priority Objective 4** Contribute to the protection of biodiversity and ecosystem structure and function
- 55) An evaluation of progress made to implement actions under each of the seven priority areas proposed and agreed by stakeholders in the SLNPOA-Sharks 2013-2017 was undertaken as part of the preparation of the SLNPA-Sharks 2018-2022. A summary of the evaluation's findings is presented below. A short evaluation report is presented in Appendix II.

### 1.2.1 Internal (Stakeholder) Assessment of the SLNPOA-Sharks (2013 – 2017)

- 56) Key informant interviews were conducted with representatives of the Department of Fisheries and Aquatic Resources (DFAR), the National Aquatic Resources, Research and Development Agency (NARA), Department of Wildlife Conservation (DWC) and Blue Resources Trust (BRT) to assess the status of each of the 28 actions proposed under the SLNPOA-Sharks 2013 – 2017. Requests for information, data and or research papers on Sharks were sent to 35 Sri Lankan academics working in marine, environmental, biology / zoology and or fisheries departments in 12 local universities.
- 57) The feedback, comment, information, data, reports and publications gathered during the internal assessment revealed that 22 of the 28 actions proposed under the SLNPOA-Sharks 2013 – 2017 (79%), have been completed or are being implemented by stakeholders (see Table 01). The six actions that have yet to be implemented by stakeholders are as follows:
- *Logbooks are not mandatory to obtain data on Sharks from non-motorized and motorized vessels, unlike for EEZ and BEEZ fishing vessels. Data collection is still dependent on port / landing centre sampling for non-motorized and motorized vessels fishing boats operating within Sri Lanka's EEZ and monthly estimates by Fishery Inspectors (Priority Area 1)*

**Note:** Currently Log Books are mandatory for the mechanized boats operate more than one day (>8m in length./>28 feet)within and beyond EEZ. Data collection is dependent on both log book and the sampling of the catch conducted by the enumerator assigned by DFAR and NARA at port / landing centers. However the coverage is not satisfactory and has to be increased.

- *There are regulations and prohibitions, but there are no data of species at risk to inform management measures, but there are no such management arrangements for sharks are enforceable and consistent with the ecologically sustainable use of sharks in terms of the objectives and actions of NPOA and introduce amendments accordingly (Priority Area 3)*
- *When considering the fishers affected by the Prohibition of Catching Thresher Shark Regulations, there were 11 major boats in the area which were targeting thresher shark in 2012.After banning the thresher shark fishery these fishermen are targeting alternative species / livelihoods, but there is no data about their alternative livelihoods and no livelihood assistance was provided following the ban(Priority Area 5)*
- *No awareness programmes have been held for boat operators, fishers, fish collectors and traders on post-harvest technology for quality improvement of Shark products (Priority Area 7)*
- *Guidelines for Whale Shark have not been formulated / no awareness programmes have been held for boat owners and operators on Whale Shark Guidelines (Priority Area 7)*
- *Awareness programs for all stakeholders highlighting the main elements and recommendations of the SLNPOA–Sharks were conducted during the formulation of the SLPOA. The number of steering committee meetings was held was not satisfactory and has to be increased under the new NPOA 2018 - 2022(Priority Area 7)*

**Table 1 Status of actions proposed for each Priority Area, under the SLNPOA-Sharks (2013 – 2017)**

|                        | Actions   |           |           |             |
|------------------------|-----------|-----------|-----------|-------------|
|                        | Total     | Completed | On-going  | Not Started |
| <i>Priority Area 1</i> | <b>08</b> | <b>06</b> | <b>01</b> | <b>01</b>   |
| <i>Priority Area 2</i> | <b>02</b> | <b>00</b> | <b>02</b> | <b>00</b>   |
| <i>Priority Area 3</i> | <b>08</b> | <b>04</b> | <b>03</b> | <b>01</b>   |
| <i>Priority Area 4</i> | <b>01</b> | <b>01</b> | <b>00</b> | <b>00</b>   |
| <i>Priority Area 5</i> | <b>01</b> | <b>00</b> | <b>00</b> | <b>01</b>   |
| <i>Priority Area 6</i> | <b>01</b> | <b>00</b> | <b>01</b> | <b>00</b>   |
| <i>Priority Area 7</i> | <b>07</b> | <b>01</b> | <b>03</b> | <b>03</b>   |
| <i>Sub Totals</i>      | <b>28</b> | <b>12</b> | <b>10</b> | <b>06</b>   |

- 58) When the evaluation examined the actions completed in respect of the four Priority Objectives, it was observed that seven out of the seven actions had either been completed (4) or were still on-going (3) as shown in Table 02.

**Table 2 Status of actions proposed for each Priority Objective, under the SLNPOA-Sharks (2013 – 2017)**

|                             | Actions   |           |           |             |
|-----------------------------|-----------|-----------|-----------|-------------|
|                             | Total     | Completed | On-going  | Not Started |
| <i>Priority Objective 1</i> | <b>03</b> | <b>02</b> | <b>00</b> | <b>00</b>   |
| <i>Priority Objective 2</i> | <b>03</b> | <b>01</b> | <b>01</b> | <b>00</b>   |
| <i>Priority Objective 3</i> | <b>01</b> | <b>01</b> | <b>02</b> | <b>00</b>   |
| <i>Priority Objective 4</i> | <b>00</b> | <b>00</b> | <b>00</b> | <b>00</b>   |
| <i>Sub Totals</i>           | <b>07</b> | <b>04</b> | <b>03</b> | <b>00</b>   |

- 59) The results of the internal assessment were presented at the 2<sup>nd</sup> National Steering Committee of the SLNPOA-Sharks held at the Ministry of Fisheries and Aquatic Resources Development and Rural Economy (MFARD&RE) on 19<sup>th</sup> of October 2018 (Appendix II). Comments and observations made by the members of the National Steering Committee of the SLNPOA-Sharks on the results of the internal assessment and suggestions made by members of the committee, contributed directly to the formulation of the new action plan to further improve the conservation and management of Sharks set out in Section 6.0 herein.

## 2.0 Shark Catch (2014 – 2016)

- 60) A historical overview of the Shark Catch in Sri Lanka from the 1950s up to 2013 is contained in the first SLNPOA (2013 – 2017)<sup>1</sup>. As noted above, a list of the Shark species that have been recorded in the catch of Sri Lankan fishing vessels is presented in Appendix I. The description of the Shark Catch in Sri Lanka presented herein is based on an analysis of data collected by NARA’s large pelagic marine fishery survey for EEZ and BEEZ fisheries and monthly catch estimates for coastal fisheries submitted by the Fisheries Inspectors of DFAR for their FI Divisions<sup>2</sup> reported between 2014 and 2016.
- 61) The analysis is presented in two sections. The first section reviews and analyses information and data pertaining to directed Shark fisheries in Sri Lanka. Directed fisheries are those fisheries where Sharks are the target species. There are a small number of directed, Shark fisheries in operation around the island’s 1,340 km of coastline. A small number of Shark fisheries, often comprising of no more than a handful of vessels motorized boats per fishery, are found at several locations off the northwest (Puttalam), west (Beruwela), south (Galle) and east (Valachenai) and northeast (Muthur) coasts (see Figure 1). Directed ray fisheries predominate off the northern and northwest coasts of Sri Lanka.
- 62) Section two of the second NPOA reviews and analyses information and data pertaining to non-directed Shark fisheries in Sri Lanka. Non-directed Shark fisheries are those fisheries where Sharks are *not* the target species. Six small scale fisheries (*i.e.* deploying vessels < 24 m length overall) are associated non-target Shark Catch in Sri Lanka. These fisheries are defined by gear type and location. The six key fisheries associated non-target catches of Sharks in Sri Lanka are as follows

|                                       |            |
|---------------------------------------|------------|
| (i) Gillnet fisheries <sup>3</sup>    | EEZ & BEEZ |
| (ii) Longline fisheries               | EEZ & BEEZ |
| (iii) Ring net fisheries <sup>4</sup> | EEZ        |
| (iv) Handline fisheries               | EEZ        |
| (v) Trolling fisheries                | EEZ        |
| (vi) Beach seine fisheries            | EEZ        |

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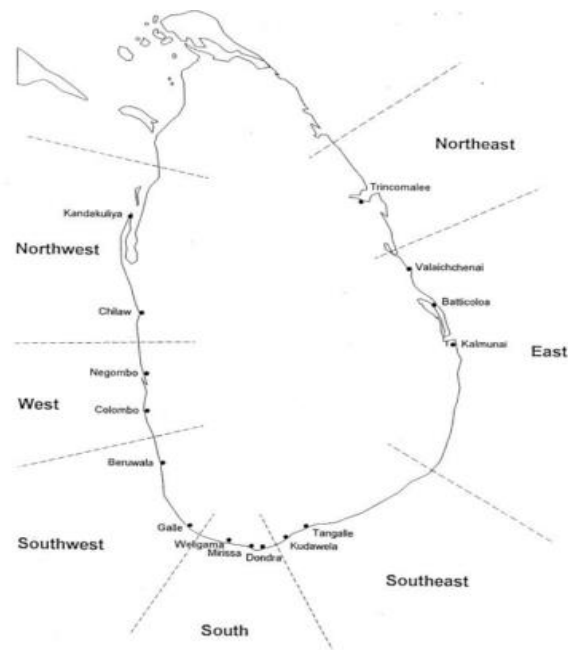
<sup>1</sup>[http://www.fao.org/tempref/FI/DOCUMENT/IPOAS/national/Srilanka/NPOA\\_Sharks.pdf](http://www.fao.org/tempref/FI/DOCUMENT/IPOAS/national/Srilanka/NPOA_Sharks.pdf)

<sup>2</sup> Fisheries Statistics 2017 Ministry of Fisheries & Aquatic Resources Development, Maligawatte Colombo 10

<sup>3</sup> Many vessels operate ‘gillnet & longline combination’ gear, but this gear operation is not distinguished in the data

<sup>4</sup>In Sri Lanka many types of surrounding net are used for different species. The term ‘ring net’ used herein references to ‘mini purse seines’ targeting frigate tuna (*Auxis thazard*) and mackerel scad (*Decapterus macarellus*)

**Figure 2** Principal statistical zones & major landing centers used in estimating EEZ fish production in Sri Lanka (source: NARA)



- 63) Vessels engaged in these fisheries operate from harbours, anchorages and landing centres along the western (*i.e.* Negombo, Dikowitta, Beruwela), southern (*i.e.* Galle, Matara, Tangalle) and eastern (*i.e.* Valchenai, Trincomalee) coasts. Harbours to accommodate EEZ and BEEZ fishing vessels are currently under construction along the northern coast (*i.e.* Jaffna and Mannar). These harbours will become operational within duration of the second NPOA.

## 2.1 Directed Shark Fisheries (EEZ)

- 64) Directed Shark fisheries are those fisheries where Sharks are the target species. There are a very small number of directed Shark fisheries located on all four coasts in Sri Lanka. Directed Shark fisheries target a number of shallow waters ray species predominate off the northern (Jaffna, Mannar, Kilinochchi districts) and north western (Puttalam District) coasts, using motorised traditional and fibre-reinforced plastic (OFRP) boats (<7 m). Coastal fisheries for sharks are located at a small number of locations off the north western (Puttalam), western (Beruwela), southern (Galle) and eastern (Valachenai and Muthur) coasts of Sri Lanka.

### 2.1.1 Ray Fisheries (EEZ Only)

- 65) Directed fishing for rays occurs at a number of landing centers in the districts bordering the Palk Bay (Jaffna, Kilinochchi and Mannar districts) and in the Gulf of Mannar (Mannar and Puttalam districts). The relatively shallow (<10 m), sandy / muddy, broad coastal shelf that links Sri Lanka to the southernmost tip of the Indian sub-continent is an ideal habitat for small ray species.
- 66) Seasonal, directed fisheries for pale-edged stingray (*Dasyatis zugei*) and blue spotted stingray (*D. kuhlii*) occur in all four districts. Small numbers of fishermen operate 17½ft fibre reinforced plastic (OFRP) boats and use 5” and 6” bottom-set nets (4ply - 6ply) to target these species. Bottom-set nets with a larger mesh size and stronger ply (18” / 9 ply – 36 ply) are used to target whiptail stingray (*D. brevis*), manata ray (*Mobula sp.*), spotted eagle ray (*Aetobatus narinari*), javanese cownose ray (*Rhinoptera javanica*) and honeycomb ray (*Himantura uarnak*) in the same districts<sup>5</sup>.
- 67) Coastal ray fisheries in the Palk Bay and the Gulf of Mannar are temporal. Fishermen fish for rays during periods when other, more commercially valuable fish species such as prawns or crabs are unavailable. Fishing for larger rays in Puttalam District takes place for a few days each month, on the nights leading up to the new moon and full moon / spring tides<sup>6</sup>, during periods between the two annual – north east and south west – monsoons.
- 68) Estimates based on monthly district reports submitted by the Fisheries Inspectors of DFAR for their FI Divisions in the four districts bordering the Gulf of Mannar and Palk Bay suggest that the catch of Sharks in the Palk Bay and Gulf of Mannar averaged 2,540 mt per year between 2014 and 2016 (see Table 03). No species specific fishery data is available for ray fisheries in either the Palk Bay or the Gulf of Mannar.

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<sup>5</sup> Criterion 2 - Impacts on Other Capture Species - Dugong and turtle interactions with the blue swimming crab fishery in the Gulf of Mannar & Palk Bay. Sri Lanka Blue Swimming Crab Fishery Improvement Project Unpublished Report 2017

<sup>6</sup> Puttalam and Mannar small scale fishermen, *pers. comm.*



**Table 3 Estimated coastal Shark Catch in the Gulf of Mannar & Palk Bay<sup>7</sup>**

| Districts         | 2014         |          | 2015         |             | 2016         |             | Totals       |          | Average      |        |
|-------------------|--------------|----------|--------------|-------------|--------------|-------------|--------------|----------|--------------|--------|
|                   | mt           | District | mt           | District    | mt           | District    | mt           | District | mt           | Region |
| Jaffna            | 620          | 2.4%     | <b>590</b>   | <b>2.0%</b> | <b>1,060</b> | <b>3.3%</b> | 2,270        | 2.6%     | 757          | 30%    |
| Kilinochchi       | 110          | 0.7%     | 420          | <b>3.0%</b> | 900          | <b>6.2%</b> | 1,430        | 3.2%     | 477          | 19%    |
| Mannar            | 680          | 3.1%     | 250          | <b>1.3%</b> | 520          | <b>3.0%</b> | 1,450        | 2.5%     | 483          | 19%    |
| Puttalam          | 760          | 2.0%     | 430          | <b>1.0%</b> | 1,280        | <b>3.1%</b> | 2,470        | 2.0%     | 823          | 32%    |
| <b>Sub Totals</b> | <b>2,170</b> |          | <b>1,690</b> |             | <b>3,760</b> |             | <b>7,620</b> |          | <b>2,540</b> |        |

### 2.1.2 Longline Shark Fishery (EEZ)

- 69) The shark longline fishery was an offshoot of the tuna longline fishery that was introduced to Sri Lanka in the 1950s. Longline fishing for sharks evolved in response to the scarcity of good quality bait for tuna longline fishing. As a result of the success of shark longline operations in combination with the operation of large mesh gillnets for large pelagics, many EEZ and BEEZ fishing vessels carried a set of shark longlines which they set in combination with large mesh gill nets<sup>8</sup>.
- 70) The development of Sri Lanka's longline tuna fishery from the mid-1990s onwards, including the importation of bait and growing international market demand tuna products, enabled fishermen to re-focus their longline fishing activities on tuna rather than sharks. The decline in the Shark catches from the EEZ fishery reported from the 1990s onwards was supported by stakeholder consultations workshops conducted as part of the preparations of the SLNPOA – Sharks in 2013.
- 71) According these consultations, 50 EEZ / BEEZ multi-day boats that were previously targeting Sharks operating out of Negombo fishery harbour (Gampaha District), had stopped operations by 2013. In Beruwala out of a total of about 700 EEZ / BEEZ registered multi-day boats, only 25-30 boats were still engaged in directed shark fishing. No directed, longline Shark fishing was reported in Galle during the stakeholder consultations workshops conducted as part of the preparations of the SL NPOA – Sharks (2013 – 2017)<sup>9</sup>.
- 72) Measure that have been taken by the MFARD&RE and implemented by the DFAR since 2014 to prevent, deter & eliminate illegal, unreported, and unregulated (IUU) fishing are believed to have also played a role in reducing the operation of shark longlines by Sri Lanka's EEZ and BEEZ fishing fleet<sup>10</sup>.

<sup>7</sup> Note: Fisheries Statistics 2015 & 2018 MFARD, Colombo

<sup>8</sup> Fishing Craft & Gear of Sri Lanka DFAR, FAO Marine Fisheries Management Project, Colombo Sri Lanka 1995.

<sup>9</sup> [http://www.fao.org/tempref/FI/DOCUMENT/IPOAS/national/Srilanka/NPOA\\_Sharks.pdf](http://www.fao.org/tempref/FI/DOCUMENT/IPOAS/national/Srilanka/NPOA_Sharks.pdf)

<sup>10</sup> DFAR, pers. comm.

- 73) The introduction and operation of a vessel monitoring system (VMS) for all vessels licensed to fish beyond Sri Lanka's Exclusive Economic Zone has enabled Sri Lanka to significantly reduce the reported incidences and arrest of Sri Lankan vessels for illegally fishing in the EEZ of neighbouring countries including India and British Indian Ocean Territories since 2014, when the new VMS became operational.
- 74) A small number of motorized vessels (<7.0 m) are engaged in directed fisheries for little gulper shark (*Centrophorus uyato*) at several locations around the island<sup>11</sup>. These fisheries are associated with villages where the edge of the continental shelf is close to the shore. Examples include Baththalangunduwa and Thalawila on the northwest coast (Puttalam District); Beruwala on the west coast (Kalutara District); Galle and Mirissa on the southern coast (Galle and Matara Districts) and Valachenai (Batticaloa District) and Muthur (Trincomalee District) on the east coast.
- 75) Little gulper shark are a small (<2.0 m), common deep-water dogfish found on the outer continental shelf and upper slopes. A bathydemersal species, little gulper shark are commonest below 200 m, up to a depth of 1,440m<sup>12</sup>.
- 76) The species specific catch data that is available for the gulper shark fishery in Sri Lanka, suggests that the total catch of little gulper shark in 2016 was 10.3 mt (see Table 12 below). All of the catch was taken by fishermen using shark longline within the EEZ.

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<sup>11</sup> DFAR, pers. comm

<sup>12</sup><https://www.fishbase.de/summary/Centrophorus-uyato>

## 2.2 Non-Directed Shark Fisheries

- 77) Non-directed fisheries are fisheries where Sharks are ***not*** the target species. Handline fisheries, trolling and beach seine fisheries, together with ring net, gillnet and small scale (<24 m) and industrial (>24 m) longline fisheries are the main non-directed fisheries associated with accidental Shark Catch in Sri Lanka. These fisheries operate mainly within Sri Lanka's EEZ off the western, southern, eastern and northeastern coasts of Sri Lanka.
- 78) Only gillnet and longline fisheries operate BEEZ (beyond the EEZ). Handlines, trolling lines, ring nets and beach seines, are deployed using non-motorized and motorized traditional boats and OFRP boats. Gillnets and longlines are deployed by mechanized single-day (IDAY) and multi-day (IMUL) fishing vessels. As 1<sup>st</sup> January 2018, Sri Lanka had registered only six vessels out of more than 4,000 IDAY and IMUL vessels with a length of 24 m length overall.
- 79) The small size of Sri Lanka's fishing fleet (4.0 –11.0 m) ensures that the majority of the EEZ fisheries are seasonal. 43,974 non-motorized and motorized traditional and OFRP boats were licensed to fish off Sri Lanka's eastern, southern and western coast in 2016 (Table 04).

**Table 4** Number and length overall of registered vessels in 2017

| Type of Vessel                      | Length Overall<br>(m) | Registered Vessels |     |
|-------------------------------------|-----------------------|--------------------|-----|
|                                     |                       | No.                | %   |
| Non-Motorized Traditional Boat      | 4.0 – 9.0             | 17,853             | 37% |
| Motorized Traditional Boat          | 4.0 – 11.0            | 1,839              | 4%  |
| Fiber Reinforce Plastic (OFRP) Boat | 5.5 – 5.7             | 24,282             | 50% |
| Single-Day (IDAY) Boat              | 8.5 – 9.8             | 786                | 2%  |
| Multi-Day (IMUL) Boat               | 10.5 – 28.5           | 3,996              | 8%  |
| <b>Total Number of Vessels</b>      |                       | <b>48,756</b>      |     |

- 80) In contrast, small scale (<24 m LOA) and industrial (>24m LOA) gillnet and longline fisheries employing multi-day vessels ranging in size from 10.5 m to 28.5 m operate throughout the year. 4,782 single-day (n = 786) and multi-day (n = 3,996) vessels were registered to fish in Sri Lanka's EEZ and BEEZ fisheries in 2016.
- 81) The largest number of multi-day vessels was registered in Matara (Southern Province - 34%), followed by Negombo (Western Province - 12%), Tangalle (Southern Province - 13%), Batticaloa (Eastern Province - 10%) and Galle (Southern Province - 9%)<sup>13</sup>.

<sup>13</sup> Fisheries Statistics 2018 Ministry of Fisheries & Aquatic Resources Development, Colombo

## 2.2.1 Target Species Catch

- 82) Article III (Species & Stocks) of the Agreement for the Establishment of the IOTC states that *‘the species covered by this Agreement shall be those set out in Annex B (see Appendix III herein). The term “stocks” means the populations of such species which are located in the Area or migrate into or out of the Area’*. The sixteen species listed in Annex B of the Agreement (Appendix III herein) are the de facto ‘target species’ of under the IOTC.
- 83) The term ‘target species’ used herein and hereafter refers to the sixteen species listed in Annex B of the Agreement (Appendix III herein).
- 84) The IOTCs’ Glossary of Scientific Terms, Acronyms and Abbreviations (updated on 11<sup>th</sup> December 2015), indirectly reiterates the definition of ‘target species’ of under the IOTC, wherein the term ‘bycatch’ is defined as *‘all species, other than the 16 species listed in Annex B of the IOTC Agreement, caught or interacted with by fisheries for tuna and tuna-like species in the IOTC area of competence. A bycatch species includes those non-IOTC species which are (a) retained (byproduct), (b) incidentally taken in a fishery and returned to the sea (discarded); or (c) incidentally affected by interacting with fishing equipment in the fishery, but not taken.*
- 85) The terms ‘bycatch and or ‘bycatch species’ used herein and hereafter refers to all species, other than the 16 species listed in Annex B (Appendix III herein) of the IOTC Agreement.
- 86) Target species comprised more than 72.5% (270,771.9 mt) of the total catch of the EEZ and BEEZ fisheries between 2014 and 2016 (see Table 05). The percentage contribution of IOTC target species to the total catch ranged from 65.4% (82,918.2 mt) in 2016 to 80.5% (100,415.0 mt) in 2014. The average annual target species catch from Sri Lanka’s EEZ and BEEZ fisheries over the same period was 90,257.3 mt, equivalent to 72.6% of the total EEZ and BEEZ catch from all gears.

**Table 5 Total, target & bycatch species from the EEZ & BEEZ fisheries 2014 – 2016 (data source NARA 2018)**

| Year         | Total Catch | Target Species |       | Bycatch Species <sup>14</sup> |       |
|--------------|-------------|----------------|-------|-------------------------------|-------|
| <b>2014</b>  | 124,804.5   | 100,415.0      | 80.5% | 24,389.5                      | 19.5% |
| <b>2015</b>  | 122,090.3   | 87,438.7       | 71.6% | 34,651.6                      | 28.4% |
| <b>2016</b>  | 126,791.2   | 82,918.2       | 65.4% | 43,873.0                      | 34.6% |
| <b>Total</b> | 373,656.0   | 270,771.9      | 72.5% | 102,884.1                     | 27.5% |
| <b>Av.</b>   | 124,393.1   | 90,257.3       | 72.6% | 34,135.8                      | 27.4% |

- 87) Retained bycatch species comprised 27.6% (102,884.1 mt) from the total catch of the EEZ and BEEZ fisheries between 2014 and 2016 (see Table 05). The percentage contribution of retained bycatch species ranged from 19.5% (24,389.5 mt) in 2014 to 34.7% (43,873.0

<sup>14</sup>**Note:** This data refers only to bycatch species that are ‘retained’. Insufficient data is currently available to confidently estimate the volumes of IOTC bycatch species caught and discarded by Sri Lankan vessels fishing in the EEZ and BEEZ

mt) in 2016. The average annual bycatch from Sri Lanka’s EEZ and BEEZ fisheries over the same period was 34.135.8 mt, equivalent to 27.4% of the total EEZ and BEEZ catch from all gears.

**Table 6 Total, bycatch fish & Shark species from the EEZ & BEEZ fisheries 2014 – 2016 (data source NARA 2018)**

|       | Total Catch | Total Bycatch |       | Fish Species |       | Shark Species |      |
|-------|-------------|---------------|-------|--------------|-------|---------------|------|
| 2014  | 124,804.5   | 24,389.5      | 19.5% | 21,628.5     | 17.3% | 2,761.0       | 2.2% |
| 2015  | 122,090.3   | 34,651.6      | 28.4% | 32,520.7     | 26.6% | 2,130.9       | 1.7% |
| 2016  | 126,791.2   | 43,873.0      | 34.7% | 41,101.6     | 32.5% | 2,771.4       | 2.2% |
| Total | 373,656.0   | 102,884.1     | 27.6% | 95,250.8     | 25.5% | 7,633.3       | 2.0% |
| Av.   | 124,393.1   | 34,135.8      | 27.4% | 31,750.3     | 25.5% | 2,385.5       | 1.9% |

- 88) Fish species (>87 species, see Appendix I) comprised on average 25.5% (31,750.3 mt) of the total catch landed by vessels fishing in the EEZ and BEEZ between 2014 and 2016, ranging from 17.3% (21,628.50 mt) in 2014 to 32.5% (41,101.60 mt) in 2016.
- 89) Shark species ( $\approx$  87 species, see Appendix II) contributed the balance 1.9% of the total catch landed by vessels fishing in the EEZ and BEEZ fisheries. The percentage contribution of Sharks to the total catch ranged from 1.7% (2,131.10 mt) in 2015 to 2.2% (2,759.00 mt) in 2014.

### 2.2.2 Non Directed Shark Catch

- 90) None of the Shark species recorded from Sri Lanka’s EEZ and BEEZ fisheries were present at more than 1.0% of the total catch from the EEZ and BEEZ fisheries. The commonest Shark species observed in the catch, silky shark (FAL *Carcharhinus falciformis*) comprised only 0.54% of the total EEZ and BEEZ fish catch.
- 91) Silky shark were the commonest Shark species caught, representing 32.9% of the Shark Catch (2,519.5 mt) between 2014 and 2016 (see Table 07). Blue shark (BSH *Prionace glauca*) was the second most commonest Shark species observed in the EEZ and BEEZ catch, contributing 0.21% of the total catch and 12.7% of the Shark Catch (976.8 mt) (see Table 07).
- 92) Species belonging to the IOTC category Devil Rays (RMM) and Rays, Stingrays and Manta Rays nei (SRX) contributed 0.41% and 18.3% (1,405.20 mt) of the total Shark Catch (see Table 7). Five species of devil ray (see Appendix IX) and several species of rays, stingrays and manta rays are commonly caught in Sri Lanka’s EEZ and BEEZ fisheries.

**Table 7 Total annual non-directed Shark Catch by sector 2014 – 2016**

| <i>2014 - 2016</i>               |      | <b>Main Species</b> |  |             |       |
|----------------------------------|------|---------------------|--|-------------|-------|
| <b>Shark Species List</b>        | Code | Total Catch         |  | Shark Catch |       |
|                                  |      | %                   |  | mt          | %     |
| Silky shark                      | FAL  | 0.54%               |  | 2,519.5     | 32.9% |
| Blue shark                       | BSH  | 0.21%               |  | 976.8       | 12.7% |
| Sharks various nei               | SKH  | 0.05%               |  | 233.6       | 3.0%  |
| Scalloped hammerhead             | SPL  | 0.03%               |  | 150.5       | 2.0%  |
| Shortfin mako                    | SMA  | 0.03%               |  | 142.3       | 1.9%  |
| Smooth hammerhead                | SPZ  | 0.02%               |  | 85.0        | 1.1%  |
| Oceanic whitetip shark           | OCS  | 0.02%               |  | 78.0        | 1.0%  |
| Longfin mako                     | LMA  | 0.01%               |  | 41.6        | 0.5%  |
| Spot-tail shark                  | CCQ  | 0.00%               |  | 11.1        | 0.1%  |
| Little Gulper Shark*             | CPU* | 0.00%               |  | 10.3        | 0.1%  |
| Great hammerhead shark           | SPK  | 0.00%               |  | 9.1         | 0.1%  |
| Sharks mackerel & porbeagles nei | MSK  | 0.00%               |  | 5.5         | 0.1%  |
| Silvertip shark                  | ALS  | 0.00%               |  | 4.2         | 0.1%  |
| Blacktip reef shark              | BLR  | 0.00%               |  | 3.4         | 0.0%  |
| Blacktip shark                   | CCI  | 0.00%               |  | 2.9         | 0.0%  |
| Whale shark                      | RHN  | 0.00%               |  | 2.4         | 0.0%  |
| Mackerel Sharks                  | SHM  | 0.00%               |  | 0.1         | 0.0%  |
| <b>Shark Species</b>             |      | 0.91%               |  | 4,276.23    | 55.8% |
| <i>Devil Ray</i>                 | RMM  | 0.41%               |  | 1,926.50    | 25.1% |
| Rays and stingrays & mantas nei  | SRX  | 0.30%               |  | 1,405.20    | 18.3% |
| Eagle Rays                       | EAG  | 0.01%               |  | 55.40       | 0.7%  |
| Giant Manta                      | RMB  | 0.00%               |  | 0.00        | 0.0%  |
| <b>Skates &amp; Rays</b>         |      | 0.72%               |  | 3,387.1     | 44.2% |
| <i>Total Sharks</i>              |      |                     |  | 7,663.33    |       |

### 2.2.3 Indian Ocean Shark Catch

- 93) According to the IOTC, the total Shark Catch from the Indian Ocean between 2014 and 2016 was 318,079 mt (see Table 08). The total Shark Catch in the Indian Ocean ranged from 94,932 mt in 2014 to 112,053 mt in 2016. The average Shark Catch in the Indian Ocean during this period was 106,026 mt (see Table 08).

**Table 8 The relative contribution of directed and non-directed fisheries to the Shark Catch in Sri Lanka between 2014 and 2016**

|               | Total IO Shark Catch | Sri Lanka Shark Catch |      |                |       |              |       |
|---------------|----------------------|-----------------------|------|----------------|-------|--------------|-------|
|               |                      | Total                 |      | EEZ            |       | BEEZ         |       |
| Years         | mt                   | mt                    | %    | mt             | %     | mt           | %     |
| 2014          | 94,932.0             | 2,761.0               | 2.9% | 1,984.9        | 71.9% | 776.1        | 28.1% |
| 2015          | 111,094.0            | 2,130.9               | 1.9% | 1,740.9        | 81.7% | 390.0        | 18.3% |
| 2016          | 112,053.0            | 2,771.4               | 2.5% | 2,496.1        | 90.1% | 275.3        | 9.9%  |
| <b>Totals</b> | <b>318,079.0</b>     | 7,663.3               | 2.4% | 6,221.9        | 81.2% | 1,441.4      | 18.8% |
| <i>Av.</i>    | <i>106,026.3</i>     | <i>1,915.8</i>        |      | <i>1,555.5</i> |       | <i>360.3</i> |       |

- 94) Sri Lanka's contribution to the Indian Ocean Shark Catch was 7,663.3 mt between 2014 and 2016, equivalent to 2.4% of the total Shark Catch in the Indian Ocean over the three year period (see Table 08). More than 80% of Sri Lanka's total shark catch was landed from Sri Lankan waters (*i.e.* within the EEZ) between 2014 and 2016 (see Table 08).

### 2.2.4 EEZ & BEEZ Fisheries

- 95) As noted above a variety of fishing gears are deployed by Sri Lankan fishermen harvesting marine resources from Sri Lanka's EEZ and BEEZ. Handline fisheries, trolling, ring nets, gillnets and small scale and industrial longline fisheries are all associated with non-directed Shark Catch in Sri Lanka.
- 96) Gillnets were the predominate gear associated with Shark landings from Sri Lanka's EEZ and BEEZ fisheries between 2014 and 2017. 51.1% of the total Shark Catch from Sri Lanka's EEZ and BEEZ fisheries was landed by vessels operating gillnets between 2014 and 2017 (Table 09). Rays comprised 63.3% of the total Shark Catch from the EEZ and BEEZ gillnet fisheries, amounting to nearly two thirds of the gillnet Shark Catch (3,570.8mt) over the four year period (Table 09).

- 97) EEZ and BEEZ vessels operating longlines caught 34.8% of Sharks landed during the period. 79.9% of the longline Shark Catch comprised of shark species. These two gears combined – gillnet and longlines - accounted for 84.0% of Sri Lanka’s total non-directed Shark Catch from the EEZ and BEEZ fisheries between 2014 and 2017 (Table 09).

**Table 9 Total non-directed Shark Catch by gear type (2014 – 2017)**

| Fishery            | EEZ&BEEZ Shark Catch |       |                |       |                |       |
|--------------------|----------------------|-------|----------------|-------|----------------|-------|
|                    | All                  |       | Sharks         |       | Rays           |       |
| Gear Type          |                      |       |                |       |                |       |
| <b>Gillnet</b>     | 5,642.2              | 51.6% | 2,071.4        | 36.7% | 3,570.8        | 63.3% |
| <b>Longline</b>    | 3,989.4              | 36.5% | 3,187.4        | 79.9% | 802.0          | 20.1% |
| <b>Trolling</b>    | 304.8                | 2.8%  | 228.0          | 74.8% | 76.8           | 25.2% |
| <b>Handline</b>    | 192.4                | 1.8%  | 78.6           | 40.9% | 113.8          | 59.1% |
| <b>Ring Net</b>    | 492.1                | 4.5%  | 430.2          | 87.4% | 61.9           | 12.6% |
| <b>Beach Seine</b> | 321.6                | 2.9%  | 44.9           | 14.0% | 276.7          | 86.0% |
| <b>All Gears</b>   | <b>10,942.5</b>      |       | <b>6,040.5</b> | 55.2% | <b>4,902.0</b> | 44.8% |

- 98) Other gears – trolling (2.8%), handline (1.8%) ring nets (4.5%) and beach seine(2.9%) were responsible for landing the balance 16% of Sharks caught in Sri Lanka’s EEZ and BEEZ fisheries between 2014 and 2017 (see Table 9). Overall, shark species contributed 55.2% of the Shark Catch compared to ray species which contributed 44.8% of the catch from non-directed shark fishing gears (see Table 9).
- 99) Fisheries operating inside the EEZ contributed 84.7% (9,266.5 mt) of the total Shark Catch (see Table 10), with the balance contributed by fisheries operating BEEZ (15.3% / 1,676.0 mt)(see Table 10).

**Table 10 Total non-directed Shark Catch by gear type / fishery (2014 – 2017)**

| Gear Type          | All              |       | EEZ            |              | BEEZ           |              |
|--------------------|------------------|-------|----------------|--------------|----------------|--------------|
|                    |                  |       |                |              |                |              |
| <b>Gillnet</b>     | 5,642.22         | 51.6% | 4,956.48       | 87.8%        | 685.74         | 12.2%        |
| <b>Longline</b>    | 3,989.37         | 36.5% | 3,047.4        | 76.4%        | 941.98         | 23.6%        |
| <b>Trolling</b>    | 304.80           | 2.8%  | 287.5          | 94.3%        | 17.3           | 5.7%         |
| <b>Handline</b>    | 192.40           | 1.8%  | 184.4          | 95.8%        | 8              | 4.2%         |
| <b>Ring net</b>    | 492.14           | 4.5%  | 469.14         | 95.3%        | 23             | 4.7%         |
| <b>Beach Seine</b> | 321.60           | 2.9%  | 321.6          | 100.0%       | 0              | 0.0%         |
| <b>All Gears</b>   | <b>10,942.53</b> |       | <b>9,266.5</b> | <b>84.7%</b> | <b>1,676.0</b> | <b>15.3%</b> |



### 2.2.5 Gillnet Fishery (EEZ&BEEZ)

- 100) Drift gillnet fishing in EEZ waters and BEEZ is the main source of the large pelagic fish catch in Sri Lanka. The target species for the EEZ and BEEZ drift net fisheries is skipjack tuna (*K. pelamis*). Other IOTC target species caught using include yellowfin tuna (*T. albacares*), Indo-Pacific sailfish (*I. platypterus*), marlins (*Istiophoridae*) and swordfish (*X. gladius*). Other medium and large pelagics occasionally caught in the gillnet catch include dolphin fish (*Coryphaena hippurus*) and rainbow runners (*Elagatis bipinnulata*).
- 101) Drift gillnet fishing is carried out throughout the year, using small scale multi-day fishing vessels within and beyond Sri Lanka's EEZ (see Table 04 above). Draft gillnet fishing vessels operate from harbours along the western (*i.e.* Negombo and Beruwela), southern (*i.e.* Galle, Matara, Tangalle) and eastern (*i.e.* Valchenai, Trincomalee) coasts. Harbours to accommodate EEZ and BEEZ gillnet fishing vessels are currently under construction along the northern coast (*i.e.* Jaffna and Mannar). These harbours will become operational within the next few years.
- 102) Drift gillnet fishing accounted for 51.6% of the total Shark Catch, between 2014 and 2017 (Table 09). 87.8% of the gillnet Shark Catch was harvested from within Sri Lanka's EEZ, with the balance caught beyond the EEZ (Table 10).
- 103) Devil rays (RMM<sup>15</sup>) and not elsewhere identified (*nei*) rays, stingrays and manta rays were the most common species reported from EEZ and BEEZ gillnet fisheries comprising 32.3% and 30.9% of the catch respectively (see Table 10). 93% of the catch of devil rays and *nei* rays, stingrays and manta rays were caught in EEZ waters (Table 11).
- 104) Among the shark species landed by vessels operating gillnets in EEZ waters and BEEZ, silky shark (FAL) were the dominant species in the catch (18.6%). The second most common caught shark species was blue shark (BSH) (10.7%)(Table 11).
- 105) None of the other 15 shark species identified and mackerel/porbeagle sharks *nei* were present in the catch of vessels operating gillnets in EEZ waters and BEEZ at more than 1.6% of the gillnet catch (Table 11).
- 106) The majority of silky shark (FAL–81.4%) and of blue shark (BSH–81.2%) catch was landed by vessels operating gillnets in EEZ waters (Table 11).

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<sup>15</sup> See IOTC Shark Codes in Appendix III

**Table 11 Non directed Shark Catch landed by gillnet fisheries**

| 2014-2017                       | IOTC | Gillnet Fisheries |              |                 |              |               |              |
|---------------------------------|------|-------------------|--------------|-----------------|--------------|---------------|--------------|
|                                 |      | Total             |              | EEZ             |              | BEEZ          |              |
|                                 |      | mt                |              | mt              | %            | mt            | %            |
| <b>Shark Species List</b>       |      |                   |              |                 |              |               |              |
| Silky shark                     | FAL  | 1,050.80          | 18.6%        | 855.3           | 81.4%        | 195.5         | 18.6%        |
| Blue shark                      | BSH  | 604.8             | 10.7%        | 491.1           | 81.2%        | 113.7         | 18.8%        |
| Shortfin mako                   | SMA  | 91.1              | 1.6%         | 73.5            | 80.7%        | 17.6          | 19.3%        |
| Scalloped hammerhead            | SKH  | 90.3              | 1.6%         | 26.8            | 29.7%        | 63.5          | 70.3%        |
| Sharks various nei              | SPL  | 86.22             | 1.5%         | 58.38           | 67.7%        | 27.84         | 32.3%        |
| Longfin mako                    | LMA  | 60.8              | 1.1%         | 57.3            | 94.2%        | 3.5           | 5.8%         |
| Smooth hammerhead               | SPZ  | 38.9              | 0.7%         | 23.3            | 59.9%        | 15.6          | 40.1%        |
| Oceanic whitetip shark          | OCS  | 22.9              | 0.4%         | 22.9            | 100.0%       | 0             | 0.0%         |
| Spot-tail shark                 | CCQ  | 13.1              | 0.2%         | 13.1            | 100.0%       | 0             | 0.0%         |
| Great hammerhead shark          | SPK  | 7.1               | 0.1%         | 7.1             | 100.0%       | 0             | 0.0%         |
| Blacktip shark                  | CCI  | 2.9               | 0.1%         | 2.9             | 100.0%       | 0             | 0.0%         |
| Whale shark                     | RHN  | 2.4               | 0.0%         | 2.4             | 100.0%       | 0             | 0.0%         |
| Mackerel Sharks                 | SHM  | 0.1               |              | 0.1             | 100.0%       | 0             | 0.0%         |
| Blacktip reef shark             | BLR  | 0                 |              | 0               |              | 0             |              |
| Little Gulper Shark*            | CPU* | 0                 |              | 0               |              | 0             |              |
| Mackerel & porbeagles nei       | MSK  | 0                 |              | 0               |              | 0             |              |
| Silvertip shark                 | ALS  | 0                 |              | 0               |              | 0             |              |
| <b><i>Shark Species All</i></b> |      | <b>2,071.42</b>   | <b>36.7%</b> | <b>1,634.18</b> | <b>78.9%</b> | <b>437.24</b> | <b>21.1%</b> |
| <b>Ray Species List</b>         |      |                   |              |                 |              |               |              |
| Devil Ray                       | RMM  | 1819.9            | 32.3%        | 1665.5          | 91.5%        | 154.4         | 8.5%         |
| Rays, stingrays & mantas nei    | SRX  | 1746.1            | 30.9%        | 1653.8          | 94.7%        | 92.3          | 5.3%         |
| Eagle Rays                      | EAG  | 3.00              | 0.1%         | 3.00            | 100.0%       | 0             |              |
| Giant Manta                     | RMB  | 1.80              |              | 0.00            |              | 1.8           | 100%         |
| <b><i>Ray Species All</i></b>   |      | <b>3,570.80</b>   | <b>63.3%</b> | <b>3,322.30</b> | <b>93.0%</b> | <b>248.5</b>  | <b>7.0%</b>  |
|                                 |      |                   |              |                 |              |               |              |
| <b>Total Sharks</b>             |      | <b>5,642.22</b>   |              | <b>4,956.48</b> | <b>87.8%</b> | <b>685.74</b> | <b>12.2%</b> |

## 2.2.6 Longline Fishery (EEZ&BEEZ)

- 107) Sri Lanka's longline (only) fishing fleet operates drifting longline in Sri Lanka's EEZ and BEEZ. The target species are deep-water dwelling large yellowfin (*T. albacares*) and bigeye (*T. obesus*) tuna. Indo-Pacific sailfish (*I. platypterus*), marlins (Istiophoridae) and swordfish (*X. gladius*) are also common features of the catch.
- 108) The longline fishery operates throughout the year, using multi-day fishing vessels within and beyond Sri Lanka's EEZ (see Table 04 above). In 2016 out of the 1536 authorized to operate BEEZ, only 1461 vessels were active. The majority of authorized vessels are of 10.3m to 15m in length, while 14 vessels are 15m-24m length range. Longline fishing vessels operate mainly from harbours along the western coast (*i.e.* Negombo and Dikowita) during the northeast monsoon (October to March). These vessels operate from harbours on the each coast (Trincomalee) during the south west monsoon (April to September). A smaller number of longline only vessels operate from Beruwela (Western Province) and Galle, Matara and Tangalle (Southern Province).
- 109) Longline fishing accounted for 36.5% of the total Shark catch, between 2014 and 2017 (Table 09). 76.4% of longline Shark catch was harvested by vessels operating longlines within Sri Lanka's EEZ (Table 12).
- 110) Blue shark (BSH) was the most common species reported from longline fishery contributing 45.5% of the longline Shark Catch (see Table 11). Silky shark (FAL) was the next most common species caught by vessels operating longlines in the EEZ and BEEZ (21.2%), followed by rays, stingrays & mantas *nei* (SRX – 12.5%), giant manta rays (RMB – 6.2%) and longfin mako (LMA – 5.4%) (see Table 12).
- 111) None of the other shark species identified or Sharks mackerel/porbeagles *nei* were present in the catch of vessels operating longlines in EEZ waters or on the BEEZ at more than 2.2% of the longline catch (see Table 12).
- 112) The majority of two most commonly caught shark species, blue shark (BSH – 77.2%), silky shark (FAL – 73.3%) and were landed by vessels operating longlines gear in Sri Lanka's EEZ (see Table 12).

**Table 12 Non directed Shark Catch landed by longline fisheries**

| 2014 - 2017                  | Code | Longline Fisheries |              |                |              |              |              |
|------------------------------|------|--------------------|--------------|----------------|--------------|--------------|--------------|
|                              |      | Total              |              | EEZ            |              | BEEZ         |              |
|                              |      | mt                 | %            | mt             | %            | mt           | %            |
| <b>Shark Species List</b>    |      |                    |              |                |              |              |              |
| Blue shark                   | BSH  | 1,816.6            | 45.5%        | 1,401.6        | 77.2%        | 415.0        | 22.8%        |
| Silky shark                  | FAL  | 847.1              | 21.2%        | 621.0          | 73.3%        | 226.1        | 26.7%        |
| Longfin mako                 | LMA  | 215.6              | 5.4%         | 212.3          | 98.5%        | 3.3          | 1.5%         |
| Smooth hammerhead            | SPZ  | 95.1               | 2.4%         | 41.2           | 43.3%        | 53.9         | 56.7%        |
| Spot-tail shark              | CCQ  | 82.2               | 2.1%         | 52.6           | 64.0%        | 29.6         | 36.0%        |
| Sharks various nei           | SKH  | 55.1               | 1.4%         | 13.0           | 23.6%        | 42.1         | 76.4%        |
| Great hammerhead shark       | SPK  | 40.3               | 1.0%         | 20.3           | 50.4%        | 20.0         | 49.6%        |
| Shortfin mako                | SMA  | 15.5               | 0.4%         | 15.5           | 100.0%       | 0.0          | 0.0%         |
| Little Gulper Shark*         | CPU* | 10.3               | 0.3%         | 10.3           | 100.0%       | 0.0          | 0.0%         |
| Silvertip shark              | ALS  | 4.2                | 0.1%         | 4.2            | 100.0%       | 0.0          | 0.0%         |
| Blacktip reef shark          | BLR  | 3.4                | 0.1%         | 3.4            | 100.0%       | 0.0          | 0.0%         |
| Oceanic whitetip shark       | OCS  | 2.0                | 0.1%         | 2.0            | 100.0%       | 0.0          | 0.0%         |
| Scalloped hammerhead         | SPL  | 0.0                |              | 0.0            |              | 0.0          |              |
| Blacktip shark               | CCI  | 0.0                |              | 0.0            |              | 0.0          |              |
| Whale shark                  | RHN  | 0.0                |              | 0.0            |              | 0.0          |              |
| Mackerel Sharks              | SHM  | 0.0                |              | 0.0            |              | 0.0          |              |
| Mackerel & porbeagles nei    | MSK  | 0.0                |              | 0.0            |              | 0.0          |              |
| <b>Shark Species All</b>     |      | <b>3,187.4</b>     | <b>79.9%</b> | <b>2,397.4</b> | <b>75.2%</b> | <b>790.0</b> | <b>24.8%</b> |
| <b>Ray Species List</b>      |      |                    |              |                |              |              |              |
| Rays, stingrays & mantas nei | SRX  | 500.1              | 12.5%        | 423.3          | 84.6%        | 76.8         | 15.4%        |
| Giant Manta                  | RMB  | 249.2              | 6.2%         | 174.7          | 70.1%        | 74.5         | 29.9%        |
| Devil Ray                    | RMM  | 52.0               | 1.3%         | 52.0           | 100.0%       | 0.0          |              |
| Eagle Rays                   | EAG  | 0.7                |              | 0.0            |              | 0.7          | 100.0%       |
| <b>Ray Species All</b>       |      | <b>802.0</b>       | <b>20.1%</b> | <b>650.0</b>   | <b>81.0%</b> | <b>152.0</b> | <b>19.0%</b> |
| <b>Sub Totals Sharks</b>     |      | <b>3,989.4</b>     |              | <b>3,047.4</b> | <b>76.4%</b> | <b>942.0</b> | <b>23.6%</b> |

### 2.2.7 Trolling Fishery (EEZ)

- 113) Trolling fisheries are important fisheries all around the coast of Sri Lanka. Historically they predate motorization of the country's fishing craft, which commenced in the 1950s. Prior to motorization trolling was practiced by Sri Lankan fishermen using sailing outrigger canoes extending up to as much as 20 km from the shore.
- 114) After motorization trolling became a popular form of fishing for kawakawa / mackerel tuna (*Euthynnus affinis*), frigate tuna (*A. thazard*) and bullet tuna (*A. rochei*). In some areas troll fisheries also target yellowfin (*T. albacares*), skipjack tuna (*K. pelamis*) and for Spanish mackerel (*Scomberomorus sp.*).
- 115) Troll fisheries operated by motorized traditional and OFRP boats are seasonal in coastal waters, while troll fisheries operated by small scale one-day and multi-day fishing vessels within Sri Lanka's EEZ operate throughout the year (see Table 4 above).
- 116) Trolling accounted for only 2.8% of the total Shark Catch between 2014 and 2017 (Table 09). 94% of the trolling Shark Catch was harvested by vessels operating longline within Sri Lanka's EEZ (Table 10).
- 117) Blue shark (BSH) was the most common species reported from trolling fishery contributing 51.7% of the trolling Shark Catch. Silky shark (FAL – 21.9%) was the next most common species caught by vessels operating trolling lines within the EEZ and BEEZ, followed by devil rays (RMM –17.7%), rays, stingrays & mantas *nei* (SRX – 7.5%) (See Table 13).
- 118) None of the other Shark species identified in the catch of vessels operating trolling lines in EEZ waters or BEEZ occurred at more than 1% of the trolling catch (see Table 13).
- 119) All two most commonly caught shark species, blue shark (BSH) and silky shark (FAL), were landed by vessels operating trolling gear in EEZ waters (Table 13).

**Table 13 Non directed Shark Catch landed by trolling fisheries**

| 2014 - 2017                     | Code | Trolling Fisheries |              |              |               |             |               |
|---------------------------------|------|--------------------|--------------|--------------|---------------|-------------|---------------|
|                                 |      | Total              |              | EEZ          |               | BEEZ        |               |
|                                 |      | mt                 |              | mt           | %             | mt          | %             |
| <b>Shark Species List</b>       |      |                    |              |              |               |             |               |
| Blue shark                      | BSH  | 157.6              | 51.7%        | 157.6        | 100.0%        | 0           | 0.00%         |
| Silky shark                     | FAL  | 66.8               | 21.9%        | 66.8         | 100.0%        | 0           | 0.00%         |
| Sharks various nei              | SKH  | 3.1                | 1.0%         | 3.1          | 100.0%        | 0           | 0.00%         |
| Smooth hammerhead               | SPZ  | 0.3                | 0.1%         | 0.3          | 100.0%        | 0           | 0.00%         |
| Longfin mako                    | LMA  | 0.1                | 0.0%         | 0.1          | 100.0%        | 0           | 0.00%         |
| Oceanic whitetip shark          | OCS  | 0.1                | 0.0%         | 0            | 0.0%          | 0.1         | 100.00%       |
| Great hammerhead shark          | SPK  | 0                  |              | 0            |               | 0           |               |
| Scalloped hammerhead            | SPL  | 0                  |              | 0            |               | 0           |               |
| Shortfin mako                   | SMA  | 0                  |              | 0            |               | 0           |               |
| Whale shark                     | RHN  | 0                  |              | 0            |               | 0           |               |
| Mackerel Sharks                 | SHM  | 0                  |              | 0            |               | 0           |               |
| Spot-tail shark                 | CCQ  | 0                  |              | 0            |               | 0           |               |
| Blacktip shark                  | CCI  | 0                  |              | 0            |               | 0           |               |
| Blacktip reef shark             | BLR  | 0                  |              | 0            |               | 0           |               |
| Little Gulper Shark*            | CPU* | 0                  |              | 0            |               | 0           |               |
| Mackerel & porbeagles nei       | MSK  | 0                  |              | 0            |               | 0           |               |
| Silvertip shark                 | ALS  | 0                  |              | 0            |               | 0           |               |
| <b><i>Shark Species All</i></b> |      | <b>228</b>         | <b>74.8%</b> | <b>227.9</b> | <b>100.0%</b> | <b>0.1</b>  | <b>0.04%</b>  |
| <b>Ray Species List</b>         |      |                    |              |              |               |             |               |
| Devil Ray                       | RMM  | 53.9               | 17.7%        | 36.7         | 68.1%         | 17.2        | 31.91%        |
| Rays, stingrays & mantas nei    | SRX  | 22.9               | 7.5%         | 22.9         | 100.0%        | 0           | 0.00%         |
| Eagle Rays                      | EAG  | 0                  |              | 0            |               | 0           |               |
| Giant Manta                     | RMB  | 0                  |              | 0            |               | 0           |               |
| <b><i>Ray Species All</i></b>   |      | <b>76.8</b>        | <b>25.2%</b> | <b>59.6</b>  | <b>77.6%</b>  | <b>17.2</b> | <b>22.40%</b> |
| <b><i>Sub Totals Sharks</i></b> |      |                    |              |              |               |             |               |
|                                 |      | <b>304.8</b>       |              | <b>287.5</b> | <b>94.3%</b>  | <b>17.3</b> | <b>5.68%</b>  |

### 2.2.8 Handline Fishery (EEZ)

- 120) Handlining with dead or live bait is one of the oldest and simplest line fishing gears practiced in Sri Lanka<sup>16</sup>. Handline fisheries for yellowfin (*T. albacares*) and bigeye tuna (*T. obesus*) using squid as bait are operated at depths of 200 to 300 m (*ibid*).
- 121) Drift handlining with dead bait for Spanish mackerel (*Scomberomorus sp.*), queen fish (Sciaenidae) and trevally (*Caranx*) takes place over the continental shelf. Drift longline with live bait is used to target Spanish mackerel, Indo-pacific sailfish (*Istiophorus platypterus*), swordfish (*Xiphias gladius*) and yellowfin tuna (*T. albacares*) beyond the continental shelf (*ibid*).
- 122) Handlines are operated by fishermen using non-motorized and motorized traditional fishing boats and OFRP boats (see Table 04 above) from landing centers and harbours along the eastern, southern and western coasts of Sri Lanka. Handline fisheries in Sri Lanka are seasonal on account of the small size of the vessels and the influence of the south west and north east monsoons.
- 123) Handling accounted for only 1.8% of the total Shark Catch between 2014 and 2017 (see Table 09). 95.8% of the Shark catch landed by fishermen operating handlines was harvested from vessels fishing in Sri Lanka's EEZ (Table 14).
- 124) Rays, stingrays & mantas *nei* (SRX) were the most common species reported from handline fishery, contributing 33.0% of the handline Shark Catch. Devil rays (RMM – 25.9%), followed by silky shark (FAL – 16.2%), blue sharks (BSH – 15.4%), Scalloped hammerhead (SPL-4.5%) and Sharks various *nei*(SKH-3.4%) were the next most common species caught by vessels operating handlines in EEZ waters and on the BEEZ (see Table 14).
- 125) None of the other Shark species identified in the catch of vessels operating handlines in EEZ waters or on the BEEZ were present at more than 1% of the handline catch (Table 14).
- 126) More than 95% of Rays, stingrays & mantas *nei* (SRX) catch and all of the blue shark (BSH) and silky shark (FAL) catch was landed by vessels operating handlines in EEZ waters (Table 14).

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<sup>16</sup> Fishing Craft & Gear of Sri Lanka DFAR, FAO Marine Fisheries Management Project, Colombo Sri Lanka 1995

**Table 14 Non directed Shark Catch landed by handline fisheries**

| 2014 - 2017                     | Code | Handline Fisheries |              |              |               |            |             |
|---------------------------------|------|--------------------|--------------|--------------|---------------|------------|-------------|
|                                 |      | Total              |              | EEZ          |               | BEEZ       |             |
|                                 |      | mt                 | %            | mt           | %             | mt         | %           |
| <b>Shark Species List</b>       |      |                    |              |              |               |            |             |
| Silky shark                     | FAL  | 31.1               | 16.2%        | 31.1         | 100.0%        | 0          | 0.0%        |
| Blue shark                      | BSH  | 29.7               | 15.4%        | 29.7         | 100.0%        | 0          | 0.0%        |
| Scalloped hammerhead            | SPL  | 8.6                | 4.5%         | 8.6          | 100.0%        | 0          | 0.0%        |
| Sharks various nei              | SKH  | 6.6                | 3.4%         | 6.6          | 100.0%        | 0          | 0.0%        |
| Smooth hammerhead               | SPZ  | 2                  | 1.0%         | 2            | 100.0%        | 0          | 0.0%        |
| Longfin mako                    | LMA  | 0.6                | 0.3%         | 0.6          | 100.0%        | 0          | 0.0%        |
| Oceanic whitetip shark          | OCS  | 0                  |              | 0            |               | 0          |             |
| Whale shark                     | RHN  | 0                  |              | 0            |               | 0          |             |
| Shortfin mako                   | SMA  | 0                  |              | 0            |               | 0          |             |
| Great hammerhead shark          | SPK  | 0                  |              | 0            |               | 0          |             |
| Mackerel Sharks                 | SHM  | 0                  |              | 0            |               | 0          |             |
| Spot-tail shark                 | CCQ  | 0                  |              | 0            |               | 0          |             |
| Blacktip shark                  | CCI  | 0                  |              | 0            |               | 0          |             |
| Blacktip reef shark             | BLR  | 0                  |              | 0            |               | 0          |             |
| Little Gulper Shark*            | CPU* | 0                  |              | 0            |               | 0          |             |
| Mackerel and porbeagles nei     | MSK  | 0                  |              | 0            |               | 0          |             |
| Silvertip shark                 | ALS  | 0                  |              | 0            |               | 0          |             |
| <b><i>Shark Species All</i></b> |      | <b>78.6</b>        | <b>40.9%</b> | <b>78.6</b>  | <b>100.0%</b> | <b>0</b>   | <b>0.0%</b> |
| <b>Ray Species List</b>         |      |                    |              |              |               |            |             |
| Rays, stingrays & mantas nei    | SRX  | 63.5               | 33.0%        | 61.5         | 96.9%         | 2.0        | 3.1%        |
| Devil Ray                       | RMM  | 49.9               | 25.9%        | 43.9         | 88.0%         | 6.0        | 12.0%       |
| Eagle Rays                      | EAG  | 0.4                | 0.2%         | 0.4          | 100.0%        | 0.0        |             |
| Giant Manta                     | RMB  | 0                  |              | 0            |               | 0.0        |             |
| <b><i>Ray Species All</i></b>   |      | <b>113.8</b>       | <b>59.1%</b> | <b>105.8</b> | <b>93.0%</b>  | <b>8.0</b> | <b>7.0%</b> |
| <b><i>Total Sharks</i></b>      |      | <b>192.4</b>       |              | <b>184.4</b> | <b>95.8%</b>  | <b>8.0</b> | <b>4.2%</b> |



### 2.2.9 Ring Net Fishery (EEZ & BEEZ)

- 127) Seasonal ring net fisheries operate off southwestern coast of Sri Lanka targeting small pelagics such as herrings, anchovy, scad, mackerels and squid, while ring net fisheries for small and medium pelagics including frigate tuna (*A. thazard*), half beaks (Hemiramphidae), bullet tuna (*A. rochei*), queen fish (Sciaenidae) and trevally (*Caranx*) are common off the southwestern, southern and eastern coasts<sup>17</sup>.
- 128) Ring net fisheries are also seasonal (*ibid*). Fishermen deploy ring nets in coastal and EEZ waters using small scale single-day and multiday vessels. Ring nets are set using motorized traditional and FRP boats (see Table 04 above).
- 129) Ring net fishing accounted for 4.5% of the total Shark Catch between 2014 and 2017 (Table 09). 95.3% of the Shark Catch landed by fishermen operating ring nets in Sri Lanka's EEZ (Table 10).
- 130) Silky shark (FAL) was the main species observed in the catch of vessels operating ring nets, comprising 35.9% of the catch. Scalloped hammerhead (SPL - 17.9%), Blue shark (BSH-15.8%), Sharks various *nei* (SKH – 12.8%), followed rays, stingrays & mantas *nei* (SRX – 8.5%) and devil rays (RMM – 4.1% were the next most common species in the ring net Shark Catch (Table 15).
- 131) None of the other Shark species identified in the catch of vessels operating ring nets in Sri Lanka's EEZ waters or BEEZ were present at more than 3% of the ring net catch (Table 15).
- 132) 96.5% of the silky shark (FAL) and more than 97.6% of the rays, stingrays & mantas *nei* (SRX) catch was landed by vessels operating ring nets in Sri Lanka's EEZ (Table 15).

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<sup>17</sup>Fishing Craft & Gear of Sri Lanka DFAR, FAO Marine Fisheries Management Project, Colombo Sri Lanka 1995

**Table 15 Non directed Shark Catch by ring net fisheries**

| 2014 - 2017                     | Code | Ring Net     |              |              |              |             |             |
|---------------------------------|------|--------------|--------------|--------------|--------------|-------------|-------------|
|                                 |      | Total        |              | EEZ          |              | BEEZ        |             |
|                                 |      | mt           | %            | mt           | %            | mt          | %           |
| <b>Shark Species List</b>       |      |              |              |              |              |             |             |
| Silky shark                     | FAL  | 176.8        | 35.9%        | 170.7        | 96.5%        | 6.1         | 3.5%        |
| Scalloped hammerhead            | SPL  | 87.9         | 17.9%        | 86.3         | 98.2%        | 1.6         | 1.8%        |
| Blue shark                      | BSH  | 77.5         | 15.8%        | 77.3         | 99.7%        | 0.26        | 0.3%        |
| Sharks various nei              | SKH  | 63.1         | 12.8%        | 58.9         | 93.3%        | 4.24        | 6.7%        |
| Smooth hammerhead               | SPZ  | 14.9         | 3.0%         | 5.9          | 39.6%        | 9           | 60.4%       |
| Mackerel & porbeagles nei       | MSK  | 5.5          | 1.1%         | 5.5          | 100.0%       | 0           | 0.0%        |
| Shortfin mako                   | SMA  | 4.4          | 0.9%         | 3.6          | 81.9%        | 0.8         | 18.1%       |
| Longfin mako                    | LMA  | 0            |              | 0            |              | 0           |             |
| Oceanic whitetip shark          | OCS  | 0            |              | 0            |              | 0           |             |
| Whale shark                     | RHN  | 0            |              | 0            |              | 0           |             |
| Great hammerhead shark          | SPK  | 0            |              | 0            |              | 0           |             |
| Mackerel Sharks                 | SHM  | 0            |              | 0            |              | 0           |             |
| Spot-tail shark                 | CCQ  | 0            |              | 0            |              | 0           |             |
| Blacktip shark                  | CCI  | 0            |              | 0            |              | 0           |             |
| Blacktip reef shark             | BLR  | 0            |              | 0            |              | 0           |             |
| Little Gulper Shark*            | CPU* | 0            |              | 0            |              | 0           |             |
| Silvertip shark                 | ALS  | 0            |              | 0            |              | 0           |             |
| <b><i>Shark Species All</i></b> |      | <b>430.2</b> | <b>87.4%</b> | <b>408.2</b> | <b>94.9%</b> | <b>22</b>   | <b>5.1%</b> |
| <b>Ray Species List</b>         |      |              |              |              |              |             |             |
| Rays, stingrays & mantas nei    | SRX  | 41.7         | 8.5%         | 40.7         | 97.6%        | 1.0         | 2.4%        |
| Devil Ray                       | RMM  | 20.2         | 4.1%         | 20.2         | 100.0%       | 0.0         | 0.0%        |
| Eagle Rays                      | EAG  | 0            |              | 0            |              | 0.0         |             |
| Giant Manta                     | RMB  | 0            |              | 0            |              | 0.0         |             |
| <b><i>Ray Species All</i></b>   |      | <b>61.9</b>  | <b>12.6%</b> | <b>60.9</b>  | <b>98.4%</b> | <b>1.0</b>  | <b>1.6%</b> |
| <b><i>Total Sharks</i></b>      |      | <b>492.1</b> |              | <b>469.1</b> | <b>95.3%</b> | <b>23.0</b> | <b>4.7%</b> |

### 2.2.10 Beach Seine Fishery (EEZ)

- 133) The beach seine fishery is one of the oldest fisheries in Sri Lanka<sup>18</sup>. Up to the introduction of outboard motors in the 1950s it was the most important fishery, contributing as much as 40% of the total catch (ibid). Beach seine fishing is confined to relatively shallow coastal waters up to a distance of 1.5 km from the shore. The gear can be operated only on relatively calm days, so the fishery is highly seasonal.
- 134) The beach seine accounted for 2.9% of the total Shark Catch between 2014 and 2017 (see Table 09). All the Shark Catch landed by fishermen operating beach seine was harvested by vessels fishing within Sri Lanka's EEZ (Table 16).
- 135) Rays and stingrays & mantas nei (SRX) were the main species observed in the catch of vessels operating beach seine, comprising 61.1% of the catch. Devil rays (RMM – 24.9%) and Sharks various nei (SKH – 14.0%) were the next most common species in the beach seine fishery Shark Catch (Table 16).
- 136) No other Shark species identified in the catch of vessels operating beach seines in EEZ waters. All the shark and ray catch was landed by vessels operating beach seines in Sri Lanka's EEZ (Table 16).

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<sup>18</sup>Fishing Craft & Gear of Sri Lanka DFAR, FAO Marine Fisheries Management Project, Colombo Sri Lanka 1995

**Table 16 Non directed Shark Catch by beach seine fisheries**

| 2014 - 2017                      | Code | Beach Seine Fisheries |              |              |      |          |   |
|----------------------------------|------|-----------------------|--------------|--------------|------|----------|---|
|                                  |      | Total                 |              | EEZ          |      | BEEZ     |   |
|                                  |      | mt                    | %            | mt           | %    | mt       | % |
| <b>Shark Species List</b>        |      |                       |              |              |      |          |   |
| Sharks various nei               | SKH  | 44.9                  | 14.0%        | 44.9         | 100% | 0.0      |   |
| Blue shark                       | BSH  | 0                     |              | 0            |      | 0.0      |   |
| Silky shark                      | FAL  | 0.0                   |              | 0.0          |      | 0.0      |   |
| Longfin mako                     | LMA  | 0.0                   |              | 0.0          |      | 0.0      |   |
| Oceanic whitetip shark           | OCS  | 0.0                   |              | 0.0          |      | 0.0      |   |
| Whale shark                      | RHN  | 0.0                   |              | 0.0          |      | 0.0      |   |
| Shortfin mako                    | SMA  | 0.0                   |              | 0.0          |      | 0.0      |   |
| Great hammerhead shark           | SPK  | 0.0                   |              | 0.0          |      | 0.0      |   |
| Scalloped hammerhead             | SPL  | 0.0                   |              | 0.0          |      | 0.0      |   |
| Smooth hammerhead                | SPZ  | 0.0                   |              | 0.0          |      | 0.0      |   |
| Mackerel Sharks                  | SHM  | 0.0                   |              | 0.0          |      | 0.0      |   |
| Spot-tail shark                  | CCQ  | 0.0                   |              | 0.0          |      | 0.0      |   |
| Blacktip shark                   | CCI  | 0.0                   |              | 0.0          |      | 0.0      |   |
| Blacktip reef shark              | BLR  | 0.0                   |              | 0.0          |      | 0.0      |   |
| Little Gulper Shark*             | CPU* | 0.0                   |              | 0.0          |      | 0.0      |   |
| Sharks mackerel & porbeagles nei | MSK  | 0.0                   |              | 0.0          |      | 0.0      |   |
| Silvertip shark                  | ALS  | 0.0                   |              | 0.0          |      | 0.0      |   |
| <b><i>Shark Species All</i></b>  |      | <b>44.9</b>           | <b>14.0%</b> | <b>44.9</b>  | 100% | <b>0</b> |   |
| <b>Ray Species List</b>          |      |                       |              |              |      |          |   |
| Rays and stingrays & mantas nei  | SRX  | 196.5                 | 61.1%        | 196.5        | 100% | 0.0      |   |
| Devil Ray                        | RMM  | 80.2                  | 24.9%        | 80.2         | 100% | 0.0      |   |
| Eagle Rays                       | EAG  | 0.0                   |              | 0.0          |      | 0.0      |   |
| Giant Manta                      | RMB  | 0.0                   |              | 0.0          |      | 0.0      |   |
| <b><i>Ray Species All</i></b>    |      | <b>276.7</b>          | <b>86.0%</b> | <b>276.7</b> | 100% | <b>0</b> |   |
| <b><i>Total Sharks</i></b>       |      | <b>321.6</b>          |              | <b>321.6</b> | 100% | <b>0</b> |   |

### **3.0 Identification of Key Shark Species / Key Fisheries (2014 – 2017)**

- 137) To move beyond the broad-based measures for the general, overall conservation and management for Sharks outlines and successfully implemented in the SLNPOA – Sharks 2013 – 2017, it is necessary to identify the key Shark species and the key fisheries that contribute to the Shark Catch from directed and non-directed Shark fisheries in Sri Lanka. Having identified both the key species and key fisheries, then species specific / fishery specific conservation and management measures can be formulated and implemented under the SLNPOA-Sharks (2018 – 2022). Such measures will lead to the effective conservation and management of Sharks in Sri Lanka, which is the desired outcome of all stakeholders of Sri Lanka’s fishery sector.

#### **3.1 Key Species for Conservation**

- 138) Five shark species, belonging to three families are protected by existing laws in Sri Lanka. Three species of thresher shark (*i.e. Alopius vulpinus*, *A. superciliosus* and *A. pelagicus*) are protected under the Shark Fisheries Management Regulation, 2015 (Gazette No. 1938/2 of 26 October 2015) also prohibits fishing operations in Sri Lankan waters for the Oceanic white-tip shark (*Carcharhinus longimanus*) and the Whale shark (*Rhincodon typus*).
- 139) No data or information was reported for thresher shark catch or discards were reported between 2014 and 2016, following the prohibition thresher shark fishing in 2012. 78 mt of oceanic white-tip shark were reported in the catch from EEZ and BEEZ vessels between 2014 – 16, with roughly equal amounts being landed by EEZ (46%) and BEEZ (54%) vessels. Gillnets were responsible for 100% of the oceanic white-tip shark landed from the EEZ fishery, while longlines were the main gear associated with landings from the BEEZ fishery.
- 140) A catch of 2.4 mt of whale shark was recorded from the EEZ gillnet fishery in 2015. Four young whale sharks were entangled in gill nets and all four were dead and discarded. This information has been reported to IOTC in the annual data submission under discards.

- 141) Conservation measures will be monitored for compliance for the following key species / key fisheries, under the SLNPOA-Sharks (2018 – 2022).

| <b>Species</b>   | <b>Code</b> | <b>Key Fisheries</b> | <b>Key Gears</b>   |
|--|-------------|----------------------|--------------------|
| <b>I. Common thresher shark</b><br><i>Alopius vulpinus</i>           | THR         | EEZ / BEEZ           | Gillnet / Longline |
| <b>II. Bigeye thresher shark</b><br><i>A. superciliosus</i>          | BTH         | EEZ / BEEZ           | Gillnet / Longline |
| <b>III. Pelagic thresher shark</b><br><i>A. pelagicus</i>            | PTH         | EEZ / BEEZ           | Gillnet / Longline |
| <b>IV. Oceanic white-tip shark</b><br><i>Carcharhinus longimanus</i> | OCS         | EEZ / BEEZ           | Gillnet / Longline |
| <b>V. Whale shark</b><br><i>Rhincodon typus</i>                      | RHN         | EEZ / BEEZ           | Gillnet / Longline |

### 3.2 Key Species for Management (Directed Fisheries)

- 142) Several species of stingray (*e.g.* pale-edged stingray (*D. zugei*), blue-spotted stingray (*D. kuhlii*), whiptail stingray (*D. brevis*), honeycomb ray (*Himantura uarnak*), manta, devil and eagle rays (Myliobatidae), Rhinoptera (Javanese cownose ray - *Rhinoptera javanica*) are targeted by fishermen, operating motorized boats off the northwestern coast.
- 143) Little gulper shark (*Centrophorus uyato*) is targeted by small fisheries in several locations around the island. This is the only Shark species out of the 64 IOTC Shark species (see Appendix IV) associated with Directed Shark fisheries in Sri Lanka. No data is available on the stock status of little gulper shark (*Centrophorus uyato*) in Sri Lanka. Without data describing the stock status of the main Shark species caught by Directed Shark fisheries, it is not possible to design, develop and implementation of conservation and management measures for these stocks in Sri Lanka.
- 144) In view of the absence of data on any of the Shark species targeted by Sri Lankan fishermen in several fisheries around the country, it is proposed that data be collected that will permit management measures to be designed, developed and implemented for one or more key Shark species targeted by one or more fishery, under the second SLNPOA-Sharks (2018 - 2022).

### 3.3 Key Species for Management (Non-Directed Fisheries)

- 145) A breakdown of the Shark Catch from Sri Lanka’s EEZ and BEEZ fisheries by species reveals that 18 out of the 64 IOTC Shark species (see AppendixIV) species were identified in the non-directed Shark Catch between 2014 and 2017 (Table 17).
- 146) Silky shark (FAL) was the main species observed in the total non-directed Shark Catch from the EEZ and BEEZ fisheries (28.7%). Devils rays (RMM–23.1%) were the next most important component of the non-directed Shark Catch, followed by rays, stingrays & mantas *nei* (SRX – 21.2%), blue shark (BSH –15.7%), Sharks various *nei* (SKH- 3.8%) and Scalloped hammerhead (SPL- 2.4%) (Table 17).
- 147) None of the other Shark species were present above 1.7% of the total Shark Catch (see Table 17). There is no data on the stock status of devils rays (RMM) or rays, stingrays & mantas in Sri Lanka, or on the IUCN’s *Red List* or on *FishBase*. It is proposed that management measures will be designed, developed and implemented for the following key species and key non-directed fisheries, under the SLNPOA-Sharks (2018 - 2022).

| Main Species  | Code | Key Fisheries | Key Gears                     |
|---|------|---------------|-------------------------------|
| <b>Silky Shark</b><br><i>Carcharhinus falciformis</i>               | FAL  | EEZ           | Longline / Gillnet            |
| <b>Blue Shark</b><br><i>Prionace glauca</i>                         | BSH  | EEZ           | Longline / Gillnet / Trolling |
| <b>Devil Rays</b><br>Mobulidae                                      | RMM  | EEZ           | Gillnet / Longline            |
| <b>Rays/Stingrays/Manta <i>nei</i></b><br>Mobulidae / Myliobatoidei | SRX  | EEZ           | Gillnet / Longline            |

**Table 17 Total non-directed Shark Catch 2014 – 2017**

| 2014 - 2017                      | Code | Shark Species caught from by all gears |              |                 |              |                 |              |
|----------------------------------|------|--|--------------|-----------------|--------------|-----------------|--------------|
|                                  |      | Total                                  |              | EEZ             |              | BEEZ            |              |
| Shark Species List               |      | mt                                     | %            | mt              | %            | mt              | %            |
| Silky shark                      | FAL  | <b>3,142.1</b>                         | 28.7%        | 2,525.50        | 80.4%        | 616.6           | 19.6%        |
| Blue shark                       | BSH  | <b>1,716.8</b>                         | 15.7%        | 1376.7          | 80.2%        | 340.06          | 19.8%        |
| Sharks various nei               | SKH  | <b>420.6</b>                           | 3.8%         | 349.61          | 83.1%        | 71.01           | 16.9%        |
| Scalloped hammerhead             | SPL  | <b>268.1</b>                           | 2.4%         | 208.98          | 78.0%        | 59.07           | 22.0%        |
| Shortfin mako                    | SMA  | <b>190.7</b>                           | 1.7%         | 118.33          | 62.0%        | 72.38           | 38.0%        |
| Smooth hammerhead                | SPZ  | <b>96.4</b>                            | 0.9%         | 51.83           | 53.7%        | 44.6            | 46.3%        |
| Oceanic whitetip shark           | OCS  | <b>78.0</b>                            | 0.7%         | 35.9            | 46.0%        | 42.1            | 54.0%        |
| Longfin mako                     | LMA  | <b>76.9</b>                            | 0.7%         | 73.36           | 95.4%        | 3.5             | 4.6%         |
| Spot-tail shark                  | CCQ  | <b>13.1</b>                            | 0.1%         | 13.1            | 100.0%       | 0               |              |
| Little Gulper Shark*             | CPU* | <b>10.3</b>                            | 0.1%         | 10.3            | 100.0%       | 0               |              |
| Great hammerhead shark           | SPK  | <b>9.1</b>                             | 0.1%         | 9.1             | 100.0%       | 0               |              |
| Sharks mackerel & porbeagles nei | MSK  | <b>5.5</b>                             | 0.1%         | 5.5             | 100.0%       | 0               |              |
| Silvertip shark                  | ALS  | <b>4.2</b>                             | <0.0%        | 4.2             | 100.0%       | 0               |              |
| Blacktip reef shark              | BLR  | <b>3.4</b>                             | <0.0%        | 3.4             | 100.0%       | 0               |              |
| Blacktip shark                   | CCI  | <b>2.9</b>                             | <0.0%        | 2.9             | 100.0%       | 0               |              |
| Whale shark                      | RHN  | <b>2.4</b>                             | <0.0%        | 2.4             | 100.0%       | 0               |              |
| Mackerel Sharks                  | SHM  | <b>0.1</b>                             | <0.0%        | 0.1             | 100.0%       | 0               |              |
|                                  |      | <b>6,040.53</b>                        | <b>55.2%</b> | <b>4,791.2</b>  | <b>79.3%</b> | <b>1,249.3</b>  | <b>20.7%</b> |
| <b>Skates &amp; Rays</b>         |      |  |              |                 |              |                 |              |
| Devil Ray                        | RMM  | 2,524.20                               | 23.1%        | 2269.8          | 89.9%        | 254.4           | 10.1%        |
| Rays, stingrays & mantas nei     | SRX  | 2,319.90                               | 21.2%        | 2150.1          | 92.7%        | 169.8           | 7.3%         |
| Eagle Rays                       | EAG  | 55.40                                  | 0.5%         | 55.40           | 100.0%       | 0               |              |
| Giant Manta                      | RMB  | 2.50                                   | <0.0%        | 0.00            |              | 2.5             | 100.0%       |
|                                  |      | <b>4,902.0</b>                         | <b>44.8%</b> | <b>4,475.3</b>  | 91.3%        | <b>426.7</b>    | 8.7%         |
| <b>Total Sharks</b>              |      | <b>10,942.53</b>                       |              | <b>9,266.51</b> | <b>84.7%</b> | <b>1,676.02</b> | <b>15.3%</b> |



#### 4.0 Consumptive & Non Consumptive Use of Sharks

- 148) **Consumptive Utilization, Market and Trade:** The utilization of Sharks caught from directed and non-directed fisheries in Sri Lanka complies with the guidelines set out in the IPOA-Sharks, which encourages *full use of dead Sharks and to minimize waste and discards from Shark Catches in accordance with article 7.2.2. (g) of the CCRF (e.g. utilization of carcasses of Sharks from which fins are removed)* (see para 19 above).
- 149) Sharks caught from directed and non-directed fisheries are consumed locally as both dry (small rays and sharks) and fresh (large rays and sharks) products. The main markets for fresh Shark products include urban, rural and upcountry areas. Shark products are consumed mainly by low and very low income families in cities and villages throughout the country. The markets for both fresh and dried shark products are associated with both rural and urban poor. Fresh and dried Shark products play an important role in meeting the nutritional requirements for daily dietary protein for these vulnerable and marginalized groups.
- 150) Shark meat has always been enjoyed in the domestic market in Sri Lanka. There is high demand, both in fresh and salted dried form with less waste than most other species<sup>19</sup>. It is believed that eating of cooked meat of milk shark (*Rhizoprionodon acutus*), locally known as ‘kiri mora’ in Sinhala promotes lactation in breast feeding mothers.
- 151) Tempered dried shark and ray meat with onion is a well-known delicacy, which permits to eat a plateful of rice. Buying shark meat and dried fish is considered to give good value for money, particularly among the poor and the middle class in the past. However with the limitations over the shark fishery in the recent past, shark meat is not so common in the market and the price is comparatively high at present.
- 152) **Shark liver oil industry in Sri Lanka:** As many as six species of Shark are used to produce shark liver oil in Sri Lanka. Shark liver oil contains high levels of squalene and alkylglycerols (AKG) and other fatty acids, having high medicinal properties. Research on Shark liver oil processing and production in Sri Lanka is scarce.
- 153) According to DFAR (*pers. comm.*), there are estimated to be around 30 producers of Shark liver oil and two collectors in Sri Lanka. They are scattered in south, west and the east coastal areas of the country. Sri Lanka produces 1200 kg of Shark liver oil annually. The total production is exported to Japan for purification and value addition processes.
- 154) Literature reveals that a failure in earning an income through shark liver oil is due to lack of a purification process in Sri Lanka. Hence there is a requirement to develop a purification and value addition process to enhance the shark liver industry for a better production and profit.

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<sup>19</sup> Report of the survey of shark fisheries for conservation and management of shark resources, Sri Lanka BOBLME 2013

- 155) **Shark fin industry in Sri Lanka:** At the landing site / harbour, Sharks are auctioned as a whole fish with the fins intact. The collectors buy the whole fish and sort the products as fins and the meat and supply to the processors as required. The fins processed to dry.
- 156) Shark fins are exported mainly to Hong Kong, Korea, China, Singapore and Taiwan. Silky shark (FAL) and blue shark (BSH) are the main species from which fins are extracted. The fins are dried and exported without further processing or any value addition. Dried Shark skin is exported to China to make shoes and belts, while Shark jaws, teeth and skin are exported to The Maldives for the tourism industry.
- 157) The global price and demand for Shark fins has declined drastically as Shark fin exports have reduced due to international initiatives that discourage the global shark fin trade. According to export statistics submitted by Sri Lanka Customs, total shark fin exports in 2012 amounted to 82,544 kg. Only 5520 kg has been exported in 2013 up to June. The export of shark fins, skins, jaws and teeth are regulated under the Shark Fisheries Management Regulations 2015 and Fish and Fishery Products Export, Import and Re-export Regulations 2017. More than five companies have been exporting shark fins from Sri Lanka."
- 158) **Non-Consumptive Utilization (Eco-tourism):** Marine eco-tourism activities commenced operations in Sri Lanka after 2009, focusing on dolphin and whale watching tours. Operations are conducted from three main centers of the North West coast (Kalpitiya), the southern coast (Mirissa) and the eastern coast (Trincomalee). In each of this area the extent of the coastal shelf is narrow, enabling small boats to travel to and beyond the edge of continental coastal shelf, where whales, dolphins and occasionally manta rays and whale sharks can be seen.
- 159) A number of dive schools are in operation around the country, but none specifically offer tours promoting diving with Sharks. Reef sharks are regularly sited within the Pigeon Island National Park, located 1 km off the coast of Nilaveli in Trincomalee District, in the Eastern Province.

## 5.0 Legal Provisions and Regulations for the Conservation & Management of Sharks

### 5.1 Convention on International Trade in Endangered Species of Wild Fauna & Flora

- 160) The DWC is the focal point and management and scientific authority for CITES in Sri Lanka. The DWC implements the provisions of CITES. No Shark species are listed in CITES Appendices I or III. Eight species and three genera are currently listed in Appendix II (Table 18).
- 161) According to CITES<sup>20</sup> *Appendix II lists species that are not necessarily now threatened with extinction but that may become so unless trade is closely controlled. It also includes so-called "look-alike species", i.e. species whose specimens in trade look like those of species listed for conservation reasons (see Article II, paragraph 2 of the Convention). International trade in specimens of Appendix-II species may be authorized by the granting of an export permit or re-export certificate. No import permit is necessary for these species under CITES (although a permit is needed in some countries that have taken stricter measures than CITES requires). Permits or certificates should only be granted if the relevant authorities are satisfied that certain conditions are met, above all that trade will not be detrimental to the survival of the species in the wild. (See Article IV of the Convention)*

**Table 18 CITES listed Shark species**

| Class Elasmobranchii (Sharks)                  | Appendices <sup>21</sup> |                                 |     |
|--|--------------------------|---------------------------------|-----|
|  | I                        | II                              | III |
| <b>Carcharhiniformes</b>                       |                          |                                 |     |
| <b>Carcharhinidae (Requiem sharks)</b>         |                          |                                 |     |
| Silky shark                                    |                          | <i>Carcharhinus falciformis</i> |     |
| Oceanic whitetip shark                         |                          | <i>Carcharhinus longimanus</i>  |     |
| <b>Sphyrnidae (Hammerhead sharks)</b>          |                          |                                 |     |
| Scalloped hammerhead shark                     |                          | <i>Sphyrna lewini</i>           |     |
| Great Hammerhead shark                         |                          | <i>Sphyrna mokarran</i>         |     |
| Smooth hammerhead shark                        |                          | <i>Sphyrna zygaena</i>          |     |
| <b>Lamniformes</b>                             |                          |                                 |     |
| <b>Alopiidae (Thresher sharks)</b>             |                          | <i>Alopias spp.</i>             |     |
| <b>Cetorhinidae (Basking sharks)</b>           |                          | <i>Cetorhinus maximus</i>       |     |
| <b>Lamnidae (Mackerel sharks)</b>              |                          |                                 |     |
| Great white shark                              |                          | <i>Carcharodon carcharias</i>   |     |
| Porbeagle shark                                |                          | <i>Lamna nasus</i>              |     |
|  |                          |                                 |     |
| <b>Myliobatiformes</b>                         |                          |                                 |     |
| <b>Myliobatidae (Eagle &amp; Mobulid rays)</b> |                          | <i>Manta spp.</i>               |     |
|  |                          | <i>Mobula spp.</i>              |     |

<sup>20</sup><https://www.cites.org/eng/app/index.php>

<sup>21</sup><https://www.cites.org/eng/app/appendices.php>

## **5.2 The Fauna & Flora Protection Ordinance**

- 162) The Fauna and Flora Protection Ordinance (FFPO) is the legal framework for the protection of species of wild animals that include mammals, birds, reptiles, amphibians, fishes and invertebrates, and plants in Sri Lanka. The FFPO is a key legal instrument that has relevance to the conservation and management of Sharks. FFPO is administered by the DWC.
- 163) Under the FFPO a number of marine protected areas (MPAs) have been declared including marine national parks, nature reserves and sanctuaries. MPAs established in Sri Lanka include Hikkaduwa National Park, Pigeon National Park, Adam's National Park, Vidaththalthivu and the Bar Reef Marine Sanctuary. The MPAs were established with the aim of protecting marine ecosystems and the species, including Sharks that depend upon them. These marine national parks, nature reserves and sanctuaries provide partial protection to Sharks in near shore waters and contribute towards Sri Lanka's commitment to meet the United Nations' Sustainable Development Goal No. 14: To conserve and sustainably use the oceans, seas and marine resources for sustainable development.

## **5.3 The Fisheries and Aquatic Resources Act**

- 164) The Fisheries and Aquatic Resources Act, No. 2 of 1996 (FARA) is the main legal instrument that provides for the management, regulation, conservation and development of fisheries and aquatic resources harvested by fishing vessels registered and operated in Sri Lanka. The FARA gives effect to Sri Lanka's obligations under international and regional fisheries agreements within Sri Lanka's EEZ and on the high-seas (BEEZ).
- 165) The Fisheries (Regulation of Foreign Fishing Boats) Act, No. 59 of 1979 provides for regulation, control and management of fishing activities by foreign boats in Sri Lanka's EEZ. The Act was amended in 2018, as the Fisheries (Regulation of Foreign Fishing Boats) Act, No. 1 of 2018 (FFBA). The FARA and FFBA are administered by the DFAR, which has the overall mandate for the implementation of the provisions incorporated in them.
- 166) A number of provisions included in FARA and FFBA, and regulations made under those provisions are applicable for all fisheries in Sri Lanka including direct and non-direct Shark fisheries. Implementation of those provisions and regulations is essential for general management of all fisheries in the country including direct and non-direct Shark fisheries. Table 1 provides an overview of the important provisions and regulations for general management of fisheries that have a positive impact on the management of direct and non-direct Shark fisheries in Sri Lanka.
- 167) In addition to the above, a number of draft regulations are under the process of promulgation to give effect to the obligations of Sri Lanka under certain international and regional fisheries agreements. These regulations, which are given in Table 19, once enforced will also have beneficial effects on the management of among other fisheries, Shark fisheries BEEZ.

**Table 19 Legal provisions & regulations enacted for the management of fisheries**

|   | <b>Provision in the Act; Regulations</b>   | <b>Management Measure</b>   | <b>Penalty for Non-Compliance</b>   |
|---|--|---|---|
| 1 | Section 6,7,8,9, 29,61 of FARA; Fishing Operations Regulations of 1996 (Gazette, No. 948/25 of 07-11-1996)         | Engaging in any of the prescribed fishing activities in Sri Lanka waters without a license obtained from Director General (DG)  | Fine not exceeding LKR 25,000   |
| 2 | Section 15 of FARA; Registration of Fishing Boats Regulations, 1980 (Gazette, No. 109 of 10 March 1980)            | Use of a fishing boat that has not been registered as a fishing boat by DG for fishing in Sri Lanka waters  | Fine not exceeding LKR 25,000   |
| 3 | Section 27 of FARA as amended by Act, No. 4 of 2004  | Use of poisonous, explosive or stupefying substances (including dynamite) or other noxious or harmful material for fishing or dumping of poisonous, explosive, stupefying or other obnoxious or harmful material in Sri Lanka waters  | Imprisonment of either description for a term not less than three years and not exceeding five years and a fine not less than LKR 100,000 or on a second or subsequent conviction imprisonment of either description for a term not less than five years and not exceeding seven years and a fine not less than LKR 500,000 |
| 4 | Sections 28, and 61 of FARA; Monofilament Nets Prohibition Regulations, 2006 (Gazette No. 1454/33 of 21 July 2006) | Using monofilament nets for fishing   | Fine not exceeding LKR 25,000   |
| 5 | Sections 4 and 15 (a) of FFBA  | Using a foreign boat for fishing or related activities in Sri Lanka waters except under the authority of a permit issued by DG with approval of the Minister  | Fine not exceeding LKR 1.5 million and repatriation costs of the crew, forfeiture of the boat and fishing equipment   |
| 6 | Sections 61 of FARA; Fish Catch Data Collection Regulations, 2012 (Gazette 1755/32 of 25 April 2012)               | Not maintaining a logbook issued by DFAR by a mechanized fishing boat fishing in Sri Lanka waters; not maintaining a record of the catch of each fishing trip, or not furnishing a certificate of the catch to the CA in the prescribed form or importing fish for re-export without a catch certificate & health | Fine not exceeding LKR 25,000   |

| Provision in the Act; Regulations   | Management Measure  | Penalty for Non-Compliance  |
|---|---|---|
|   |   |   |
|   | certificate issued by the CA of the importing country   |   |
| BEEZ Fishing Operations Regulation No.1 of 2014 published in Gazette Extraordinary No. 1878/12 of September 01, 2014                                      | Engage in any prescribed fishing operation in high seas without the authority of a valid license granted by the DG; Not complying with the conditions imposed by the DG for fishing in the high seas; Unloading or transshipping fish in any port of any other country; Not carrying and using the line cutters and de-hookers on board to release sharks / turtles |   |
| BEEZ Fishing Operations Regulation No.1 of 2014 published in Gazette Extraordinary No. 1878/12 of September 01, 2014, amendment of item 3 of Schedule III | Fee for fishing operation license in the high seas ( boats between 10.3 – 15 min length)  |   |
| Fisheries and Aquatic Resource, Act No 2 of 1996, Fishing Gear Marking Regulations No.1 of 2015   | Not marking all types of fishing gear and fish aggregating devices carried on board fishing boats as prescribed   | Fine not exceeding LKR 25,000 (Section 49 (5) as amended by Act, No 35 of 2013) |
| Fisheries and Aquatic Resource, Act No 2 of 1996, Fish Catch Data Collection Regulations, 2014  | Not carrying onboard a log book issued by DFAR during each fishing trip, who uses mechanized fishing boat fishing in Sri Lanka waters; Not maintaining a record of the catch in the log book, relating to each fishing trip; Not submitting the log book to the authorized officer  |   |
| Fisheries and Aquatic Resource, Act No 2 of 1996, Implementation of Satellite based Vessel Monitoring   | Deploying fishing vessels having an overall length of 10.3 m or more for high seas fishing operations without Satellite based Vessel  |   |

| Provision in the Act; Regulations  | Management Measure  | Penalty for Non-Compliance |
|--|---|----------------------------|
| System (VMS) for Fishing Boats Operation in BEEZ Regulations 2015  | Monitoring System; Not taking steps to ensure that the Monitoring device on board is activated at all times irrespective of their geological location   |                            |
| Fisheries and Aquatic Resource, Act No 2 of 1996, Shark Fisheries Management Regulations, 2015   | Engage in any prescribed shark species fishing operations in Sri Lanka waters; Remove onboard a local fishing boat the fins of any shark caught by local fishing boat and discard carcass of such sharks of which fins have been removed; retain on board, transship or land fins of any shark; Not releasing live sharks especially juveniles and pregnant sharks;   |                            |
| Fisheries and Aquatic Resource, Act No 2 of 1996, Shark Fisheries Management Regulations (BEEZ), 2015                                  | Engage in any prescribed shark species fishing operations in Sri Lanka waters; Remove onboard a local fishing boat the fins of any shark caught by local fishing boat and discard carcass of such sharks of which fins have been removed; retain on board, transship or land fins of any shark; Not releasing any shark caught incidentally or live sharks especially juveniles and pregnant sharks to the sea; Deliberately operate ring nets in the areas frequently inhabited by whale sharks; |                            |
| Fisheries and Aquatic Resource, Act No 2 of 1996, Fish and Fishery Products, Export, Import and Re-export Management Regulations- 2017 | Not engaging to the terms and conditions imposed by DG for any export, import or re-import of fish or fishery products; Engage in export, import or re-import of fish or fishery products without register with DFAR; Engage in export, import or re-import of fish   |                            |

|  | <b>Provision in the Act; Regulations</b> | <b>Management Measure</b>  | <b>Penalty for Non-Compliance</b> |
|--|--|--|-----------------------------------|
|  |  |  |                                   |
|  |  | or fishery products without following requirements of CITES; Export, import or re-import of any fish or fishery products which are prohibited; Not declaring the species type and form of product according to the applicable HS codes |                                   |



- 168) Under the Shark Fisheries Management Regulation, 2015 no person shall engage in fishing operations in Sri Lankan waters shall catch shark species of the family Alopidae, *Carcharhinus iongimanus* or *Rhincodon typus*; remove onboard a local fishing boat the fins of any shark caught by such local fishing boat and discard carcass of such shark of which the fins have been removed; retain on board, transship or land fins of any shark unless such fins are naturally attached to the body of such shark. The owner of skipper of the vessel shall release live sharks especially juvenile or pregnant sharks.
- 169) Under the Shark Fisheries Management Regulation, 2015 no person shall engage in fishing operations in BEEZ shall catch shark species of the family Alopidae, *Carcharhinus iongimanus* or *Rhincodon typus*; remove onboard a local fishing boat the fins of any shark caught by such local fishing boat and discard carcass of such shark of which the fins have been removed; retain on board, transship or land fins of any shark unless such fins are naturally attached to the body of such shark; deliberately operate ring net fishing operations in area frequented by *Rhincodon typus*.
- 170) Under the Shark Fisheries Management Regulation, 2015 the owner of skipper of the vessel shall release or dispose of incidentally caught sharks belong to the species mentioned in the schedule and record the number, location, the steps taken to ensure safe release in the logbook maintained on board the local fishing vessels; release live sharks especially juvenile or pregnant sharks.

## 6.0 SLNPOA-Sharks (2018 - 2022)

### 6.1 Long term Goal & Objective

- 171) The long term goal, strategic and immediate objectives of the SLNPOA-Sharks (2018-2022) are based on the ten objectives of the IPOA-Sharks (see para 17), taking into consideration the goals and objectives of the Government of Sri Lanka's fisheries policy and the livelihoods of Sri Lankan fishermen.
- 172) **Long Term Goal:** The long term goal of the SLNPOA-Sharks (2018-2022) is *to ensure the conservation and the sustainable management of key Shark species from directed and non-directed fisheries in Sri Lankan waters and BEEZ, by 2029*
- 173) **Strategic Objectives:** The strategic objectives of the SLNPOA-Sharks (2018-2022) were derived from the ten objectives of the IPOA-Sharks (see para 17), taking into consideration the strategic objectives of the Government of Sri Lanka's fisheries policy and the livelihoods of Sri Lankan fishermen.
- 174) The strategic objectives of the SLNPOA-Sharks (2018-2022) are threefold
- i. *Laws and legal frameworks necessary for the conservation of Shark species in Sri Lankan waters are in place and implemented, by 2026*
  - ii. *Harvesting strategies, together with harvest control rules and tools consistent with the principles of biological sustainability and rational long-term economic use are in place and implemented for key Shark species including but not limited to one or more directed Shark fishery, silky shark, blue shark and mobulids, by 2026,*
  - iii. *Critical Shark habitats are protected through MPAs (including Fisheries Management Areas)<sup>22</sup>and marine biodiversity and ecosystem structure and function necessary for the conservation and management of Sharks are maintained, by 2026.*

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<sup>22</sup>The area of marine habitats currently protected under the FFPO and FARA is around ~1,300 km<sup>2</sup> or 0.26% of Sri Lanka's EEZ

175) **Immediate Objectives:** The immediate objectives of the SLNPOA-Sharks (2018-2022) are fourfold

- i. *Special attention is paid and appropriate legal instruments are identified to protect the most endangered Shark species occurring in Sri Lankan waters, by 2024*
- ii. *Threats to Shark populations, including but not limited to one or more directed Shark fishery, silky shark, blue shark and mobilids are assessed and used to formulate harvesting strategies, with harvest control rules and tools consistent with the principles of biological sustainability and rational long-term economic use,*
- iii. *rational long-term economic use encourages full use of dead sharks and or minimize unutilized incidental catches of sharks and or minimize waste and discards from shark catches in accordance with article 7.2.2.(g) of the Code of Conduct for Responsible Fisheries (for example, requiring the retention of sharks from which fins are removed, by 2024.*
- iv. *Critical habitats for Sharks are determined and measures to protect these habitats and the marine biodiversity and ecosystem structure and function necessary for the conservation and management of Sharks are identified and implemented, by maintained, by 2024.*

## **6.2 SLNPOA Sharks Activities (2018 - 2022)**

176) The following Actions to conserve and manage Sharks will be implemented by stakeholders through the SLNPOA-Sharks (2018-2022), under the following three headings

**Activity 1      Conservation Measures for Protected Shark Species**

**Activity 2      Management Measures for Directed Shark Fisheries**

**Activity 3      Management Measures for Non Directed Shark Fisheries**

**SLNPOA Sharks Activities (2018 - 2022)**

**Activity 1 - Conservation Measures for Protected Shark Species**

| <b>Actions</b>   | <b>List of Indicators</b>  | <b>Responsible Agencies</b>   |
|--|--|---|
| <p><b>Action 1.1- Conservation of Protected Species</b><br/> <i>Monitor and enforce compliance with the regulation prohibiting the catch of protected species i.e., thresher sharks (three species), oceanic white-tip shark and whale shark</i></p> | <ul style="list-style-type: none"> <li>• <i>Port Inspection Reports</i></li> <li>• <i>Discard Data from Logbooks, including live release</i></li> <li>• <i>Discard Data from IOTC Observer Programme, including live release</i></li> <li>• <i>Discard Data from Local Observer Programme, including live release</i></li> <li>• <i>List of prosecutions for possession / landing prohibited shark species</i></li> <li>• <i>Import data from third parties</i></li> </ul> | <ul style="list-style-type: none"> <li>○ DFAR</li> <li>○ NARA</li> <li>○ SLN</li> </ul> |

**Activity 2 - Management Measures for Directed Shark Fisheries**

| <b>Actions</b>   | <b>List of Indicators</b>   | <b>Responsible Agencies</b>  |
|--|---|--|
| <p><b>Action 2.1 Directed Shark Fisheries</b><br/> <i>Conduct species specific research on the biology and ecology of one or more shark fisheries (e.g. little gulper shark); research and introduce a code of conduct; formulate and implement a fishery management plan and a draft regulation for one or more shark fisheries</i></p> | <ul style="list-style-type: none"> <li>• <i>A study of the biology and ecology of one or more targeted shark species</i></li> <li>• <i>A code of conduct for one or more targeted shark fisheries</i></li> <li>• <i>A management plan for one or more targeted shark fisheries</i></li> <li>• <i>A regulation for one or more targeted shark fisheries</i></li> </ul> | <ul style="list-style-type: none"> <li>○ NARA</li> <li>○ DFAR</li> </ul> |
| <p><b>Action 2.2 Directed Ray Fisheries</b><br/> <i>Conduct species specific research on the biology and ecology of one or more ray fisheries (e.g. pale-edged stingray); research and introduce a code of conduct; formulate and implement a fishery management plan and a draft regulation for one or more ray fisheries</i></p>       | <ul style="list-style-type: none"> <li>• <i>A study of the biology and ecology of one or more targeted ray species</i></li> <li>• <i>A code of conduct for one or more targeted ray fisheries</i></li> <li>• <i>A management plan for one or more targeted ray fisheries</i></li> <li>• <i>A regulation for one or more targeted ray fisheries</i></li> </ul>         | <ul style="list-style-type: none"> <li>○ NARA</li> <li>○ DFAR</li> </ul> |
| <p><b>Action 2.3 Directed Thresher Shark Fisheries:</b><br/> <i>Establish a ‘technical committee’ to research and publish a scientific opinion regarding the request made by fishermen to remove the ban on fishing</i></p>  | <ul style="list-style-type: none"> <li>• <i>Scientific report on removing the ban temporary on fishing for thresher sharks in Sri Lankan waters, using OFRP vessels</i></li> </ul>  | <ul style="list-style-type: none"> <li>○ NARA</li> <li>○ DFAR</li> </ul> |

| <b>SLNPOA Sharks Activities (2018 - 2022)</b>  |  |   |
|--|--|---|
| <i>for thresher sharks using OFRP vessels for a specific period of time and in specified locations.</i>  |  |   |
| <b>Activity 3 - Management Measures for Non Directed Shark Fisheries</b>   |  |   |
| <b>Actions</b>   | <b>List of Indicators</b>  | <b>Responsible Agencies</b>   |
| <p><b>Action 3.1 Prohibition of Wire Traces</b><br/> <i>Introduce, monitor and enforce a regulation prohibiting single-day (IDAY) and multi-day (IMUL) fishing boats from carrying longlines with wire traces.</i></p>   | <ul style="list-style-type: none"> <li>• <i>A regulation prohibiting IDAY and IMUL vessels from carrying longlines with wire traces</i></li> <li>• <i>Port Inspection Reports</i></li> <li>• <i>List of prosecutions for possession of longline with wire traces</i></li> </ul>  | <ul style="list-style-type: none"> <li>○ DFAR</li> <li>○ NARA</li> <li>○ SLN</li> <li>○ CG</li> </ul> |
| <p><b>Action 3.2 Establish a Maximum Length for Gillnet Fishing</b><br/> <i>Introduce, monitor and enforce a regulation setting a maximum length for gillnet fishing by single-day (IDAY) and multi-day (IMUL) fishing boats of 2,500 m.</i></p>   | <ul style="list-style-type: none"> <li>• <i>A regulation prohibiting IDAY and IMUL vessels from carrying gillnets with a length of more than 2,500 m</i></li> <li>• <i>Port Inspection Reports</i></li> <li>• <i>List of prosecutions for possession of gillnets with a length of more than 2,500 m</i></li> <li>• <i>Conduct further studies on the interaction of gill net with Sharks</i></li> </ul>  | <ul style="list-style-type: none"> <li>○ DFAR</li> <li>○ NARA</li> </ul>                              |
| <p><b>Action 3.3 A Management Plan and Regulation for Fish Aggregating Devices</b><br/> <i>Research and develop a management plan for the construction, deployment and use of fish aggregating devices by Sri Lankan vessels in Sri Lanka's EEZ and BEEZ, supported by a regulation</i></p>                    | <ul style="list-style-type: none"> <li>• <i>A management plan for the construction, deployment and use of FADs by Sri Lankan vessels in EEZ &amp; BEEZ</i></li> <li>• <i>A regulation governing the construction, deployment and use of FADs by Sri Lankan vessels in EEZ &amp; BEEZ</i></li> <li>• <i>Port Inspection Reports</i></li> <li>• <i>List of prosecutions for illegal construction, deployment or use of FADs by Sri Lankan vessels in EEZ &amp; BEEZ</i></li> </ul> | <ul style="list-style-type: none"> <li>○ DFAR</li> <li>○ NARA</li> </ul>                              |
| <p><b>Action 3.4 New HS Codes and Permit System for the Export &amp; Import of Sharks</b><br/> <i>Discuss, introduce, monitor and enforce new HS Codes for the export and import of Shark products, for example 'meat', 'fins', 'skins', 'jaws and or teeth', 'cartilage' and 'oil' and permit system.</i></p> | <ul style="list-style-type: none"> <li>• <i>A Regulation listing new Shark Codes for the export and import of Shark products</i></li> <li>• <i>Annual export and import data for Shark products, using the new HS Codes for Shark products</i></li> <li>• <i>New and improved permit system for Shark products</i></li> </ul>  | <ul style="list-style-type: none"> <li>○ SLC</li> <li>○ DFAR</li> <li>○ NARA</li> </ul>               |
| <p><b>Action 3.5 A new Schedule for the Export &amp; Import of Sharks</b><br/> <i>Discuss, introduce, monitor and enforce a new Schedule for the export and import of Sharks</i></p>   | <ul style="list-style-type: none"> <li>• <i>A Schedule requiring importers / exporters to provide a 'packing list' and pack imported / exported Shark products according to the packing list, for listed Shark species.</i></li> </ul>   | <ul style="list-style-type: none"> <li>○ DFAR</li> <li>○ SLC</li> <li>○ NARA</li> </ul>               |

| SLNPOA Sharks Activities (2018 - 2022)  |  |  |
|---|--|--|
| <p><i>products. The Schedule will require importers and exporters to provide a 'packing list' by listed (top ten?) Shark species. The Schedule will require importers and exporters to pack Shark products separately in accordance with the 'packing list' and to submit the 'packing list' along with the import / export documentation</i></p>             | <ul style="list-style-type: none"> <li>• Annual export and import data for Shark products, using the new HS Codes for Shark products.</li> </ul>   |  |
| <p><b>Action 3.6 Explore the possibility of introducing 'Introduction from the Sea' certificates for CITES listed Shark species</b><br/> <i>Research and review the opportunities and constraints associated with introducing IFS Certificates for CITES listed Shark species</i></p>   | <ul style="list-style-type: none"> <li>• A report highlighting the opportunities and constraints associated with introducing IFS certificates for CITES listed Shark species landed by directed and non-directed fisheries.</li> </ul> | <ul style="list-style-type: none"> <li>○ DFAR</li> <li>○ SLC</li> <li>○ NARA</li> <li>○ DWC</li> </ul> |
| <p><b>Action 3.7 Catch Data Collection</b><br/> <i>Continue to collect and analyze catch data using logbooks from Sri Lanka's EEZ and BEEZ fisheries and improve the catch data collection for rays to family level identification for manta ray (RMB), devil ray (RMM), eagle rays (EAG) and Rays and stingrays and mantas nei (SRX).</i></p>                | <ul style="list-style-type: none"> <li>• Annual catch data reports and analysis for Sri Lanka's EEZ and BEEZ fisheries</li> <li>• Disaggregation of ray catch data to family level.</li> </ul>   | <ul style="list-style-type: none"> <li>○ DFAR</li> <li>○ NARA</li> </ul>                               |
| <p><b>Action 3.8 Catch Data Collection</b><br/> <i>Continue to collect and analyze catch data using logbooks from Sri Lanka's EEZ and BEEZ fisheries and improve the catch data collection for rays to family level identification for manta ray (RMB), devil ray (RMM), eagle rays (EAG) and Rays and stingrays and mantas nei (SRX).</i></p>                | <ul style="list-style-type: none"> <li>• Annual catch data reports and analysis for Sri Lanka's EEZ and BEEZ fisheries</li> <li>• Disaggregation of ray catch data to family level.</li> </ul>   | <ul style="list-style-type: none"> <li>○ DFAR</li> <li>○ NARA</li> </ul>                               |
| <p><b>Action 3.9 Scientific Catch Data Collection</b><br/> <i>Continue to collect &amp; analyze scientific catch data using IOTC registered Observers from vessels measuring more than 24 m (Industrial), licensed to fish beyond Sri Lanka's EEZ and introduce alternative an Observer programme(s) to collect scientific data for vessels measuring</i></p> | <ul style="list-style-type: none"> <li>• Annual Scientific catch data reports and analysis for Sri Lanka's BEEZ fisheries</li> </ul>   | <ul style="list-style-type: none"> <li>○ DFAR</li> <li>○ NARA</li> </ul>                               |

| SLNPOA Sharks Activities (2018 - 2022)   |  |        |
|--|--|--------|
| <i>less than 24 m, licensed to fish beyond Sri Lanka's EEZ</i>   |  |        |
| <b>Action 3.10 Silky Shark Research</b><br><i>Conduct research on the biology and ecology of <b>silky sharks</b> landed by EEZ and BEEZ fishing vessels using longline and gillnets</i>                  | <ul style="list-style-type: none"> <li>• A study of the biology, ecology of <b>silky sharks</b> from the EEZ and BEEZ fishery for tuna and tuna-like species</li> </ul>                | ○ NARA |
| <b>Action 3.11 Blue Shark Research</b><br><i>Conduct research on the biology and ecology of <b>blue sharks</b> landed by EEZ and BEEZ fishing vessels using longline and gillnets</i>                    | <ul style="list-style-type: none"> <li>• A study of the biology, ecology of <b>blue sharks</b> from the EEZ and BEEZ fishery for tuna and tuna-like species</li> </ul>                 | ○ NARA |
| <b>Action 3.12 Mobulid Research</b><br><i>Conduct species specific research on the biology and ecology of <b>mobulids</b> landed by EEZ and BEEZ fishing vessels using longline and gillnets</i>         | <ul style="list-style-type: none"> <li>• Species specific studies of the biology, ecology of <b>mobulids</b> from the EEZ and BEEZ fishery for tuna and tuna-like species</li> </ul>   | ○ NARA |
| <b>Action 3.13 Other Ray Research</b><br><i>Conduct species specific research on the biology &amp; ecology of <b>other rays</b> landed by EEZ and BEEZ fishing vessels using longline &amp; gillnets</i> | <ul style="list-style-type: none"> <li>• Species specific studies of the biology, ecology of <b>other rays</b> from the EEZ and BEEZ fishery for tuna and tuna-like species</li> </ul> | ○ NARA |

## **7.0 International Cooperation**

- 177) International cooperation is essential for the implementation of the IPOA - Sharks. When the same Shark stock occurs within the EEZs of neighboring States, or within the EEZ and in waters adjacent to the EEZ of a coastal State, national fisheries regulations will not be sufficient to ensure their sustainable management. In such cases it is necessary to implement regional management measures through a regional fisheries management organization established under the provisions of UNCLOS and UNFSA, for example IOTC. The following activities may be implemented under international cooperation.
- Seeking for means through international agreements to establish cooperative research, stock assessments, conservation and management initiatives for trans-boundary, straddling, highly migratory and high-seas Shark stocks and promote development and implementation of a regional plan of action for the conservation and management of Sharks (RPOA – Sharks)
  - Prompt analysis of data and publishing results in a timely manner in an understandable format, and making the reports available for peer review.
  - Seeking of international assistance and resources to enhance national capacities to further develop and implement NPOA – Sharks.

## **8.0 Implementation, monitoring and evaluation**

- 178) The second SLNPOA - Sharks will continue to be implemented as an integral part of the Sri Lanka National Fisheries and Aquatic Resources Management Plan. The main responsibility for the implementation of the NPOA on lies with the DFAR. Several other agencies namely Sri Lanka Navy (SLN), Sri Lanka Coast Guard (SLCG), Department of Wildlife Conservation (DWLC), Ceylon Fisheries Harbours Corporation (CFHC), NARA, and Sri Lanka Customs (SLC) also have major roles to play in the implementation of the second NPOA. Resources required for its implementation need to be allocated from the National Budget.
- 179) A coordinating committee comprising representatives of the respective organizations under the Chair of the Director General of the DFAR (DG), and Director of the Fisheries Management Division of DFAR (FMD) as the Secretary will continue to review the progress of the implementation of the second NPOA - Sharks and where necessary make adjustments to improve its effectiveness. The Coordinating Committee may co-opt representatives from other government agencies, and other organizations such as the National Fisheries Federation, multi-day fishing boat owners' association and fish exporters associations as required. The NPOA Sharks Implementation Coordinating Committee will meet once in six months.



- 180) The terms of reference of the Coordinating Committee shall be as follows:
- Develop an implementation schedule based on priority requirements and availability of resources for implementation of second SLNPOA–Sharks.
  - Oversee its implementation and evaluate the progress.
  - Provide the coordination and guidance required.
  - Keep the stakeholders informed of the progress and any other information relevant to the conservation and management of shark resources.
  - Fulfill the reporting requirements under the FAO IPOA - sharks.
- 181) The second SLNPOA–Sharks is intended to have a duration of five years (2018 - 2022) focused on establishment of the necessary capacity, systems and databases while managing the fishing effort on the directed and non-directed Shark fisheries based on an active and progressive precautionary approach in consultation with stakeholders. Upon the conclusion of this period the overall progress and the impacts of implementation will again be evaluated against the new goals and objectives, using identified indicators with a view to revision of SLNPOA–Sharks taking into account the changes in fisheries in the future.

## Appendix I - Shark Species Recorded in Sri Lanka

### Sharks

#### ORDER HEXANCHIFORMES

##### Family Hexanidae

1. *Hexanchus griseus* (Bonnaterre, 1788) blunt-nose six-gill shark
2. *Notorynchus cepedianus* (Peron, 1907) broad-nose seven-gill shark

#### ORDER SQUALIFORMES

##### Family Echinorhinidae

3. *Echinorhinus brucus* (Bonnaterre, 1788) bramble shark

##### Family Squaliidae

4. *Centrophorus squamosus* (Bonnaterre, 1788) leaf-scale gulper shark
5. *Centroscyllium ornatum* (Alcock, 1889) ornate dogfish
6. *Dalatias licha* (Bonnaterre, 1788) kite-fin shark

#### ORDER ORECTOLOBIFORMES

##### Family Hemiscylliidae

7. *Chiloscyllium griseum* (Muller & Henle, 1838) grey bamboo shark
8. *C. indicum* (Gmelin, 1789) slender bamboo shark
9. *C. plagiosum* (Bennet, 1830) white-spotted bamboo shark

##### Family Stegostomatidae

10. *Stegostoma fasciatum* (Hermann, 1783) zebra shark

##### Family Ginglymostomatidae

11. *Nebrius ferrugineus* (Lesson, 1831) tawny nurse shark

##### Family Rhincodontidae

12. *Rhincodon typus* (Smith, 1828) whale shark

## ORDER LAMNIFORMES

### Family Alopiidae

13. *Alopias vulpinus* (Bonnaterre, 1788) thresher shark
14. *A. superciliosus* Lowe, 1841) big-eye thresher shark
15. *A. pelagicus* (Nakamura, 1935) pelagic thresher shark

### Family Odontaspidae

16. *Odontaspis noronhai* (Maul, 1955) big-eye sand tiger shark
17. *O. ferox* (Risso, 1810) small-tooth sand-tiger shark
18. *Carcharias taurus* (Rafinesque, 1810) sand-tiger shark

### Family Pseudocarchariidae

19. *Pseudocarcharias kamoharai* (Matsubara, 1936) crocodile shark

### Family Lamnidae

20. *Carcharodon carcharias* (Linnaeus, 1758) great white shark
21. *Isurus oxyrinchus* (Rafinesque, 1810) short-fin mako shark
22. *I. paucus* (Guitart, 1966) long-fin mako shark

## ORDER CARCHARHINIFORMES

### Family Scyliorhinidae

23. *Atelomycterus marmoratus* (Bennet, 1830) coral-cat shark
24. *Bythaelurus hispidus* (Alcock, 1891) bristly-cat shark

### Family Proscylliidae

25. *Eridacnis radcliffei* (Smith, 1913) pygmy ribbon-tail cat shark

### Family Triakidae

26. *Mustelus manazo* (Bleeker, 1854) star-spotted smooth hound shark
27. *M. mosis* (Hemprich & Ehrenberg, 1899) Arabian smooth hound shark

### Family Hemigaleidae

28. *Chaenogaleus macrostoma* (Bleeker, 1852) hook-tooth shark
29. *Hemigaleus microstoma* (Bleeker, 1852) sickle-fin weasel shark
30. *Hemipristis elongata* (Klunzinger, 1871) snaggletooth shark

### Family Carcharhinidae

31. *Carcharhinus albimarginatus* (Ruppell, 1837) silvertip shark
32. *C. altimus* (Springer, 1950) big-nose shark
33. *C. amblyrhynchoides* (Whitley, 1934) graceful shark
34. *C. amblyrhynchus* (Bleeker, 1856) grey reef shark
35. *C. amboinensis* (Muller & Henle, 1839) pig-eye shark

36. *C. brevipinna* (Muller & Henle, 1839) spinner shark
37. *C. dussumieri* (Muller & Henle, 1839) white cheek shark.
38. *C. falciformis* (Muller & Henle, 1839) silky shark
39. *C. hemiodon* (Muller & Henle, 1839) Pondicherry shark
40. *C. limbatus* (Muller & Henle, 1839) black-tip shark
41. *C. longimanus* (Poey 1861) oceanic white-tip shark
42. *C. macroti* (Muller & Henle, 1839) hard-nose shark
43. *C. melanopterus* (Quoy & Gaimard, 1824) black-tip reef shark
44. *C. plumbeus* (Nardo, 1827) sandbar shark
45. *C. sealei* (Pietschmann, 1913) black-spot shark
46. *C. sorrah* (Muller & Henle, 1839) spot-tail shark
47. *Galeocerdo cuvier* (Peron & Lesueur, 1822) tiger shark
48. *Lamiopsis temminckii* (Muller & Henle, 1839) broad-fin shark
49. *Loxodon macrorhinus* (Muller & Henle, 1839) slit-eye shark
50. *Negaprion acutidens* (Ruppell, 1837) sickle-fin lemon shark
51. *N. brevirostris* (Poey, 1868) lemon shark
52. *Prionace glauca* (Linnaeus, 1758) blue shark
53. *Rhizoprionodon acutus* (Ruppell, 1837) milk shark
54. *R. oligolinx* (Springer, 1964) grey sharp-nose shark
55. *Scoliodon laticaudus* (Muller & Henle, 1838) spade-nose shark
56. *Triaenodon obesus* (Ruppell, 1837) white-tip reef shark

#### **Family Sphyrnidae**

57. *Eusphyra blochii* (Cuvier, 1816) wing-head shark
58. *Sphyrna lewini* (Griffith & Smith, 1834) scalloped hammerhead shark
59. *S. mokarran* (Ruppell, 1837) great hammerhead shark
60. *S. zygaena* (Linnaeus, 1758) smooth hammerhead shark

## SKATES AND RAYS

### ORDER RAJIFORMES

#### Family Rhinobatidae

1. *Rhina ancylostoma* (Bloch & Schneider 1801) bowmouth guitarfish
2. *Rhinobatos holcorhynchus* (Norman, 1922) slender guitarfish
3. *Rhinobatos blochii* (Muller & Henle, 1841) bluntnose guitarfish
4. *Rhinobatos ocellatus* (Norman, 1926) speckled guitarfish
5. *Rhinobatos leucospilus* (Norman, 1926) grayspotted guitarfish
6. *Rhinobatos annulatus* (Muller & Henle, 1841) lesser guitarfish (sandshark)
7. *Rhinobatos annandalei* (Norman, 1926) Annandale's guitarfish
8. *Rhinobatus albomaculatus* (Norman, 1930) white-spotted guitarfish
9. *Glaucostegus granulatus* (Cuvier, 1829) granulated guitarfish

### ORDER MYLIOBATIFORMES

#### Family Myliobatidae

10. *Manta birostris* (Walbaum, 1792) giant manta ray
11. *Mobula mobular* (Bonnaterre, 1788) giant devil ray
12. *Rhinoptera adpersa* (Muller & Henle, 1841) rough cownose ray
13. *Rhinoptera javanica* (Muller & Henle, 1841) flapnose ray
14. *Aetobatus narinari* (Euphrasan 1790) spotted eagle ray
15. *Aetomylaeus maculatus* (Gray 1834) mottled eagle ray
16. *Aetomylaeus nichofii* (Bloch & Schneider 1801) banded eagle ray

#### Family Dasyatidae

17. *Neotrygon kuhlii* (Muller & Henle, 1841) blue-spotted stingray
18. *Dasyatis zugei* (Muller & Henle, 1841) pale-edged stingray
19. *Dasyatis acutirostra* (Nishida & Nakaya, 1988) sharpnose stingray
20. *Dasyatis thetidis* (Ogilby, 1899) thornail stingray
21. *Himantura imbricata* (Bloch & Schneider, 1801) scaly whipray
22. *Himantura undulata* (Bleeker, 1852) honeycomb (leopard) whipray
23. *Himantura jenkinsii* (Annandale, 1909) Jenkins' whipray
24. *Pastinachus sephen* (Forsskal, 1775) cowtail stingray
25. *Taeniura lymma* (Forsskal, 1775) bluespotted ribbontail ray
26. *Urogymnus asperrimus* (Bloch & Schneider, 1801) porcupine ray

#### Family Gymnuridae

27. *Gymnura micrura* (Bloch & Schneider, 1801) butterfly ray

## **Appendix II Internal (Stakeholder) Evaluation Report SLNPOA-Sharks 2013 - 2017**

### **Introduction**

The Sri Lanka National Plan of Action for the Conservation and Management of Sharks covered the period to 2013 to 2017. Towards the end of 2017, the Department of Fisheries and Aquatic Resources indicated that it was necessary to review the National Plan of Action in 2018. Blue Resource Trust which is a non-governmental organization in Sri Lanka provided the core fund to conduct the review and formulate the new NPOA Sharks (2018 – 2022), with funds provided by the Pew Charitable Trust. The review and formulation of the new NPOA was undertaken by pelagikos Pvt Ltd, as part of the Sri Lankan Longline Fishery Improvement Project.

After studying the Sri Lanka National Plan of Action for the Conservation and Management of Sharks in 2013-2017, a semi structured questionnaire was prepared and conducted with all the relevant government and non –governmental organization to assess the progress of implementation and impact of the NPOA 2013 - 17. The following government and non-government authorities were interviewed using the questionnaire.

- Department of Fisheries and Aquatic Resources
- National Aquatic Resource Research and Development Agency
- Blue Resource Trust
- Department of Wild Life Conservation

Information relevant to the implementation of the NPOA was requested from leading Sri Lankan academic based in 12 local universities. The following Priority Areas and Priority Objectives were covered by the questionnaire

### **Priority Areas**

- Priority Area 1:** Improvement of data acquisition and reporting (Catch, discards, landing, effort and trade)
- Priority Area 2:** Strengthening of data acquisition on biological aspects and habitats
- Priority Area 3:** Effective Conservation and Management
- Priority Area 4:** Strengthening of Enforcement/Compliance
- Priority Area 5:** Measures to address socioeconomic issues
- Priority Area 6:** Capacity building
- Priority Area 7:** Communication /Awareness

## **Priority Objectives**

- Priority Objective 1:** Ensure that shark catches from directed and non-directed fisheries are sustainable.
- Priority Objective 2:** Assess threats to shark populations, determine and protect critical habitats and implement harvesting strategies consistent with the principles of biological sustainability and rational long-term economic use.
- Priority Objective 3:** Identify and provide special attention, in particular to vulnerable or threatened shark stocks.
- Priority Objective 4:** Contribute to the protection of biodiversity and ecosystem structure and function

## **Results**

- Priority Area 1: Improvement of data acquisition and reporting (Catch, discards, landing, effort and trade)**

| <b>Priority Area</b>   | <b>Completed</b> | <b>Ongoing</b> | <b>Not completed</b> |
|------------------------|------------------|----------------|----------------------|
| <b>Priority Area 1</b> | <b>6/8</b>       | <b>1/8</b>     | <b>1/8</b>           |

## **Stakeholder suggestions and observations**

- ✓ NARA, IOTC, FAO and the Manta Trust has developed Shark identification guide, handouts and coloured posters.
- ✓ The Marine Biology Division of NARA already has Shark species list which form part of NARA's ongoing data collection scheme to cover the coastal sharks.
- ✓ There are paper logbooks and also in e-logbook where the IOTC list of Shark and Ray species is used for reporting Shark catches for fishing boats.
- ✓ Still there are no methodology to obtain data from small boats for which logbooks are not mandatory.
- ✓ Port sampling under the Fishing Operation Regulation 2014 is applicable only for the IMUL class vessels.
- ✓ DFAR is already implementing a Scientific Observer Programme on board fishing vessels > 24m.

- ✓ DFAR has submitted updated export/import trade data in terms of quantity and value separated by product type and form.
- ✓ DFAR had completed a socio-economic survey to assess the number of fishers and traders engaged in shark fishing and trade but didn't publish the results.

**Priority Area 2: Strengthening of data acquisition on biological aspects and habitats**

| Priority Area   | Completed | Ongoing | Not completed |
|-----------------|-----------|---------|---------------|
| Priority Area 2 | 0/2       | 2/2     | 0/2           |

**Stakeholder suggestions and observations**

- ✓ There are no research surveys or Observer Programme to collect data to compile information on stock structure, abundance, life history and reproduction rates of commercially important species and protected species. There are some university students from Uwa wellassa and Ocean University who are doing research on Shark species.
- ✓ Data on the feeding habitats of Silky Shark is available in NARA, but no data on critical shark habitats or threats for their habitats under Conducting research surveys and an Observer Programme to identify critical Shark habitats (e.g. pupping, egg laying and nursery grounds, and seasonal feeding or breeding aggregations) and threats to these habitats is required

**Priority Area 3: Effective Conservation and Management**

| Priority Area   | Completed | Ongoing | Not completed |
|-----------------|-----------|---------|---------------|
| Priority Area 3 | 4/8       | 3/8     | 1/8           |

**Stakeholder suggestions and observations**

- ✓ Under Monitoring - regulations for controlling international trade of shark species adopted under CITES, there are conditions in the Import and Export Regulation 2017. There are also regulations for prohibiting thresher shark, Oceanic whitetip shark and Whale shark landings. 183 countries listed thresher shark, Oceanic whitetip shark, Whale shark and porbeagle hammerhead under CITES. But CITES clearance is only upon request and importer countries such as China and Hong Kong do not request CITES clearance.



- ✓ Under Monitoring - conduct further studies on endangered and threatened species listed under CITES, DFAR check all the EEZ and BEEZ catches, Conditions are in Import and Export Regulation 2017 and CITES requirements, NARA length frequency data and sampling data from ports is available with NARA.
- ✓ There is no spatial and/or temporal closures at localities identified based on improved data acquisition.
- ✓ DFAR does not give any subsidies for Shark fishing.
- ✓ Introducing techniques for live release of prohibited shark species incidentally caught in fishing gear used in other fisheries is required. DFAR will prevent using wire trace and enforce compliance with using de-hooking devices on IMUL vessels.
- ✓ There are no such management arrangements for Sharks that are enforceable and consistent with the ecologically sustainable use of Sharks in terms of the objectives and actions of NPOA and introduce amendments accordingly. But there are regulations and prohibitions, but there are no data of species at risk to inform management measures. For example, already there are conditions for protect whale sharks in the Shark Management Regulation 2015 and the thresher shark fishery is already prohibited in Sri Lanka

**Priority Area 4: Strengthening of Enforcement/Compliance**

| <b>Priority Area</b>   | <b>Completed</b> | <b>Ongoing</b> | <b>Not completed</b> |
|------------------------|------------------|----------------|----------------------|
| <b>Priority Area 4</b> | <b>1</b>         | <b>0</b>       | <b>0</b>             |

**Stakeholder suggestions and observations**

- ✓ Under enhancing implementation of the Sri Lanka National Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing (SLNPOA – IUU) by, among others, DFAR establishing VMS in all BEEZ fishing vessels with high level of compliance and scientific observer programme is operating in all >21m vessels. DFAR is going to conduct e-monitoring with FAO UN and crew based observer program by DFAR / FIP in 2018.
- ✓ Under strengthening the port inspection scheme, and encouraging informants to give information on unlawful fishing activities, Catch Data is collected from al BEEZ fishing vessels. According to MFAR Compliance with IOTC is 80% in 2018, compared to 18% in 2013.

**Priority Area 5: Measures to address socioeconomic issues**

| Priority Area   | Completed | Ongoing | Not completed |
|-----------------|-----------|---------|---------------|
| Priority Area 5 | 0         | 0       | 1             |

**Stakeholder suggestions and observations**

- ✓ When considering the fishers affected by the Prohibition of Catching Thresher Shark Regulations, there were 11 major boats in above area which are targeting thresher shark in 2012. But after banning the fishery they are doing other alternative things, there is no data about their alternative livelihoods.

**Priority Area 6: Capacity building**

| Priority Area   | Completed | Ongoing | Not completed |
|-----------------|-----------|---------|---------------|
| Priority Area 6 | 0         | 1       | 0             |

**Stakeholder suggestions and observations**

- ✓ Under providing researchers with the opportunities through national, regional and international training to build their research capabilities on shark fisheries, NARA has done some manta ray studies with a small sample size in western and southern coast.

**Priority Area 7. Communication /Awareness**

| Priority Area   | Completed | Ongoing | Not completed |
|-----------------|-----------|---------|---------------|
| Priority Area 6 | 1/7       | 3/7     | 3/7           |

**Stakeholder suggestions and observations**

- ✓ There were some programmes to develop and implement a comprehensive education and awareness building strategy in the initial stage of NPOA. However no follow up programmes have been conducted.
  - Awareness for the fishers on the importance and need to conserve and manage Shark resources is part of Development of National Plan of Action.
  - There were no awareness for stakeholders on the current regulations concerning conservation and management of Sharks.

- There was a Shark fin identification workshop conducted by Blue Resource Trust for officers of DFAR, Sri Lanka Customs (SLC) and others. DFAR has requested an HS code for Shark and ray products and CG / SLN ID sharks in harbours.
- Awareness programme will be done for boat operators on the importance of Shark catch data for management of Shark fisheries and recording catch data in the logbooks with the respective GPS positions with the logbook, e-logbook and crew based observer programme.
- There were no awareness programme conducted for boat operators, fishers, fish collectors and traders on post-harvest technology for quality improvement of Shark products.
- No awareness programmes for boat owners and operators on Whale Shark Guidelines.
- DFAR is conducting awareness programs for all stakeholders highlighting the main elements and recommendations of the SLNPOA – Sharks. But only one steering committee meeting was held in 2014

**Priority Objective 1:            Ensure that shark catches from directed and non-directed fisheries are sustainable**

| <b>Priority Objective</b>   | <b>Completed</b> | <b>Ongoing</b> | <b>Not completed</b> |
|-----------------------------|------------------|----------------|----------------------|
|                             |                  |                |                      |
| <b>Priority Objective 1</b> | <b>2/3</b>       | <b>1/3</b>     | <b>0</b>             |

**Stakeholder suggestions and observations**

- ✓ Data from 2014 for the annual production under Biological Indicators has been given by Department of Fisheries and Aquatic Resources.
- ✓ Length data for some species are available with NARA, including the percentage of juveniles or under-sized fish in catches under Biological Indicators.
- ✓ Data for number of fishers, processors and traders dependent on shark fishing is available with DFAR.

**Priority Objective 2:** Assess threats to shark populations, determine and protect critical habitats and implement harvesting strategies consistent with the principles of biological sustainability and rational long-term economic use.

| Priority Area               | Completed  | Ongoing    | Not completed |
|-----------------------------|------------|------------|---------------|
|                             |            |            |               |
| <b>Priority Objective 2</b> | <b>1/3</b> | <b>2/3</b> | <b>0</b>      |

**Stakeholder suggestions and observations**

- ✓ It is important to know mangrove habitats under the Extent of habitat damage. Because most Sharks are breeding in mangrove habitats.
- ✓ There are no data and information to know the extent of skate grounds.
- ✓ Under Species Abundance (richness. no. of species?), the 2013 level was 60 Shark Species / 27 Ray Species in the NPOA and 2018 Level = 64 Shark Species were observed. There was some doubt about the meaning of species richness meant here? And that it was not very meaningful. The number of species in the catch, is less important than the quantity of each species caught. This is likely to have reduced, along with the reduction in IUU fishing by Sri Lankan vessels in the EEZ of other countries, notably BIOT. Many vessels illegally fishing in BIOT before the EC ban in 2014 - were targeting sharks.

**Priority Objective 3:** Identify and provide special attention, in particular to vulnerable or threatened shark stocks

| Priority Area               | Completed | Ongoing  | Not completed |
|-----------------------------|-----------|----------|---------------|
|                             |           |          |               |
| <b>Priority Objective 3</b> | <b>1</b>  | <b>0</b> | <b>0</b>      |

**Stakeholder suggestions and observations**

- ✓ There are no data or information about the proportion of thresher sharks in shark catches because the thresher shark ban is implementing from 2013.

**Priority Objective 4:** Contribute to the protection of biodiversity and ecosystem structure and function

### Appendix III The Species Covered by the IOTC Agreement

| <b>FAO English name</b>                   | <b>Nom FAO en français</b>       | <b>Nombre FAO en español</b>        | <b>Scientific name</b>         |
|---|----------------------------------|-------------------------------------|--------------------------------|
| <b>Nom FAO en anglais</b>                 | <b>FAO French name</b>           | <b>FAO Spanish name</b>             | <b>Nom scientifique</b>        |
| <b>Nombre FAO en inglés</b>               | <b>Nombre FAO en francés</b>     | <b>Nom FAO en español</b>           | <b>Nombre científico</b>       |
| <b>1. Yellowfin tuna</b>                  | Albacore                         | Rabil                               | <i>Thunnus albacares</i>       |
| <b>2. Skipjack</b>                        | Listao; Bonite à ventre rayé     | Listado                             | <i>Katsuwonus pelamis</i>      |
| <b>3. Bigeye tuna</b>                     | Patudo; Thon obèse               | Patudo                              | <i>Thunnus obesus</i>          |
| <b>4. Albacore tuna</b>                   | Germon                           | Atún blanco                         | <i>Thunnus alalunga</i>        |
| <b>5. Southern Bluefin tuna</b>           | Thon rouge du sud                | Atún del sur                        | <i>Thunnus maccoyii</i>        |
| <b>6. Longtail tuna</b>                   | Thon mignon                      | Atún tongol                         | <i>Thunnus tonggol</i>         |
| <b>7. Kawakawa</b>                        | Thonine orientale                | Baroceta oriental                   | <i>Euthynnus affinis</i>       |
| <b>8. Frigate tuna</b>                    | Auxide                           | Melva                               | <i>Auxis thazard</i>           |
| <b>9. Bullet tuna</b>                     | Bonitou                          | Melva (= Melvera)                   | <i>Auxis rochei</i>            |
| <b>10. Narrow barred Spanish mackerel</b> | Thazard rayé                     | Carite estraido<br>(Indo- Pacífico) | <i>Scomberomorus commerson</i> |
| <b>11. Indo-Pacific king mackerel</b>     | Thazard ponctué                  | Carite<br>(Indo-Pacífico)           | <i>Scomberomorus guttatus</i>  |
| <b>12. Indo-Pacific blue marlin</b>       | Makaire bleu de l'Indo Pacifique | Aguja azul<br>(Indo-Pacífico)       | <i>Makaira mazara</i>          |
| <b>13. Black marlin</b>                   | Makaire noir                     | Aguja negra                         | <i>Makaira indica</i>          |
| <b>14. Striped marlin</b>                 | Marlin rayé                      | Marlín rayado                       | <i>Tetrapturus audax</i>       |
| <b>15. Indo-Pacific sailfish</b>          | Voilier de l'Indo-Pacifique      | Pez vela<br>(Indo-Pacífico)         | <i>Istiophorus platypterus</i> |
| <b>16. Swordfish</b>                      | Espadon                          | Pez espada                          | <i>Xiphias gladius</i>         |

## Appendix IVIOTC Shark Species Codes

| <b>Code</b> | <b>Shark Species</b>                         |
|-------------|--|
|             |  |
| <b>AGN</b>  | Angel shark                                  |
| <b>ALS</b>  | Silvertip shark                              |
| <b>ALV</b>  | Thresher Shark                               |
| <b>AML</b>  | Grey Reef Shark                              |
| <b>BLR</b>  | Blacktip reef shark                          |
| <b>BRO</b>  | Copper shark                                 |
| <b>BSH</b>  | Blue shark                                   |
| <b>BTH</b>  | Bigeye thresher                              |
| <b>CCB</b>  | Spinner Shark                                |
| <b>CCD</b>  | Whitecheek shark                             |
| <b>CCE</b>  | Bull shark                                   |
| <b>CCG</b>  | Galapagos shark                              |
| <b>CCL</b>  | Blacktip shark                               |
| <b>CCM</b>  | Hardnose shark                               |
| <b>CCP</b>  | Sandbar shark                                |
| <b>CCQ</b>  | Spot-tail shark                              |
| <b>CCY</b>  | Graceful shark                               |
| <b>CLD</b>  | Sliteye shark                                |
| <b>CWZ</b>  | Carcharhinus sharks <i>nei</i> <sup>23</sup> |
| <b>DGZ</b>  | Dogfishes <i>nei</i>                         |
| <b>DUS</b>  | Dusky shark                                  |
| <b>EAG</b>  | Eagle Rays                                   |
| <b>FAL</b>  | Silky shark                                  |
| <b>GAG</b>  | Tope shark                                   |
| <b>GAM</b>  | Mouse catshark                               |
| <b>HCM</b>  | Hooktooth shark                              |
| <b>HEE</b>  | Snaggletooth shark                           |
| <b>LMA</b>  | Longfin mako                                 |
| <b>MAK</b>  | Mako sharks                                  |
| <b>MSK</b>  | Sharks mackerel and porbeagles <i>nei</i>    |
| <b>NTC</b>  | Broadnose sevengill shark                    |
| <b>OCS</b>  | Oceanic whitetip shark                       |
| <b>OXY</b>  | Angular rough shark                          |
| <b>PLS</b>  | Pelagic stingray                             |

<sup>23</sup>*nei* – not elsewhere included

| <b>Code</b> | <b>Shark Species</b>   |
|-------------|--|
| <b>POR</b>  | Porbeagle  |
| <b>PSK</b>  | Crocodile shark  |
| <b>PTH</b>  | Pelagic thresher shark   |
| <b>RHA</b>  | Milk shark   |
| <b>RHN</b>  | Whale shark  |
| <b>RMB</b>  | Giant Mantas   |
| <b>RMM</b>  | Devil Ray  |
| <b>RSK</b>  | Requiem sharks <i>nei</i>  |
| <b>SBL</b>  | Bluntnose sixgill shark  |
| <b>SCK</b>  | Kitefin shark  |
| <b>SHBC</b> | Banded Cat Shark   |
| <b>SHCW</b> | Cow Shark  |
| <b>SHM</b>  | Mackerel Sharks  |
| <b>SHRK</b> | Sharks various <i>nei</i>  |
| <b>SHXX</b> | Sharks <i>nei</i> other than oceanic whitetip shark and blue shark |
| <b>SKH</b>  | Sharks various <i>nei</i>  |
| <b>SKHS</b> | Sharks finned  |
| <b>SKPN</b> | Spinner Shark  |
| <b>SMA</b>  | Shortfin mako  |
| <b>SMD</b>  | Smooth-hound   |
| <b>SPK</b>  | Great hammerhead shark   |
| <b>SPL</b>  | Scalloped hammerhead   |
| <b>SPN</b>  | Hammerhead sharks <i>nei</i>                                       |
| <b>SPY</b>  | Bonnethead and hammerhead sharks                                   |
| <b>SPZ</b>  | Smooth hammerhead  |
| <b>SRX</b>  | Rays and stingrays and mantas <i>nei</i>                           |
| <b>THR</b>  | Thresher sharks <i>nei</i>   |
| <b>TIG</b>  | Tiger shark  |
| <b>TRB</b>  | Whitetip reef shark  |
| <b>TRK</b>  | Houndsharks, smoothhounds <i>nei</i>                               |

## Appendix V- Little Gulper Shark (*Centrophorus uyato*)



**Information Source:** FishBase

### A. Classification

|           |   |
|-----------|---|
| Class     | Chondrichthyes                                  |
| Sub Class | Elasmobranchii (sharks and rays)                |
| Order     | Squaliformes (bramble, sleeper, dogfish sharks) |
| Family    | Centrophoridae                                  |

### B. Distribution

**Widespread** (43°N - 43°S): Western Central Atlantic: Gulf of Mexico. Eastern Atlantic: western Mediterranean and Gibraltar to Senegal, Côte d'Ivoire to Nigeria, Cameroon to Angola, northern Namibia. Indian Ocean: southern Mozambique, uncertain records from India; Western Australia. Western Pacific: Australia; occurrence in Taiwan needs validation.

### C. Biology & Ecology

A common deep water dogfish of the outer continental shelves and upper slopes, on or near the bottom. Bathydemersal depth range 50 - 1400 m, usually 200 - ? m. . Adults feed on bony fishes and squid. Ovoviviparous embryos feed solely on yolk. Number of young usually only 1. Size at birth between 40 and 50 cm; distinct pairing with embrace. Utilized dried salted for human consumption and probably for fishmeal and liver oil.



**C. Life History Estimates**

|                                      |                 |
|--------------------------------------|-----------------|
| Maximum Observed Weight              | 7.3 kg          |
| Maximum Length (Lmax)                | 110 cm          |
| Infinite Length (Linf)               | 113 cm          |
| Length on Maturity (Lm)              | 58.3 cm         |
| Length on Maximum Yield (Lopt)       | 78.3 cm         |
| Lifespan                             | 41.1 years      |
| Generation Time                      | 13.2 years      |
| Age of 1 <sup>st</sup> Maturity (tm) | 8.6 years       |
| Trophic Level                        | 4.5 (Carnivore) |

## Appendix VI Pale-edged Stingray (*Telatrygon zugei*)



**Information Source:** FishBase

### A. Classification

|           |                                  |
|-----------|----------------------------------|
| Class     | Chondrichthyes                   |
| Sub Class | Elasmobranchii (sharks and rays) |
| Order     | Myliobatiformes                  |
| Family    | Dasyatidae                       |

### B. Distribution

Indo-West Pacific: India to southern Japan, Myanmar, Malaya, Indonesia, China and Indo-China.

### C. Biology & Ecology

Common in estuaries. Feed on bottom-dwelling organisms - primarily small crustaceans, but also small fishes. Ovoviviparous. Landed in very large quantities as by-catch in the bottom trawl and trammel fisheries. Utilized for its meat, but of limited value due to its very small size. Exhibit ovoviparity (aplacental viviparity), with embryos feeding initially on yolk, then receiving additional nourishment from the mother by indirect absorption of uterine fluid enriched with mucus, fat or protein through specialized structures. Distinct pairing with embrace. Gives birth to litters of 1-4 pups.

**D. Life History Estimates**

Maximum Observed Weight

Maximum Length (Lmax) 29.0cm

Infinite Length (Linf) 30.4cm

Length on Maturity (Lm) 17.9cm

Length on Maximum Yield (Lopt) 18.7cm

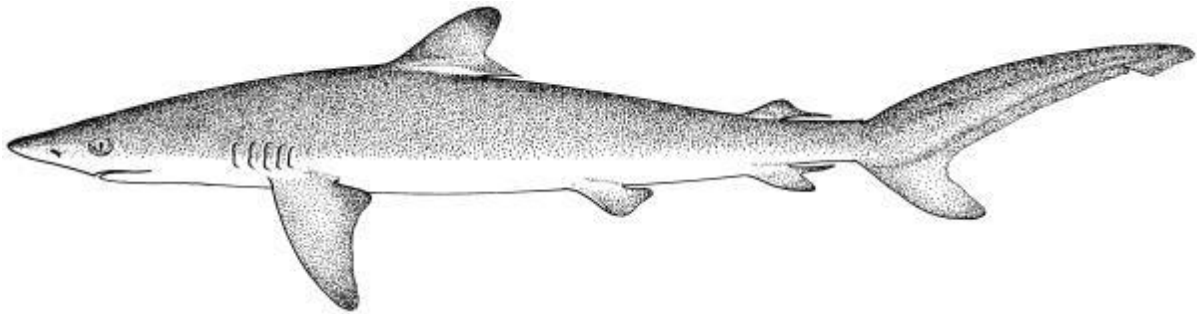
Lifespan Unknown

Generation Time Unknown

Age of 1<sup>st</sup> Maturity (tm) Unknown

Trophic Level 3.5 +/- s.e. 0.37

## Appendix VII Silky Shark (*Carcharhinus falciformis*)



**Information Source:** FishBase

### A. Classification

|           |                                  |
|-----------|----------------------------------|
| Class     | Chondrichthyes                   |
| Sub Class | Elasmobranchii (sharks and rays) |
| Order     | Carcharhiniformes                |
| Family    | Carcharhinidae                   |

### B. Distribution

**Circum tropical.** Western Atlantic: Massachusetts, USA to southern Brazil, including the Gulf of Mexico and the Caribbean Sea to Uruguay. Eastern Atlantic: Spain, Madeira to northern Angola; St. Paul's Rocks. Cape Verde. Indo-Pacific: scattered records from the Red Sea and Natal, South Africa to China, New Zealand, and the Caroline, Hawaiian, Phoenix and Line islands. Eastern Pacific: southern Baja California, Mexico to northern Chile. Highly migratory species

### C. Biology & Ecology

Found abundantly near the edge of continental and insular shelves, but also in the open sea and occasionally inshore. Often found in deep water reefs and near insular slopes. Littoral and epipelagic, in the open sea or near the bottom at 18-500 m. It is quick-moving and aggressive. Solitary; often associated with schools of tuna. Feeds mainly on fishes, but also squid, paper nautilus, and pelagic crabs. Viviparous. Regarded as dangerous to humans. Flesh utilized fresh and dried-salted for human consumption; its hide for leather; its fin for shark-fin soup; its liver for oil.

Viviparous, placental. 2-15 pups born at 57-87 cm TL; 1-16 pups born at 55-72 cm TL. Females appear to breed every year, but there appears to be no reproductive seasonality. Distinct pairing with embrace.

#### D. Life History Estimates

|                                      |           |
|--------------------------------------|-----------|
| Maximum Observed Weight              | 346.0 kg  |
| Maximum Length (Lmax)                | 350.0cm   |
| Infinite Length (Linf)               | 315.0cm   |
| Length on Maturity (Lm)              | 146.3cm   |
| Length on Maximum Yield (Lopt)       | 213.4cm   |
| Lifespan                             | 32.3years |
| Generation Time                      | 11.6years |
| Age of 1 <sup>st</sup> Maturity (tm) | 5.9years  |
| Trophic Level                        | 4.5       |

**Information Source:** Indian Ocean Tuna Commission

| Area <sup>1</sup> | Indicators   |  | 2017 stock status determination |
|-------------------|--|--|---------------------------------|
| Indian Ocean      | Reported catch 2016:<br>Not elsewhere included (nei) sharks <sup>2</sup> 2016:<br>Average reported catch 2012-16:<br>Av. not elsewhere included (nei) sharks <sup>2</sup> 2012-16:   | 2,189 t<br>54,495 t<br>3,278 t<br>49,152 t |                                 |
|                   | MSY (1,000 t) (80% CI):<br>F <sub>MSY</sub> (80% CI):<br>SB <sub>MSY</sub> (1,000 t) (80% CI):<br>F <sub>current</sub> /F <sub>MSY</sub> (80% CI):<br>SB <sub>current</sub> /SB <sub>MSY</sub> (80% CI):<br>SB <sub>current</sub> /SB <sub>0</sub> (80% CI): | unknown                                    |                                 |

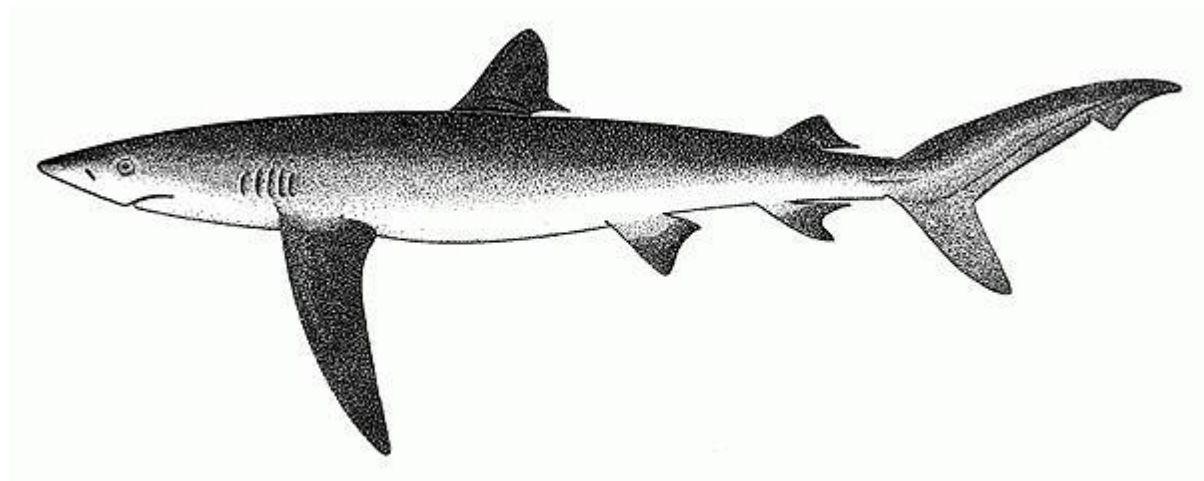
- a) **Stock Status:** The IOTC notes that *there remains considerable uncertainty about the relationship between abundance and the nominal CPUE series from the main longline fleets, and about the total catches over the past decade (Table 1). The ecological risk assessment (ERA) conducted for the Indian Ocean by the WPEB and SC in 20121 consisted of a semi-quantitative risk assessment analysis to evaluate the resilience of shark species to the impact of a given fishery, by combining the biological productivity of the species and its susceptibility to each fishing gear type.*
- b) *Silky shark received a high vulnerability ranking (No. 4) in the ERA rank for longline gear because it was estimated to be one of the least productive shark species, and with a high susceptibility to longline gear. Silky shark was estimated to be the second most vulnerable shark species in the ERA ranking for purse seine gear, due to its low productivity and high susceptibility to purse seine gear. The current IUCN threat status of 'Near Threatened' applies to silky shark in the western and eastern Indian Ocean and globally.*
- c) *There is a paucity of information available on this species but several studies have been carried out for this species in the recent years. Silky sharks are commonly taken by a range of fisheries in the Indian Ocean. Because of their life history characteristics – they are relatively long lived (over 20 years), mature relatively late (at 6–12 years), and have relatively few offspring (<20 pups every two years), the silky shark can be vulnerable to overfishing.*
- d) *Despite the lack of data, there is some anecdotal information suggesting that silky shark abundance has declined over recent decades, including from Indian longline research surveys, which are described in the IOTC Supporting Information for silky shark sharks. There is no quantitative stock assessment or basic fishery indicators currently available for silky shark in the Indian Ocean therefore the stock status is **unknown**.*
- e) **Outlook:** The IOTC notes that *maintaining or increasing effort can probably result in declines in biomass, productivity and CPUE. The impact of piracy in the western Indian Ocean has resulted in the displacement and subsequent concentration of a substantial portion of longline fishing effort into certain areas in the southern and eastern Indian Ocean. Some longline vessels have returned to their traditional fishing areas in the northwest Indian Ocean, due to the increased security onboard vessels, with the exception of the Japanese fleet which has still not returned to the levels seen before the start of the piracy threat. It is therefore unlikely that catch and effort on silky shark has declined in the southern and eastern areas, and may have resulted in localized depletion there.*

- f) **Management Advice:** The IOTC notes that *despite the absence of stock assessment information, the Commission should consider taking a cautious approach by implementing some management actions for silky sharks. While mechanisms exist for encouraging CPCs to comply with their recording and reporting requirements (Resolution 16/06), these need to be further implemented by the Commission so as to better inform scientific advice.*
- g) IOTC notes the following key points
- **Maximum Sustainable Yield (MSY):** Unknown.
  - **Reference Points:** Not applicable.
  - **Main Fishing Gear (2012-16):** Gillnet; gillnet-longline; longline (fresh); longline-gillnet.
  - **Main Fleets (2012-16):** Sri Lanka; I.R. Iran; Taiwan, China.

**Information Source:** National Aquatic Resources, Research & Development Agency

| Silky Shark      | Total   |        | EEZ      |       | BEEZ  |       |
|------------------|---------|--------|----------|-------|-------|-------|
|                  |         |        |          |       |       |       |
| <b>Longline</b>  | 1,664.5 | 57.0%  | 1,337.60 | 45.8% | 326.9 | 11.2% |
| <b>Gillnet</b>   | 1,019.8 | 34.9%  | 754.1    | 25.8% | 265.7 | 9.1%  |
| <b>Ring Net</b>  | 122.6   | 4.2%   | 114.2    | 3.9%  | 8.4   | 0.3%  |
| <b>Trolling</b>  | 85.6    | 2.9%   | 82.4     | 2.8%  | 3.2   | 0.1%  |
| <b>Handline</b>  | 28.0    | 1.0%   | 28       | 0.9%  | -     | 0.0%  |
|                  |         |        |          | 0.0%  |       | 0.0%  |
| <b>All Gears</b> | 2,920.5 | 100.0% | 2,316.30 | 79.3% | 604.2 | 20.7% |

## Appendix VIII Blue Shark (*Prionace glauca*)



**Information Source:** FishBase

### A. Classification

|           |                                  |
|-----------|----------------------------------|
| Class     | Chondrichthyes                   |
| Sub Class | Elasmobranchii (sharks and rays) |
| Order     | Carcharhiniformes                |
| Family    | Carcharhinidae                   |

### B. Distribution

Circum global in temperate and tropical waters. Western Atlantic: Newfoundland, Canada to Argentina. Central Atlantic. Eastern Atlantic: Norway to South Africa, including the Mediterranean. Indo-West Pacific: East Africa to Indonesia, Japan, Australia, New Caledonia, and New Zealand. Eastern Pacific: Gulf of Alaska to Chile. Probably the widest ranging chondrichthyan. Highly migratory species, Annex I of the 1982 Convention on the Law of the Sea

### C. Biology & Ecology

Oceanic, but may be found close inshore where the continental shelf is narrow. Usually found to at least 150 m. Reported from estuaries. Epipelagic, occasionally occurs in littoral areas. Feeds on fishes (herring, silver hake, white hake, red hake, cod, haddock, pollock, mackerel, butterfish, sea raven and flounders, small sharks, squids, pelagic red crabs, cetacean carrion, occasional sea birds and garbage. Viviparous. Sexual dimorphism occurs in skin thickness of maturing and adult females.

Sexually mature at 250 cm long and 4-5 years old. The female gives birth up to 80 young measuring 40 cm long, gestation lasts almost a year. Produces from 4 to 135 young a litter. Distinct pairing with embrace. Viviparous, placental; 4-63 young in a litter; 4-135 (usually 15-30) pups, about 35-44 cm at birth. Gestation period ranges from 9 to 12 months. Sexual dimorphism is evident in skin thickness of maturing and adult females. Females have thicker skin layer than males of the same size



#### D. Life History Estimates

|                                      |                   |
|--------------------------------------|-------------------|
| Maximum Observed Weight              | 205.9 kg          |
| Maximum Length (Lmax)                | 400.0cm           |
| Infinite Length (Linf)               | 369.0cm           |
| Length on Maturity (Lm)              | 168.7cm           |
| Length on Maximum Yield (Lopt)       | 263.6cm           |
| Lifespan                             | 29.1years         |
| Generation Time                      | 11.7years         |
| Age of 1 <sup>st</sup> Maturity (tm) | 5.2years          |
| Trophic Level                        | 4.4 +/- s.e. 0.19 |

**Information Source:** Indian Ocean Tuna Commission

| Area <sup>1</sup>   | Indicators   |                    | 2017 stock status determination |
|---|--|--------------------|---------------------------------|
| Indian Ocean  | Reported catch 2016:   | 32,312 t           | 72.6%                           |
|   | Estimated catch 2015:  | 54,735 t           |                                 |
|   | Not elsewhere included (nei) sharks <sup>2</sup> 2016:         | 54,495 t           |                                 |
|   | Average reported catch 2012-16:                                | 30,563 t           |                                 |
|   | Average estimated catch 2011-15:                               | 54,993 t           |                                 |
|   | Ave. not elsewhere included (nei) sharks <sup>2</sup> 2012-16: | 49,152 t           |                                 |
|   | MSY (1,000 t) (80% CI) <sup>3</sup> :                          | 33.0 (29.5 - 36.6) |                                 |
|   | F <sub>MSY</sub> (80% CI) <sup>3</sup> :                       | 0.30 (0.30 - 0.31) |                                 |
|   | SB <sub>MSY</sub> (1,000 t) (80% CI) <sup>3,4</sup> :          | 39.7 (35.5 - 45.4) |                                 |
|   | F <sub>2015</sub> /F <sub>MSY</sub> (80% CI) <sup>3</sup> :    | 0.86 (0.67 - 1.09) |                                 |
| SB <sub>2015</sub> /SB <sub>MSY</sub> (80% CI) <sup>3</sup> : | 1.54 (1.37 - 1.72)   |                    |                                 |
| SB <sub>2015</sub> /SB <sub>0</sub> (80% CI) <sup>3</sup> :   | 0.52 (0.46 - 0.56)   |                    |                                 |

Stock Status: The IOTC notes that *considerable progress was made since the last Indian Ocean blue shark assessment on the integration of new data sources and modelling approaches. Uncertainty in data inputs and model configuration were explored through sensitivity analysis. Four stock assessment models were applied to the blue shark in 2017, specifically a data-limited catch only model (SRA), two Bayesian biomass dynamic models (JABBA with process error and a Pella-Tomlinson production model without process error) and an integrated age-structured model (SS3).*

*All models neither produced similar results suggesting the stock is currently not overfished nor subject to overfishing, but with the trajectories showing consistent trends towards the overfished and subject to overfishing quadrant of the Kobe plot. A base case model was selected based on the best Indian Ocean biological data, consistency of CPUE standardized relative abundance series, model fits and spatial extent of the data.*

*The major change in biological parameters since the previous stock assessment is the stock recruitment relationship, i.e., steepness = 0.79 due to the update of the key biological parameters calculated specific to the Indian Ocean.*

*The major axes of uncertainties identified in the current model are catches and CPUE indices of abundance. Model results were explored with respect to their sensitivity to the major axes of uncertainty identified. If the alternative CPUE groupings were used then the stock status was somewhat more positive ( $B \gg B_{msy}$  and  $F \ll F_{msy}$ ), while if the alternative catch series (trade and EUPOA) were used then the estimated stock status resulted in  $F > F_{msy}$ .*

*The ecological risk assessment (ERA) conducted for the Indian Ocean by the WPEB and SC in 20123 consisted of a semi-quantitative risk assessment analysis to evaluate the resilience of shark species to the impact of a given fishery by combining the biological productivity of the species and its susceptibility to each fishing gear type. Blue sharks received a medium vulnerability ranking (No. 10) in the ERA rank for longline gear because it was estimated as the most productive shark species, but was also characterized by the second highest susceptibility to longline gear. Blue shark was estimated as not being susceptible thus not vulnerable to purse seine gear.*

*The current IUCN threat status of 'Near Threatened' applies to blue sharks globally. Information available on this species has been improving in recent years. Blue sharks are commonly taken by a range of fisheries in the Indian Ocean and in some areas they are fished in their nursery grounds. Because of their life history characteristics – they live until at least 25 years, mature at 4–6 years, and have 25–50 pups every year and are considered to be the most productive of the pelagic sharks. On the weight-of-evidence available in 2017, the stock status is determined to be not overfished and not subject to overfishing.*

**Outlook:** *The IOTC notes that increasing effort could result in declines in biomass. The Kobe II Strategy Matrix provides the probability of exceeding reference levels in the short (3 years) and long term (10 years) given a range of percentage changes in catch.*

**Management Advice:** *The IOTC notes that even though the blue shark in 2017 is assessed to be not overfished nor subject to overfishing, maintaining current catches is likely to result in decreasing biomass and the stock becoming overfished and subject to overfishing in the near future. If the catches are reduced at least 10%, the probability of maintaining stock biomass above MSY reference levels ( $B > B_{MSY}$ ) over the next 8 years will be increased. The IOTC recommends that the stock should be closely monitored. While mechanisms exist for encouraging CPCs to comply with their recording and reporting requirements (Resolution 16/06), these need to be further implemented by the Commission, so as to better inform scientific advice in the future.*

IOTC notes the following key points

Maximum Sustainable Yield (MSY): Estimate for the Indian Ocean stock is 33,000 t.

Reference Points: The Commission has not adopted reference points or harvest control rules for any shark species.

Main Fishing Gear (2011–15): Coastal longline; longline targeting swordfish; longline (deep-freezing).

Main Fleets (2012-16): Indonesia; EU - Spain; Taiwan, China; Japan; EU - Portugal.

**Information Source:** National Aquatic Resources, Research & Development Agency

| Blue Shark       | Total   |        | EEZ   |        | BEEZ  |        |
|------------------|---------|--------|-------|--------|-------|--------|
|                  |         |        |       |        |       |        |
| Longline         | 525.9   | 49.2%  | 398   | 37.2%  | 127.9 | 11.9%  |
| Gillnet          | 328.9   | 30.8%  | 199.6 | 18.7%  | 129.3 | 12.1%  |
| Trolling         | 185.5   | 17.4%  | 184.6 | 17.3%  | 0.9   | 0.1%   |
| Handline         | 26.3    | 2.5%   | 26.3  | 2.5%   | 0     | 0.0%   |
| Ring Net         | 2.5     | 0.2%   | 2.3   | 0.2%   | 0.2   | 0.0%   |
|                  |         |        |       |        |       |        |
| <i>All Gears</i> | 1,069.1 | 100.0% | 810.8 | 75.84% | 258.3 | 24.16% |

## Appendix IX Manta & Devil Rays (Mobilidae)

### Giant Oceanic Manta Ray (*Manta birostris*)



**Information Source:** FishBase

#### A. Classification

|           |                                  |
|-----------|----------------------------------|
| Class     | Chondrichthyes                   |
| Sub Class | Elasmobranchii (sharks and rays) |
| Order     | Myliobatiformes                  |
| Family    | Myliobatidae                     |

#### B. Distribution

Circumglobal, tropical to temperate: in the Northern Hemisphere, as far north as southern California and Rhode Island on the United States west and east coasts, Mutsu Bay, Aomori, Japan, the Sinai Peninsula, Egypt and the Azores Islands; in the Southern Hemisphere, as far south as Peru, Uruguay, South Africa and New Zealand. In some locations, including Mozambique

#### C. Biology & Ecology

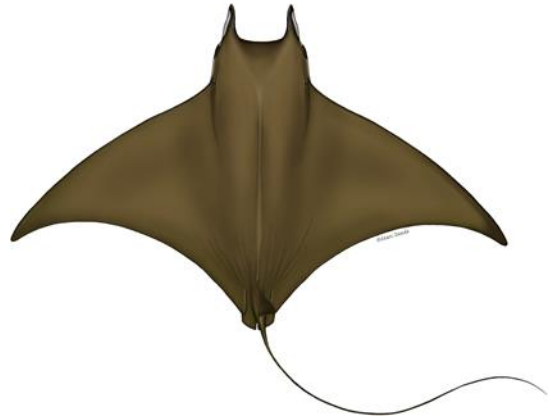
Mainly in near-shore waters, near coral and rocky reefs; sometimes found over deep water. Reported along productive coastlines with regular upwelling, oceanic island groups and EEZ pinnacles and seamounts. Penetrates shallow muddy bays and the intertidal and occurs off river mouths. Pelagic. Occurs singly or in loose aggregations. Mainly plankton feeders, but may feed on small and moderate-sized fishes as well. Leaps out the water mainly in spring and autumn, possibly as part of mating behavior. Easily approached. Ovoviviparous

Exhibit ovovi parity (aplacental viviparity), with embryos feeding initially on yolk, then receiving additional nourishment from the mother by indirect absorption of uterine fluid enriched with mucus, fat or protein through specialized structures. Bears up to 2 young; born at 122-127 cm WD

**D. Life History Estimates**

|                                      |                   |
|--------------------------------------|-------------------|
| Maximum Observed Weight              | 3.0 t             |
| Maximum Length (Lmax)                | 910.0cm           |
| Infinite Length (Linf)               | 903.6cm           |
| Length on Maturity (Lm)              | 377.0cm           |
| Length on Maximum Yield (Lopt)       | 640.1cm           |
| Lifespan                             | 36.7years         |
| Generation Time                      | 14.6years         |
| Age of 1 <sup>st</sup> Maturity (tm) | 6.0years          |
| Trophic Level                        | 3.5 +/- s.e. 0.50 |

## Chilean devil ray (*Mobula tarapacana*)



**Information Source:** FishBase

### A. Classification

|           |                                  |
|-----------|----------------------------------|
| Class     | Chondrichthyes                   |
| Sub Class | Elasmobranchii (sharks and rays) |
| Order     | Myliobatiformes                  |
| Family    | Mobulidae                        |

### B. Distribution

Circumtropical, recorded from scattered localities. Western Atlantic: off Venezuela. Eastern Atlantic: Côte d'Ivoire and South Africa. Reported from Cape Verde. Western Indian Ocean: northwestern Red Sea. Western Pacific: Japan, Taiwan, and probably tropical Australia. Eastern Pacific: Gulf of California and Chile.

### C. Biology & Ecology

Mostly oceanic, but also in coastal waters. Solitary, sometimes forms groups. Feeds on small fishes and planktonic crustaceans. Ovoviviparous. Litter number 1. Sometimes found stranded in beaches in temperate areas. Commonly caught in tuna gillnet and in harpoon fisheries. Utilized for its gill filter plates (very high value), meat, cartilage and skin.

Exhibit ovovi parity (aplacental viviparity), with embryos feeding initially on yolk, then receiving additional nourishment from the mother by indirect absorption of uterine fluid enriched with mucus, fat or protein through specialized structures

**D. Life History Estimates**

|                                      |                   |
|--------------------------------------|-------------------|
| Maximum Observed Weight              | 350.0 kg          |
| Maximum Length (Lmax)                | 328.0cm           |
| Infinite Length (Linf)               | 331.0cm           |
| Length on Maturity (Lm)              | 153.0cm           |
| Length on Maximum Yield (Lopt)       | 224.8cm           |
| Lifespan                             | 13.2years         |
| Generation Time                      | 4.8years          |
| Age of 1 <sup>st</sup> Maturity (tm) | 2.4years          |
| Trophic Level                        | 3.8 +/- s.e. 0.59 |

## Spinetail devil ray (*Mobula japonica*)



**Information Source:** FishBase

### A. Classification

|           |                                  |
|-----------|----------------------------------|
| Class     | Chondrichthyes                   |
| Sub Class | Elasmobranchii (sharks and rays) |
| Order     | Myliobatiformes                  |
| Family    | Mobulidae                        |

### B. Distribution

Indo-Pacific: off South Africa, the Arabian Sea eastward to the Hawaiian Islands and Polynesia. Eastern Pacific: on the continental coast. Eastern Atlantic: Côte d'Ivoire but may probably be more wide-ranging. This has to be critically compared with *Mobula mobular* of the Mediterranean Sea and nominally elsewhere in the North Atlantic..

### C. Biology & Ecology

Found inshore, possibly in oceanic waters. Pelagic. Occurs singly or in groups. Feeds mainly on euphausiids (mainly *Nectiphanes simplex*), and to a lesser extent on copepods and crustacean larvae. May also feed on small fishes. Ovoviviparous. Acoustic tracks record the species to spend time above the thermocline at night to feed on krill.

Exhibit ovoviparity (aplacental viviparity), with embryos feeding initially on yolk, then receiving additional nourishment from the mother by indirect absorption of uterine fluid enriched with mucus, fat or protein through specialized structures. With one in a litter. Size at birth 85-92 cm WD.



**D. Life History Estimates**

Maximum Observed Weight

Maximum Length (Lmax) 310.0cm

Infinite Length (Linf) 313.0cm

Length on Maturity (Lm) 145.6cm

Length on Maximum Yield (Lopt) 212.1cm

Lifespan 13.9years

Generation Time 5.0years

Age of 1<sup>st</sup> Maturity (tm) 2.6years

Trophic Level 3.4 +/- s.e. 0.43

## Giant Devil Ray (*Mobula mobula*)



**Information Source:** FishBase

### A. Classification

|           |                                  |
|-----------|----------------------------------|
| Class     | Chondrichthyes                   |
| Sub Class | Elasmobranchii (sharks and rays) |
| Order     | Myliobatiformes                  |
| Family    | Mobulidae                        |

### B. Distribution

Probably circumglobal in warm seas.

### C. Biology & Ecology

An epipelagic species found over continental shelves and near oceanic islands. Feeds on small pelagic fishes and crustaceans, by funnelling using their cephalic fins and then trapping or filtering the food through their specialized gill plates. Ovoviviparous. It is utilized for its meat as protein source (except the head) and gill plates as ingredient in Chinese medicine

Exhibit ovoviparity (aplacental viviparity), with embryos feeding initially on yolk, then receiving additional nourishment from the mother by indirect absorption of uterine fluid enriched with mucus, fat or protein through specialized structures.

**D. Life History Estimates**

|                                      |                  |
|--------------------------------------|------------------|
| Maximum Observed Weight              | 1.5 t            |
| Maximum Length (Lmax)                | 520.0cm          |
| Infinite Length (Linf)               | 521.0cm          |
| Length on Maturity (Lm)              | 229.9cm          |
| Length on Maximum Yield (Lopt)       | 360.6cm          |
| Lifespan                             | 13.3years        |
| Generation Time                      | 5.0years         |
| Age of 1 <sup>st</sup> Maturity (tm) | 2.3years         |
| Trophic Level                        | 3.7+/- s.e. 0.53 |

## Bentfin Devil Ray (*Mobula thurstoni*)



**Information Source:** FishBase

### A. Classification

|           |                                  |
|-----------|----------------------------------|
| Class     | Chondrichthyes                   |
| Sub Class | Elasmobranchii (sharks and rays) |
| Order     | Myliobatiformes                  |
| Family    | Mobulidae                        |

### B. Distribution

Probably circum tropical but in scattered localities. Eastern Atlantic: off Senegal and Côte d'Ivoire. Indian Ocean: off South Africa, Bay of Bengal, and probably Indonesia. Western Pacific: Gulf of Thailand and northeastern Australia, Eastern Pacific: southern California, USA to Costa Rica, including the Gulf of Tehuantepec.

### C. Biology & Ecology

Occurs in coastal and oceanic waters, but more common near the coast. Found singly or in small groups. Feeds mainly on planktonic crustaceans; mostly small shrimp-like animals. Ovoviviparous. Caught occasionally in the tuna gillnet and in harpoon fisheries. Utilized for its gill filter plates (high value), meat, cartilage and skin. Can leap out of the water.

Exhibit ovoviparity (aplacental viviparity), with embryos feeding initially on yolk, then receiving additional nourishment from the mother by indirect absorption of uterine fluid enriched with mucus, fat or protein through specialized structures. With one large offspring per gestation period. Size at birth 65-85 cm.

**D. Life History Estimates**

Maximum Observed Weight

Maximum Length (Lmax) 220.0cm

Infinite Length (Linf) 223.0cm

Length on Maturity (Lm) 107.5cm

Length on Maximum Yield (Lopt) 149.2cm

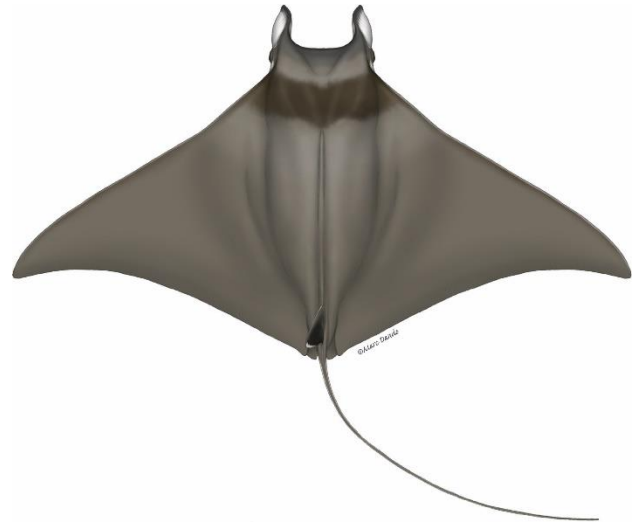
Lifespan 13.2years

Generation Time 4.6years

Age of 1<sup>st</sup> Maturity (tm) 2.5years

Trophic Level 3.1 +/- s.e. 0.30

## Shortfin Devil Ray (*Mobula kuhlii*)



**Information Source:** FishBase

### A. Classification

|           |                                  |
|-----------|----------------------------------|
| Class     | Chondrichthyes                   |
| Sub Class | Elasmobranchii (sharks and rays) |
| Order     | Myliobatiformes                  |
| Family    | Mobulidae                        |

### B. Distribution

Indo-West Pacific: eastern coast of Africa to Indonesia.

### C. Biology & Ecology

Found in coastal and oceanic waters. Feeds on plankton. Ovoviviparous. Generally found in schools, leaping out of the water. Caught rarely in the tuna gillnet fisheries. Utilized for its gill filter plates (high value), meat, cartilage and skin.

Exhibit ovoviparity (aplacental viviparity), with embryos feeding initially on yolk, then receiving additional nourishment from the mother by indirect absorption of uterine fluid enriched with mucus, fat or protein through specialized structures. Probably giving birth to only one pup; born at ~31 cm WD.

#### D. Life History Estimates

|                                      |                   |
|--------------------------------------|-------------------|
| Maximum Observed Weight              | 30.0 kg           |
| Maximum Length (Lmax)                | 119.0cm           |
| Infinite Length (Linf)               | 122.0cm           |
| Length on Maturity (Lm)              | 62.5cm            |
| Length on Maximum Yield (Lopt)       | 79.5cm            |
| Lifespan                             | 13.1years         |
| Generation Time                      | 4.3years          |
| Age of 1 <sup>st</sup> Maturity (tm) | 2.7years          |
| Trophic Level                        | 3.4 +/- s.e. 0.45 |

**Information Source:** National Aquatic Resources, Research & Development Agency

| Devil Rays       | Total   |       | EEZ     |       | BEEZ  |       |
|------------------|---------|-------|---------|-------|-------|-------|
| Gillnet          | 1,451.1 | 75.4% | 1,299.7 | 67.6% | 154.4 | 8.0%  |
| Longline         | 366.6   | 19.1% | 289.8   | 15.1% | 76.8  | 4.0%  |
| Trolling         | 53.9    | 2.8%  | 36.7    | 1.9%  | 17.2  | 0.9%  |
| Handline         | 47.1    | 2.4%  | 41.1    | 2.1%  | 6     | 0.3%  |
| Ring Net         | 4.8     | 0.2%  | 4.8     | 0.2%  | 0     | 0.0%  |
|                  |         |       |         | 0.0%  |       | 0.0%  |
| <i>All Gears</i> | 1,923.5 |       | 1,672.1 | 86.9% | 254.4 | 13.2% |

| Rays/Stingrays/Manta <i>nei</i> | Total    |        | EEZ      |       | BEEZ  |       |
|---------------------------------|----------|--------|----------|-------|-------|-------|
| Gillnet                         | 1,116    | 79.5%  | 1,041    | 74.1% | 75.4  | 5.4%  |
| Longline                        | 202.4    | 14.4%  | 132.2    | 9.4%  | 70.2  | 5.0%  |
| Trolling                        | 16.7     | 1.2%   | 16.7     | 1.2%  | 0     | 0.0%  |
| Handline                        | 57.5     | 4.1%   | 55.5     | 3.9%  | 2     | 0.1%  |
| Ring Net                        | 12.2     | 0.9%   | 11.9     | 0.8%  | 0.3   | 0.0%  |
|                                 |          |        |          | 0.0%  |       | 0.0%  |
| <i>All Gears</i>                | 1,405.20 | 100.0% | 1,257.30 | 89.5% | 147.9 | 10.5% |