SRI LANKA NATIONAL PLAN OF ACTION FOR THE CONSERVATION AND MANAGEMENT OF SHARKS

(SL-NPOA-SHARKS)

MINISTRY OF FISHERIES AND AQUATIC RESOURCES DEVELOPMENT
DEPARTMENT OF FISHERIES AND AQUATIC RESOURCES
NATIONAL AQUATIC RESOURCES RESEARCH AND DEVELOPMENT AGENCY

SRI LANKA

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CONTENTS

ABBREVIATIONS

BOBLME	Bay of Bengal Large Marine Ecosystem (Project)
BOBP-IGO	Bay of Bengal Programme-Intergovernmental Organisation
BRD	Bycatch Reduction Device
CBO	Community based organization
CCRF	FAO Code of Conduct for Responsible Fisheries
CFHC	Ceylon Fisheries Harbours Corporation
CITES	Convention on the International Trade in Endangered Species of Wild Fauna and Flora
CMS	Convention on Migratory Species
CPUE	Catch per unit effort
CTB	Ceylon Tourist Board
DFAR	Department of Fisheries and Aquatic Resources
DWLC	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 and Aquatic Resources Act, No. of 1996
FFBA	Fisheries (Regulation of Foreign Fishing Boats) Act, No. 59 of 1979
FFPO	Fauna and Flora Protection Ordinance
FMD	Fisheries Management Division
FRP	Fiber Reinforced Plastic
GEF	Global Environment Facility
GPS	Global Positioning System
IOTC	Indian Ocean Tuna Commission
IPOA - Sharks	International Plan of Action for Conservation and Management of Sharks
IUCN	International Union for Conservation of Nature
IUU fishing	Illegal, unreported and unregulated fishing
MCS	Monitoring, Control and Surveillance
MFARD	Ministry of Fisheries and Aquatic Resources Development
NARA	National Aquatic Resources Research and Development Agency
NGO	Non-Governmental Organization
NIFNE	National Institute of Fisheries and Nautical Engineering
NPOA - Sharks	National Plan of Action for the Conservation and Management of Sharks
RFMO	Regional Fisheries Management Organization
RPOA - Sharks	Regional Plan of Action for the Conservation and Management of Sharks
SLC	Sri Lanka Customs
SLCG	Sri Lanka Coast Guard
SLN	Sri Lanka Navy
SLNPOA – IUU	Sri Lanka National Plan of Action to Prevent, Deter and Eliminate IUU Fishing
UNCLOS	United Nations Convention on the Law of the Sea
UNFSA	United Nations Fish Stocks Agreement
VMS	Vessel Monitoring System

EXECUTIVE SUMMARY

The fisheries industry of Sri Lanka contributes significantly to the nutrition, employment and food security, foreign exchange earnings, and government revenue, and therefore its sustainability is a primary concern in economic development of the country. Sri Lanka agrees to the concerns expressed by the global community that shark resources worldwide are facing serious threats to their sustainability from technological improvements in fishing, expansion of fishing areas and effort, easy access to distant markets and steadily increasing demand for shark products particularly in the eastern markets.

Sri Lanka is a party to the United Nations Convention on the Law of the Sea, United Nations Fish Stocks Agreement, Convention on the International Trade in the Endangered Species of Fauna and Flora and several other international treaties that concern the conservation and management of living resources and biodiversity, and a member of the Indian Ocean Tuna Commission. 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.

This document, which is entitled the Sri Lanka National Plan of Action for the Conservation and Management of Sharks (SL-NPOA – Sharks), contains measures that are being implemented and those proposed to be adopted and implemented for the conservation and management of shark resources in Sri Lanka waters. It has been prepared considering the guidelines stipulated in the FAO Code of Conduct of Responsible Fisheries (CCRF) and International Plan of Action for the Conservation and Management of Sharks (IPOA – Sharks), and in consultation with fishery managers, fisheries researchers, academics, fishing industry and trade, fishing community, NGOs and CBOs. Its preparation was supported by the Bay of Bengal Large Marine Ecosystem (BOBLME) Project, which is a regional cooperation project.

SL-NPOA-Sharks provides information on the status of sharks in Sri Lanka, regulatory and administrative framework related to shark fishing, issues concerning conservation and management of shark fisheries, and strategies for achieving the objective of the IPOA-Sharks.

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 in Sri Lanka, and gives effect to Sri Lanka's obligations under certain international and regional fisheries agreements. The Fisheries (Regulation of Foreign Fishing Boats) Act, No. 59 of 1979 (FFBA) provides for regulation, control and management of fishing activities by foreign boats in Sri Lanka waters. Both these Acts are administered by the Department of Fisheries and Aquatic Resources (DFAR), which has the overall mandate for the implementation of the provisions incorporated in them.

A number of provisions included in FARA and FFBA, and regulations made under those provisions are applicable for all fisheries in Sri Lanka including shark fisheries. Implementation of those provisions and regulations is essential for general management of all fisheries in the

country including shark fisheries. 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 once enforced will have beneficial effects on the management of, among other fisheries, shark fisheries in high seas.

Under the provisions in FARA, regulations have already been made specifically for the conservation and management of shark fisheries with two different objectives, i.e. optimum utilization of the carcasses of harvested sharks, and protection of thresher sharks, which are threatened or vulnerable.

SL-NPOA - Sharks is to be implemented as an integral part of the Sri Lanka National Fisheries and Aquatic Resources Management Plan. The main responsibility of its implementation lies with the DFAR. Several other agencies also have major roles to play in its implementation. Resources required for its implementation need to be allocated from the National Budget. A coordinating committee comprising representatives of the respective organizations under the Chair of the Director General of the DFAR (DG) is to be set up to review the progress of its implementation and where necessary to make adjustments to improve its effectiveness.

SL-NPOA – Sharks is intended to have an initial duration of four years (2014 - 2017) focused on establishment of the necessary capacity, systems and databases while managing the fishing effort on the targeted and non-targeted shark fisheries based on an active and progressive precautionary approach in consultation with the stakeholders. Upon the conclusion of this initial period the overall progress and the impacts of implementation will be evaluated against its goals and objectives, with a view to revision of SLNPOA – Sharks taking into account of the changes in the fisheries.

1. INTRODUCTION

1. The fisheries development policy of Sri Lanka, as mentioned in the development policy framework document of the Government - Sri Lanka, the Emerging Wonder of Asia *Mahinda Chintana* Vision for the Future (page 23) - aims at exploiting the country's fisheries and aquatic resources in a sustainable manner while conserving the coastal environment (Department of National Planning, 2010 (www.treasury.gov.lk/publications)). The fisheries industry of Sri Lanka contributes significantly to the nutrition, employment and food security, foreign exchange earnings, and government revenue, and therefore its sustainability is a primary concern in economic development of the country.

2. Sri Lanka agrees to the concerns expressed by the global community that shark resources worldwide are facing serious threats to their sustainability from technological improvements in fishing, expansion of fishing areas and effort, easy access to distant markets and steadily increasing demand for shark products particularly in the eastern markets. Life history characteristics of sharks, such as slow growth, late maturation, production of few offspring and complex spatial structures (size/sex segregation and seasonal migration) make them vulnerable to over-exploitation and slow in recovering from the decline of populations. Over the past two decades, serious population declines have been reported in respect of a number of shark species in several regions around the world. Therefore in keeping with the policy of exploitation of fisheries and aquatic resources in a sustainable manner, the Government of Sri Lanka has recognized the need to pay special attention to shark resources while developing and managing fisheries and aquatic resources.

For the purposes of this document, the term "shark" is taken to include all species of sharks, skates, rays and chimaeras (Class *Chondrichthyes*), and the term "shark catch" is taken to include directed, by-catch, commercial, recreational and other forms of taking sharks.

1.1. International Initiatives for the Conservation and Management of Sharks

3. The United Nations Law of the Sea Convention (UNCLOS) has made provisions for coastal States and other States whose nationals fish in the region for the highly migratory species listed in its Annex I to cooperate directly or through appropriate international organizations 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. These species include among other migratory species the following shark species.

- *Hexanchus griseus*
- *Cetorhinus maximus*
- Family *Alopiidae*
- *Rhincodon typus*
- Family *Carcharhinidae*
- Family *Sphyrnidae*
- Family *Isuridae*

4. UNCLOS has also made several other provisions with a view to conservation and management of living resources in exclusive economic zones and high seas. 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. 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 the IOTC Resolution 05/05, which deals with the issues of utilization, stock assessment, gear selectivity, and research needs, and the IOTC Resolution 10/12 that prohibits the catching of thresher sharks (family *Alopiidae*).

5. 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 23rd Session held in February 1999 and endorsed by the FAO Council in June 1999 (FAO 1999). IPOA - Sharks is a voluntary instrument which encourages States to adopt a National Plan of Action for 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.

6. IPOA - Sharks states that NPOA - Sharks should aim to:

- Ensure that shark catches from directed and non-directed fisheries are sustainable;
- 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;
- Identify and provide special attention, in particular to vulnerable or threatened shark stocks;
- Improve and develop frameworks for establishing and coordinating effective consultation involving all stakeholders in research, management and educational initiatives within and between States;
- Minimize unutilized incidental catches of sharks;
- Contribute to the protection of biodiversity and ecosystem structure and function;
- 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);
- Encourage the full use of dead sharks;
- Facilitate improved species-specific catch and landings data and monitoring of shark catches;
- Facilitate the identification and reporting of species-specific biological and trade data.

7. 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). However, to date, IPOA - sharks is the only international initiative that is specifically dedicated to the conservation and management of sharks.

1.2. Development of the Sri Lanka National Plan of Action for the Conservation and Management of Sharks (SLNPOA-Sharks)

8. 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. This document, which is entitled the Sri Lanka National Plan of Action for the Conservation and Management of Sharks (SLNPOA-Sharks), contains measures that are being implemented and those proposed to be adopted and implemented for the conservation and management of shark resources in Sri Lanka waters and high-seas. It has been prepared considering the guidelines stipulated in the CCRF and IPOA-Sharks, and in consultation with fishery managers, fisheries researchers, academics, fishing industry and trade, fishing community, NGOs and CBOs. Preparation of SLNPOA – Sharks was supported by the Bay of Bengal Large Marine Ecosystem (BOBLME) Project, which is a GEF-funded regional cooperation project for the management and conservation of the marine environment and fisheries.

9. SLNPOA-Sharks provides information on the status of sharks in Sri Lanka, regulatory and administrative framework related to shark fishing, issues concerning conservation and management of shark fisheries, and strategies for achieving the objective of IPOA-Sharks.

2. THE SHARK FISHERY IN SRI LANKA

10. Sharks have been exploited for the last 4 - 5 decades by offshore fishing vessels, using shark long-lines. Sri Lanka was the 14th of the top 26 shark fishing countries according to the global shark catches reported to FAO during the period from 2000 to 2009. At present shark long-lines are operated at very insignificant levels while the majority of the shark landings come as by-catch from the offshore tuna long-line fishery and the gillnet fishery. Sri Lanka has experienced a steep decline in shark production over the time since 1999.

11. Currently around 60 shark species belonging to 5 orders and 17 families have been reported in marine fish landings in Sri Lanka (Appendix 1). Dominant species in shark catches include the spottail shark (*Carcharhinus sorrah*), tiger shark (*Galeocerdo cuvier*), sickle-fin lemon shark (*Negaprion acutidens*), blue shark (*Prionace glauca*), scalloped hammerhead shark (*Sphyrna lewini*), great hammerhead shark (*Sphyrna mokarran*), smooth hammerhead shark (*Sphyrna*

zygaena), pelagic thresher shark (*Alopias pelagicus),* big-eye thresher shark (*Alopias superciliosus*), short-fin mako shark (*Isurus oxyrinchus*), and long-fin mako shark *Isurus paucus).*

12. The annual shark production in 2012 was estimated at 3177 t and it contributed around 3 % to the total marine large pelagic fish production in the country. Sharks are utilized as fresh meat and dried fish for local consumption while fins and skin are used for export. Jaws, and liver oil extracted from dogfish shark are also exported.

13. Currently the shark by-catch landed by the offshore fishing vessels conducting long-line and gillnet operations targeting tuna remains the main contributor to shark catches in Sri Lanka. Apart from this, targeted spiny dogfish shark fishery and skate and ray fishery exist as localized seasonal fisheries. The coastal targeted thresher shark fishery existed as a localized coastal fishery till catching of thresher sharks was prohibited by law in 2012.

2.1. The Pelagic Shark Fishery

14. Initially sharks were exploited mostly within the coastal waters and gradually the areas fished were expanded to cover offshore and deep-sea areas within and beyond the EEZ. The pelagic shark fishery was conducted with large meshed drift gillnet and long-line fishing vessels and started in 1950 with the introduction of the shark long-line. This fishery boosted since the mid 1980s with the high demand for sharks prevailing in the international market and the expansion of the offshore fishery well beyond the EEZ, as the combination of gillnet and long-line fishing targeting pelagic sharks became popular.

15. The offshore pelagic target shark fishery gradually declined after 1990s and at present pelagic shark catches mainly come as a by-catch from other offshore fisheries particularly those conducted by 34 – 54 feet multiday boats that target tunas (Figure 1). This is because fishermen had turned to tuna fishing since tuna fishing has become more profitable compared to shark fishing. Strengthening of law enforcement against crossing the maritime boundaries is also partly responsible for declining of the shark landings from directed fisheries. At present pelagic shark fishery is operated as a target fishery only by a very few vessels. As revealed at the Negombo stakeholder consultation workshops, 50 multiday boats that were operating from Negombo and targeting sharks have now stopped operations. In Beruwala out of a total of about 700 multiday boats only 25-30 boats (4%) are engaged in directed shark fishing. In Galle, there is no directed shark fishery. Thus shark has virtually become a non-target species in the offshore fishery. Currently, the contribution of sharks to the total large pelagic fish production by weight remains around 3% while that of tuna accounts for more than 65% (Figure 2).

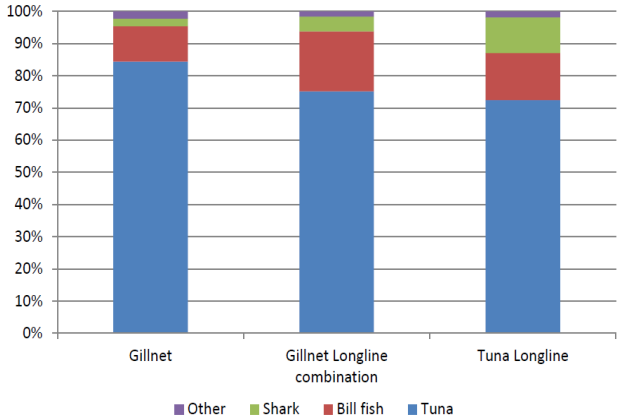

Figure 1: Percentage large pelagic catch and shark by-catch by gear in 2011 (Source: NARA)

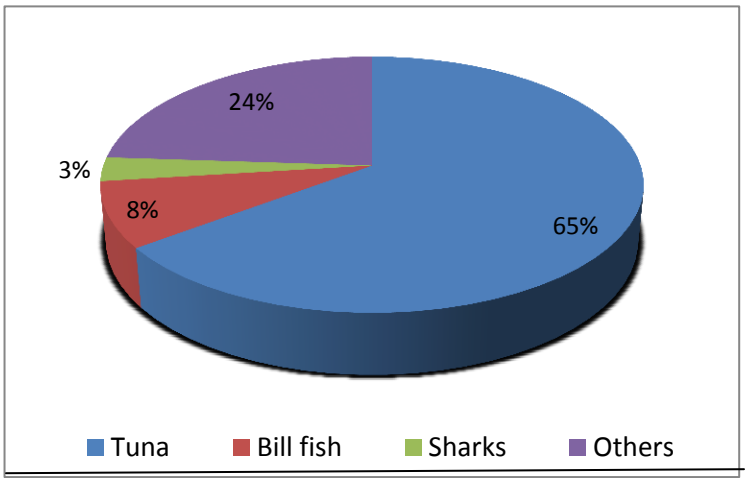

Figure 2: Contribution of sharks to the total large pelagic fish production in 2012 (Source: NARA)

2.1.1. Pelagic Shark Landings

16. Historically sharks were dominant in the large pelagic fish production and there has been an increasing trend of shark landings since 1950's to a peak production of 34,842 t reported in 1999 (Figure 3). The drastic increase in the shark production after mid 1980s' may be due to the rapid development of the marine fisheries sector in Sri Lanka after introduction of tuna long-lines for the offshore fishery. At the beginning, these long-liners were very popular for catching sharks too and the localized shark fishery extended up to EEZ and beyond targeting pelagic sharks. However, since 1999 the annual shark production had shown a considerable decline with the lowest catch of 1871 t reported in 2008. The gap between the total large pelagic fish production and the shark production has continuously increased since early 1960s and widened to a greater extent with the decline of shark landings after 1999.

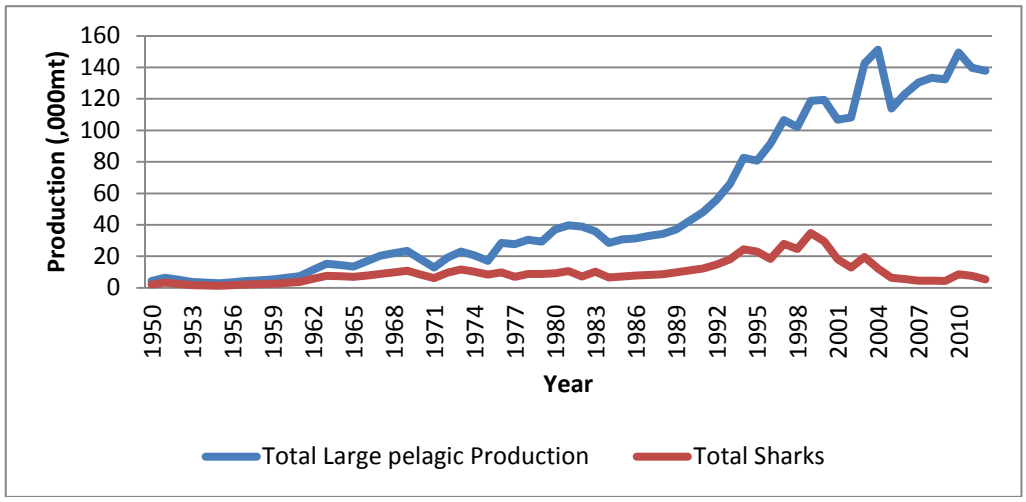

Figure 3: Shark production vs. total large pelagic fish production: 1950 – 2012 (Source: NARA)

17. The contribution of sharks to the total large pelagic fish production clearly indicates a gradual decline with time (Figure 4). Although the contribution of sharks had accounted more than 45% of the total large pelagic fish production until 1974, it has become less than 5 % over the last five year period.

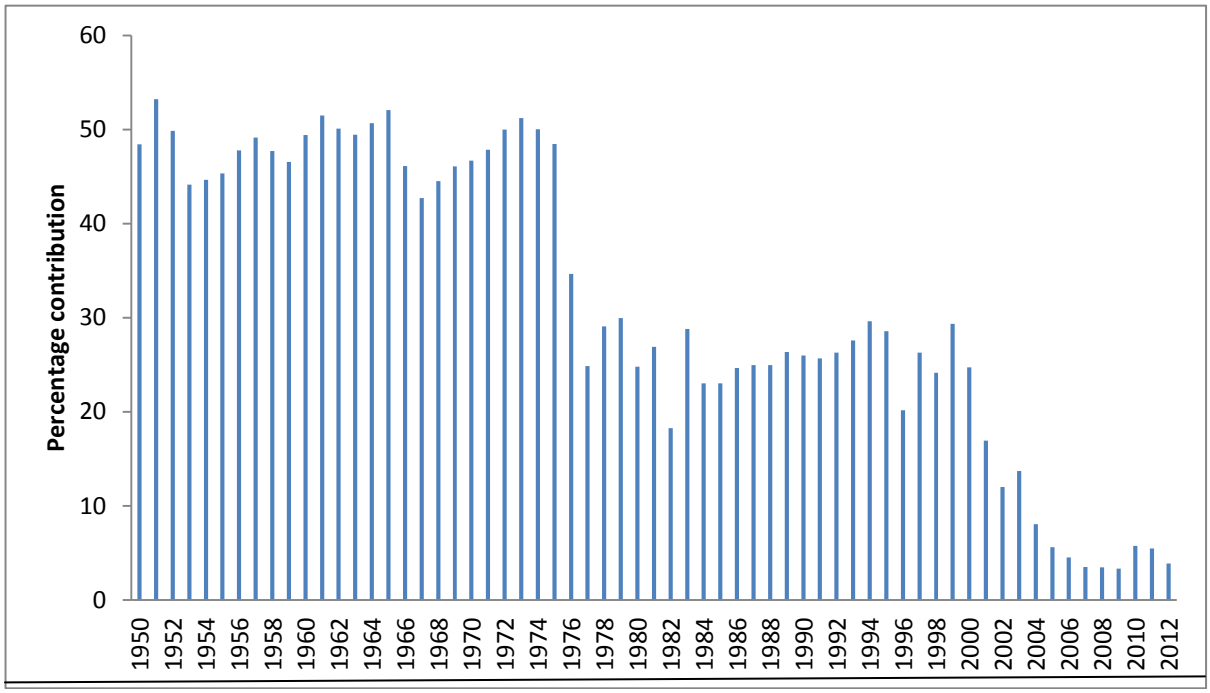

Figure 4. Percentage contribution of sharks to total large pelagic fish production: 1950 – 2012 (Source: NARA)

2.1.2. Pelagic Shark Landings by Species

18. The silky shark (*Carcharhinus falciformis*) is the dominant species in shark landings in Sri Lanka followed by the blue shark (*Prionace glauca*) and the thresher shark (*Alopias pelagicus, A. superciliosus* and *A. vulpinus*) (Figure 5).

19. As reported in historical catches, silky sharks make the highest contribution to the total shark landings in 2012 (around 36 percent by weight) (Figure 6). The relative contribution of the next two dominant species, blue shark and thresher sharks (bigeye thresher shark dominant) are 9 % and 14 %, respectively. The contribution of the above species to the total shark landings is around 59% and the percentage contributions of other sharks including the scalloped hammerhead shark and long-fin mako shark to the total landings remain relatively small.

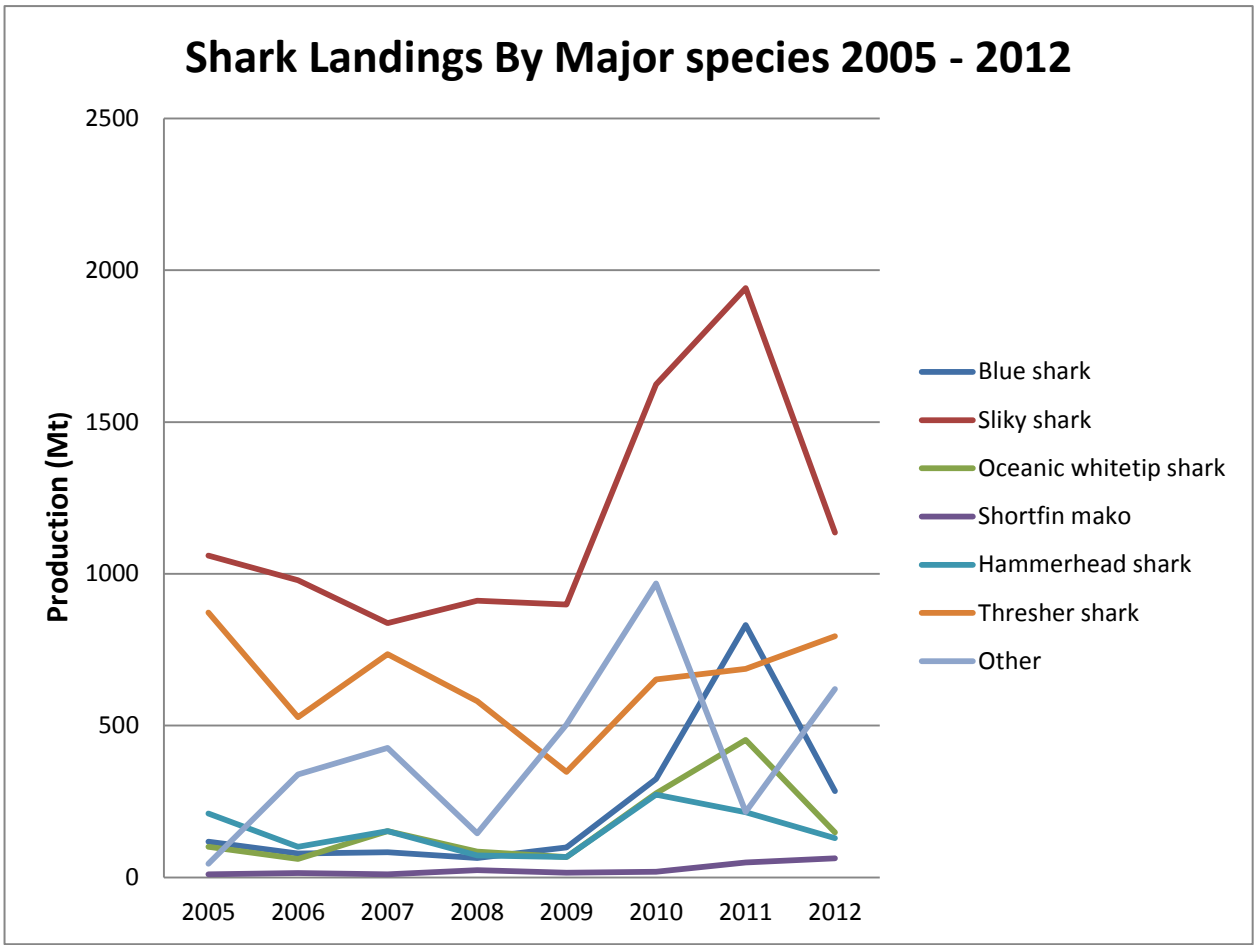

Figure 5: Shark landings by major species 2005-2012 (Source: NARA)

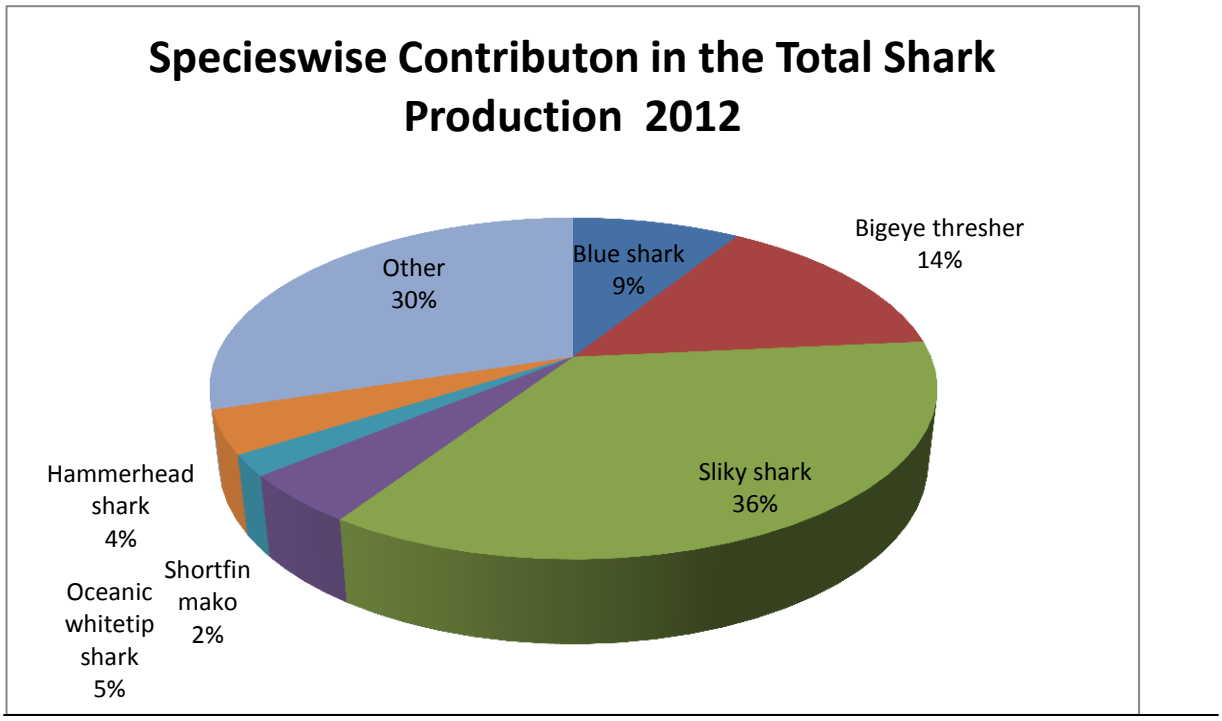

Figure 6: Species wise contribution in the total shark production in 2012 (Source: NARA)

2.1.3 Pelagic Shark Landings by Geographical Area

20. The coastline around Sri Lanka has been divided into seven fisheries statistical zones - northeast, northwest, south, southeast, southwest and west - for fisheries data collection purposes (Figure 7) excluding the north where there was civil war over 30 years since 1983. In 2011 the highest shark landings were recorded from the southwest coast while the south coast and west coast became second and third respectively (Figure 8). The highest contribution of sharks to the total landings was also recorded from the southwest and the west coasts respectively (Figure 9).

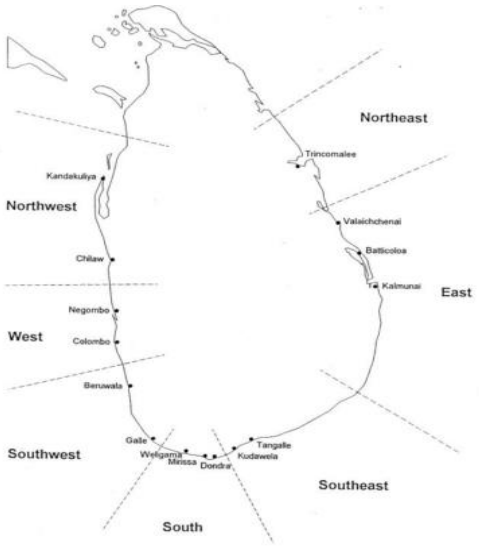

Figure 7: Principal statistical zones and major landing centers used by NARA in estimating offshore fish production in Sri Lanka in 2011 (Source: NARA)

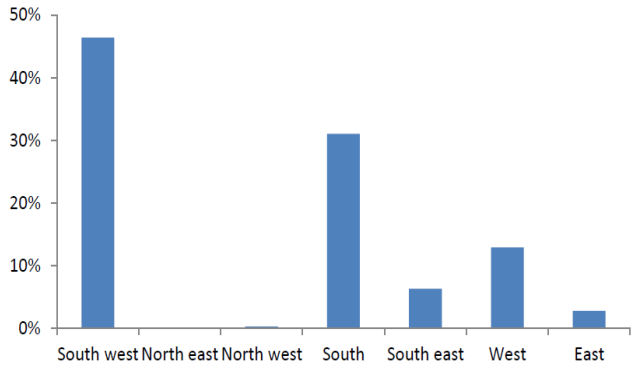

Figure 8: Shark landings by fisheries statistical zones 2011 (Source: NARA)

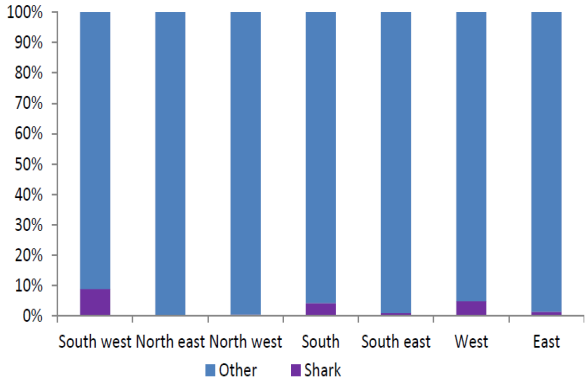

Figure 9: Percentage contribution of shark landings to the total large pelagic fish production by fisheries statistical zones 2011 (Source: NARA)

2.2. The Coastal Thresher Shark Fishery

21. The coastal thresher shark fishery existed until 2012 as a traditional localized seasonal fishery which was conducted in the southern coastal waters from November to April by coastal boats operated with using shark long-lines. However, catching of thresher sharks was prohibited in 2012 by regulations made under the Fisheries and Aquatic Resources Act, No. 2 of 1996 (Gazette 1768/36 of 27 July 2012) in response to the IOTC Resolution 10/12 on prohibition of catching thresher sharks in the area of competence of IOTC. Catch data and other socio-economic information related to this fishery are not available.

2.3. The Spiny Dogfish Shark Fishery

22. Spiny dogfish shark fishery exists as a localized seasonal fishery which was conducted from November to April in the coastal waters off Baththalangunduwa in the northwest coast, Beruwala in the west coast, Mirissa in the south coast and Mutur in the east coast. The fishing effort in this fishery has decreased over the last few years owing to the lack of facilities for marketing of its products. Deep benthic sharks are mainly exploited to extract squalene rich liver oil which has a considerable demand in the international market. Catch data and other data like socio-economic information related to this fishery are scanty.

2.4. The Skate and Ray Fishery

23. Skate (Batoid) fishery exists as localized seasonal fishery in coastal waters; it is mostly conducted by FRP boats with outboard engines using bottom set gillnets of mesh size 18", which are locally known as "*madu del*". A small percentage of skates are caught incidentally in beach seines and bottom set gillnets operated in coastal waters for other fisheries. Skates and rays also get caught incidentally in gillnets operated by multiday boats. Catch effort data and other socio-economic information related to this fishery are also scanty.

2.5. Utilization, Market and Trade

24. Sharks are utilized as fresh fish and dry fish for local consumption while fins and skin are used for export. Shark meat both as fresh fish and dried fish serves as a cheap source of animal protein and thereby helps the lower income groups in Sri Lanka to meet their animal protein needs. Sharks as dried fish is particularly popular among the estate populations in the hill-

country areas who have limited access to fresh fish. Unlike in bony fish varieties wastage in shark body is minimal.

25. Shark fins are mostly exported to Hong Kong, Korea, The Maldives, Singapore, United States and Taiwan. The silky shark, oceanic white-tip shark and blue shark are the species that are mainly used for extraction of fins. Fins are dried and exported without much processing or value addition. The price of 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. Dried skin is exported to China to make shoes and belts while shark jaws, teeth and skin are exported to The Maldives. Shark liver oil is extracted from spiny dogfish sharks and it is exported mainly to Japan. However, due to the low scale of production and the lack of appropriate technology, production of shark oil in Sri Lanka has not developed as a commercial industry.

2.6. Discards

26. Sharks caught are generally not discarded in Sri Lanka. They are used both for local consumption of meat and extraction of fins, skin, jaws and teeth for export. Shark meat is consumed as fresh fish or dry fish. Shark is perhaps the most utilized fish in Sri Lanka in the context of its different body parts. Therefore unlike in bony varieties of fish no part of shark fish is thrown away.

2.7. Non - Consumptive Use of Sharks (Eco-tourism)

27. The eco-tourism activities, which started about five years back in the Matara district, situated in the southern part of Sri Lanka are fast gaining in popularity particularly during the last 2 years. Whales, dolphins, flying fish, turtles, manta rays and whale sharks could be seen a few miles off Mirissa in the south coast and have become a strong lure for the tourists. At present more than 10 companies belonging to the state sector and private sector are operating whale watching tours from the Mirissa harbour from November to April.

3. LEGAL AND ADMINISTRATIVE FRAMEWORK FOR THE CONSERVATION AND MANAGEMENT OF SHARKS

28. 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 in Sri Lanka, and gives effect to Sri Lanka's obligations under certain international and regional fisheries agreements. The Fisheries (Regulation of Foreign Fishing Boats) Act, No. 59 of 1979 (FFBA) provides for regulation, control and management of fishing activities by foreign boats in Sri Lanka waters. Both these Acts are administered by the

Department of Fisheries and Aquatic Resources (DFAR), which has the overall mandate for the implementation of the provisions incorporated in them.

3.1. Legal Provisions and Regulations for the Conservation and Management of Fisheries in General

29. A number of provisions included in FARA and FFBA, and regulations made under those provisions are applicable for all fisheries in Sri Lanka including shark fisheries. Implementation of those provisions and regulations is essential for general management of all fisheries in the country including shark fisheries. Table 1 gives the important provisions and regulations for general management of fisheries that have positive impacts on the management of shark fisheries.

Table 1: Legal Provisions and Regulations for General Management of Fisheries that have Positive Impacts on the Management of Shark Fisheries

	Provision in the Act; Regulations	Management Measure	Penalty for Non-Compliance
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 Competent Authority in the prescribed form or importing fish for re-export without a catch certificate and health certificate issued by the Competent Authority of the importing country	Fine not exceeding LKR 25,000

30. 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 2, once enforced will also have beneficial effects on the management of among other fisheries, shark fisheries in high seas.

Table 2: Draft Regulations under the Process of Promulgation to Give Effect to Sri Lanka's Obligations under International and Regional Agreements that will have Beneficial Effects on the Management of among other Fisheries, Shark Fisheries in High Seas

	Provision in the Act; Regulations	Management Measure	Penalty for Non-Compliance
1	Section 14A of FARA; High-Seas Fishing Operation Regulations of 2013 (Proposed)	Using a local fishing boat for any fishing operation in high-seas without a license from DG	Imprisonment for a term not exceeding two years or a fine not less than LKR 1,500,000
2	Section 14E of	Failing to carry onboard the local fishing vessel or	Fine not exceeding

	FARA; High-Seas Fishing Operation Regulations of 2013 (Proposed)	produce for inspection to an authorized officer a fishing operation license issued by DG for fishing in high-seas	LKR 25,000
3	Section 14F of FARA; High-Seas Fishing Operation Regulations of 2013 (Proposed)	Engaging a local fishing boat for fishing in the waters under the national jurisdiction of another State except under the authority and in accordance with laws of that State	Imprisonment for a term not exceeding two years or a fine not less than LKR 1,500,000
4	Section 61 (t) of FARA; High-Seas Fishing Operation Regulations of 2013 (Proposed)	Using a local fishing boat issued with a license by DG for fishing in high-seas in contravention to the regulations made by the Minister to implement the management and conservation measured adopted under the Law of the Sea Convention, UN Fish Stocks Agreement, by IOTC and under FAO Port State Measures Agreement	Imprisonment for a term less than two years or a fine not exceeding LKR 1,000,000
5	Section 61(t)/Port State Measures Regulations of 2013 (proposed)	Landing of fish taken outside Sri Lanka waters at any port in Sri Lanka by a boat not registered under FARA without a landing permit from DG or not reporting data relating to the catch to DG after landing of fish at a port in Sri Lanka by a boat not registered under FARA and to which DG has issued a landing permit to land fish taken outside Sri Lanka waters at a port in Sri Lanka	Imprisonment for a term less than two years or a fine not exceeding LKR 1,000,000

3.2. Regulations made specifically for the Conservation and Management of Shark Fisheries

31. Under the provisions in FARA the following regulations have been made specifically for the conservation and management of shark fisheries with two different objectives, i.e. optimum utilization of the carcasses of harvested sharks, and protection of thresher sharks, which are threatened or vulnerable.

- Landing of Fish (Species of Shark and Skate) Regulations, 2001 (Gazette 1206/20 of 17 October 2001) forbids the practice of shark fining (slicing off fins of sharks caught) onboard fishing vessels and discarding the carcasses at sea). Fishers are required to land fish belonging to the species of shark or skate while the fins of such species of fish are attached to such fish. Landing the fins which have been removed from any fish belonging to the species of shark or skate is prohibited. Penalty for non-compliance with this requirement is a fine not exceeding LKR 25,000.

- Prohibition of Catching Thresher Shark Regulations, 2012 (Gazette 1768/36 of 27 July 2012) provides special protection status to thresher sharks. According to this regulation no person shall catch any shark species of the family *Alopiidae* (which has three species, i.e. *Alopius vulpinus*, *A. superciliosus* and *A. pelagicus*) during fishing, recreational

activities or sport fishing. Thresher sharks caught incidentally should be released live and such releases should be recorded in logbooks. Penalty for non-compliance is a fine not exceeding LKR 50,000.

3.3. Provisions in the Fauna and Flora Protection Ordinance

32. The Fauna and Flora Protection Ordinance (FFPO), which establishes the legal framework for the protection of species of wild animals that include mammals, birds, reptiles, amphibians, fishes or invertebrates, and plants in Sri Lanka is another legal instrument that has relevance to the conservation of sharks. FFPO is administered by the Department of Wildlife Conservation (DWLC). Under FFPO a number of marine parks and sanctuaries along the Sri Lankan coastline have also been promulgated with the aim of protection of coral ecosystems. These marine parks and sanctuaries provide partial protection to coastal sharks. DWLC is the focal point and competent authority in Sri Lanka for CITES, and implements provisions of CITES. Appendix II of CITES includes among other species, two shark species, i.e. whale shark (*Rhincodon typus*) and basking shark (*Cetorhinus maximus*). For export of specimens of the species included in Appendix II of CITES a permit from the competent authority of the exporting country is required.

4. THE SRI LANKA NATIONAL PLAN OF ACTION FOR THE CONSERVATION AND MANAGEMENT OF SHARKS (SLNPOA - SHARKS)

4.1. Vision

33. “The effective conservation and management of sharks to ensure their optimal, long-term, sustainable use for the benefit of all Sri Lankans of both present and future generations.”

4.2. Strategic Objectives

34. Considering the relevance of the FAO IPOA Sharks objectives to Government Fisheries policy objectives, the ten objectives have been prioritized in the order of their focus on sustainability, harvesting, environment, consultation and utilization. Utilization is given the low priority since in Sri Lanka sharks are almost fully utilized with little or no wastage. The two objectives concerning data reporting are common to all objectives although they are stated as last two objectives.

1) Ensure that shark catches from directed and non-directed fisheries are sustainable.
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.
3) Identify and provide special attention, in particular to vulnerable or threatened shark stocks.

4) Contribute to the protection of biodiversity and ecosystem structure and function.
5) Improve and develop frameworks for establishing and coordinating effective consultation involving all stakeholders in research, management and educational initiatives within and between States.
6) Minimize unutilized incidental catches of sharks.
7) 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).
8) Encourage full use of dead sharks.
9) Facilitate improved species-specific catch and landings data and monitoring of shark catches.
10) Facilitate the identification and reporting of species-specific biological and trade data.

4.3. Issues

35. At the stakeholder consultation workshops issues concerning the conservation and management of sharks were identified. The issues were prioritized through a risk assessment as high, medium and low and grouped under the three broad categories namely ecological, socioeconomics and governance following the Ecosystem Approach to Fisheries (EAF) concept.

36. Ecological

- Declining catches of the major shark species (Medium)
- Catch of the prohibited species (thresher sharks) by fishing gear targeted for other fish species (Medium)
- Destruction of corals and skates grounds due to use of harmful gear such as trammel nets, bottom set gill nets (High)
- Movements of boats used for ecotourism causing disturbances to whale sharks at site during trips (Medium)

37. Socioeconomic

- Loss of employment to fishers engaged in directed coastal thresher shark fishing due to the ban (High)
- Negative impact of the thresher shark ban on the production of and trade in dry fish thus affecting those involved in those activities (Medium)
- Loss of income to fin traders due to decline of demand for shark fins in the international market and ban on thresher shark (Medium)
- Decline in number of people engaged in shark oil industry due to high cost of production (Low)
- Decline of incomes from fishing and dry fish production (Medium)

- Poor post-harvest handling that reduces value of shark products (Medium)

38. Governance

1. Institutional

1a. Legal Framework

- Absence of specific regulations to control target multispecies fisheries and major by-catch fisheries, e.g. long-line fisheries for sustainable management of shark fisheries (Medium)
- Shortcomings in the operation license issued for fishing operations directed at fish species where shark is caught as by catch (Medium)
- Absence of regulations to protect whale shark which is of great importance for ecotourism (Medium)
- Non-standardization of the present boats used for ecotourism (Medium)

1b.Compliance

- Lack of compliance by the fishers with current regulations on sharks and protection of critical habitats (High)
- Inadequacy of awareness programs conducted on regulations for fishing communities (High)
- Lack of knowledge on the importance and need for conservation and management of shark resources among the fishermen (High))
- Difficulties experienced in releasing live of specimens of the prohibited species (thresher sharks) caught incidentally (Medium)

1c. Data and reporting (Catch, discards, landing, effort and trade)

- Misidentification and under-reporting of shark catches (High)
- Inadequacy of current logbooks issued to the multiday fishers for recording shark catches (High))
- Absence of an onboard observer scheme for validation of data (High)
- Absence of data collection scheme for shark species caught in the coastal waters (Medium)
- Lack of information on socio-economics of fishers and traders involved in sharks fisheries and fish trade (Medium)
- Lack of data on shark products(High)

1d. Life history Information of Sharks and Related Habitats

- Lack of information on stock structure (size, age and sex composition of catches), abundance, life history or reproductive rate of most species of sharks such as the long-fin mako shark and thresher sharks (Medium)
- Lack of knowledge on mating and nursery grounds (Medium)

1e.Research

- Lack of funding for research and management of sharks and rays (Medium)
- Lack of trained staff for conducting resource surveys and stock assessments on sharks (Medium)

2. Consultation

- Inadequate consultation with stakeholders prior to the introduction of the ban on catching thresher sharks (High)
- No proper coordination on sharks research among research institutions, universities and non-governmental organizations (High)

4.4 Indicators and benchmark and performance measures

39. Indicators and bench mark performance have been developed for objectives of high importance for the purpose of plan review and evaluation. They are indicated in the Table 3.

Table3: Indicators, and Benchmarks and Performance Measures in respect of Priority Objectives

Priority Objective	**Indicator**	**Benchmark and Performance Measure**
Objective 1: Ensure that shark catches from directed and non-directed fisheries are sustainable.	**Biological:** Annual production Percentage of juveniles or under-sized fish in catches **Socio-economic:** No of fishers, processors and traders dependent on shark fishing	 Present level except for thresher sharks Less than 10 percent of the present level Fishers at the present level and encourage more processors and traders
Objective 3: Identify and provide special attention, in particular to vulnerable or threatened	Proportion of thresher sharks in shark catches	Less than 50 percent of the present level

shark stocks.		
Objectives 2 and 4: 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. Contribute to the protection of biodiversity and ecosystem structure and function.	Extent of habitat damage Extent of skate grounds Species abundance	Present level or Less than 10 percent of the present level Present level or present level + 10% Present level or present level + 10%

4.5. The Action Plan

40. The following actions were identified at the stakeholder consultative workshops as required to be implemented to achieve the strategic objectives of NPOA. The actions have been prioritized to make the execution of the Plan viable within its four–year life span. Priorities are given at three levels*, High, Medium and Low* and required timeframes are indicated to facilitate progress monitoring and evaluation (Table 4).

Table 4: Action Plan

Priority Area	Task	Responsibility	Priority	Time Frame
1. Improvement of data acquisition and reporting (Catch, discards, landing, effort and trade**)**	Develop a shark identification guide, handouts and coloured posters.	NARA &DFAR	High	6 months
	Expand NARA's ongoing data collection scheme to cover the coastal sharks.	NARA	Medium	3 months
	Design logbooks for reporting shark catches, and issue to fishing boats.	DFAR	High	6 months
	Develop and implement a	DFAR	Medium	12 months

	methodology to obtain data from small boats for which logbooks are not mandatory.			
	Enforce strictly the Fish Catch Data Collection Regulations, 2012 to ensure that the fishing vessels of 32 feet and over furnish the required data in the logbooks.	DFAR	High	6 months
	Implement an observer programme on board the fishing vessels.	DFAR/NARA	High	6 months
	Update the export/import trade data in terms of quantity and value separated by product type and form.	SLC/DFAR/ MFARD	High	6 months
	Conduct a socio-economic survey to assess the number of fishers and traders engaged in shark fishing and trade.	DFAR/MFARD /NARA	Medium	12 months
2.Strengthening of data acquisition on biological aspects and habitats	Conduct research surveys and observer programme to collect data to compile information on stock structure, abundance, life history and reproduction rates of commercially important species and protected species.	NARA/ Universities	Medium	4 years
	Conduct research surveys and 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.	NARA/ Universities	Medium	4 years
3. Effective Conservation and Management	Make regulations for controlling international trade of shark species adopted under CITES.	DFAR/DWLC	High	12 months
	Monitor catches/conduct further studies on endangered and threatened species listed under CITES.	NARA	Medium	2 years
	Introduce spatial and/or temporal	DFAR/NARA	Medium	2 years

	closures at localities identified based on improved data acquisition			
	Make standards for boats used for ecotourism.	CTB/DFAR/E Industry	Medium	12 months
	Prepare whale-shark guidelines to help regulate interactions with them.	NARA/TB/E-Industry	Medium	12 months
	Introduce by-catch reduction devices (BRD) for protected shark species such as thresher sharks.	NARA/DFAR	Medium	12 months
	Introduce techniques for live release of prohibited shark species incidentally caught in fishing gear used in other fisheries.	NARA/DFAR	Medium	12 months
	Review the existing regulatory framework to assess whether the current 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.	DFAR	Medium	4 years
	Make regulations for protection of whale shark which is of importance for ecotourism (as this will not affect the fishers).	DFAR	Medium	4 years
	Establish closed areas where concentrations of threatened or vulnerable species e.g. thresher sharks are located either at certain times of year or permitting the use of gear that does not take by-catch of these species	NARA/DFAR	Medium	4 years
4.Consultation of stakeholders	Develop and establish a council consisting of representatives from universities, NARA, DFAR, MFARD, IUCN, Sri Lanka Fisheries Federation and Fishing Industry	DFAR/ CBOs	High	12 months

	for effective coordination among and consultation with all stakeholders (management, research, industry, trade, etc.).			
5. Strengthening of Enforcement/ Compliance	Enhance implementation of the Sri Lanka National Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing (SLNPOA – IUU) by, among others, establishing an efficient VMS and an observer programme, strengthening the port inspection scheme, and encouraging informants to give information on unlawful fishing activities.	DFAR	High	12 months
6. Measures to address Socioeconomic issues	Direct the fishers affected by the Prohibition of Catching Thresher Shark Regulations to alternative livelihood programmes or alternative income generating activities.	DFAR	High	12 months
	Implement programmes to improve the quality of products (meat, skin, oil, cartilage etc.).	DFAR/NARA	Low/ Medium	2 years
7. Capacity building	Provide researchers with the opportunities through national, regional and international training to build their research capabilities on shark fisheries.	NARA	Medium	4 years
8. Communication /Awareness	Develop and implement a comprehensive education and awareness building strategy comprising different media and materials and targeting different stakeholders as follows. For fishers on the importance and need for conservation and management of shark resources For all stakeholders on the current regulations concerning conservation and management of sharks	DFAR/NARA/ CTB/CBOs/ NIFNE	High	2 years

	For officers of DFAR, Sri Lanka Customs (SLC), Sri Lanka Navy (SLN), Sri Lanka Coast Guard (SLCG), Ceylon Fishery Harbours Corporation (CFHC) and boat operators on the identification of different shark species 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 For boat operators, fishers, fish collectors and traders on post-harvest technology for quality improvement of shark products For boat owners and operators on Whale Shark Guidelines			
	Conduct awareness programs for all stakeholders highlighting the main elements and recommendations of the SLNPOA - Sharks.	DFAR/NARA	High	Ongoing

5. INTERNATIONAL COOPERATION

41. 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 high seas 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), in collaboration with the BOBLME Project and the BOBP-IGO.
- Prompt analysis of data and publishing results in a timely manner in an understandable format, and making the reports available for peer review.
- Seeking for international assistance and resources to enhance national capacities to further develop and implement NPOA – Sharks.

6. IMPLEMENTATION, MONITORING AND EVALUATION

42. SL-NPOA - Sharks is to be implemented as an integral part of the Sri Lanka National Fisheries and Aquatic Resources Management Plan. The main responsibility of its implementation 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 its implementation. Resources required for its implementation need to be allocated from the National Budget. 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 is to be set up to review the progress of its implementation and where necessary to 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, the Multi-day Fishing Boat Owners' Association and the Fish Exporters Association of Sri Lanka as required. The NPOA Sharks Implementation Coordinating Committee will meet once in six months.

43. The terms of reference of the Coordinating Committee are the following.

- Develop an implementation schedule based on priority requirements and availability of resources for implementation of 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.

44. SLNPOA – Sharks is intended to have an initial duration of four years (2014 - 2017) focused on establishment of the necessary capacity, systems and databases while managing the fishing effort on the targeted and non-targeted shark fisheries based on an active and progressive precautionary approach in consultation with the stakeholders. Upon the conclusion of this initial period the overall progress and the impacts of implementation will be evaluated against its goals and objectives, using identified indicators with a view to revision of SLNPOA – Sharks taking into account of the changes in fisheries.

7. INITIATED ACTIONS

45. Fisheries management including management of shark fisheries is supported by NARA and a number of other agencies. NARA has directly involved for offshore and coastal fishery data collection and implements a well established large pelagic fishery data collection programme including maintenance of a database since 1994. Species-wise shark catch recording is also being carried out by NARA under the above programme in order to comply with the recently adopted resolutions for sharks by IOTC.

46. The following actions in the SLNPOA - Shark have already been initiated by NARA in collaboration with DFAR with assistance from BOBLME:

- Provision of training for enumerators engaged in shark data collection and species identification
- Development of educational and awareness materials (posters, leaflets and identification sheets on sharks) on shark conservation and management
- Awareness building among the stakeholders on the conservation and management of sharks
- Upgrading of the NARA PELAGOS database to enable it to incorporate more information on shark landings with regard to species, quantity and value of landings, size composition, fishing areas, fishing methods etc.
- Eliminate or minimize IOTC non-compliance issues related to sharks.

APPENDIX 1

SHARK, SKATE and RAY SPECIES RECORDED FROM FISH LANDINGS 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 Squaliudae

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 Stegostamatidae

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 Alopidae
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 Odontaspididae
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. amblyrhynchos* (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. macloti* (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 adspersa* (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. A*etomylaeus 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) thorntail 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