

Reviewing effectiveness of conservation and management measures on sharks in Sri Lanka over past five years

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Abstract

Sharks play an important role in the marine fishery of Sri Lanka. Though shark fishery was a target fishery in the past, it has become a non-target fishery at present. Sharks are mostly caught as a by-catch in the tuna fishery. The production statistics over the last five years (2013-2017) provided by the large pelagic fishery database (*PELAGOS*) of Sri Lanka was used to analyze the recent trends in the shark fishery. Recent regulations imposed on banning of three thresher shark species with oceanic white tip shark and whale shark have resulted a considerable decline in the shark landings. At present, the percentage contribution of shark production to large pelagic fish production has become less than 2%. During the past, it remained even around 5%. The shark catches in terms of number of species at present are not diverse like reported in the past. The shark catches over the last five years are mainly comprised of silky sharks (*Carcharhinus falciformis*) (57%) followed by blue sharks (24%) and scalloped Hammerhead sharks (*Sphyrna lewini*) (5%) respectively. Though the silky shark was the dominant species in recent years, blue shark (*Prionace glauca*) landings dominated in 2017 by an increase of around 7% than silky sharks. Landings of Silky sharks were peaked in 2013 (1 247Mt) and after, there was a considerable decline in the silky shark catches reported both within Exclusive Economic Zone (EEZ) of Sri Lanka and in high seas. But, there is an increase trend in the blue shark landings mainly reported within the EEZ of Sri Lanka. During the past decade, most of the shark species have been caught mainly by longline-gillnet gear combination. During 2013 - 2017, longline has become the dominant fishing gear responsible for higher shark landings. At present, more than 80% of silky sharks are caught by longline. This study reveals that shark catches have considerably declined over last five years and recent conservation and management initiatives on sharks implemented by Sri Lanka could be one possible reason for this nature. At present, Sri Lanka is in the process of reviewing the previous National Plan of Action (NPOA) implemented with the aim of conservation

and management of sharks and a new NPOA will be formulated accordingly for further strengthening the research, conservation and management of sharks.

Introduction

Sri Lanka is an island nation situated between latitudes $5^{\circ} 30'$ and $10^{\circ} 00'$ North and longitudes $70^{\circ} 30'$ and $82^{\circ} 00'$ East in the Indian Ocean, bounded on the west by the Arabian Sea and the Gulf of Mannar and on the east by the Bay of Bengal (Samaranayake, 2003). It has a coast-line of 1760 km long and Exclusive Economic Zone (EEZ), extending up to 200 nautical miles, with 436 000 km² of ocean have come under national jurisdiction (Samaranayake, 2003; CBSL, 2016).

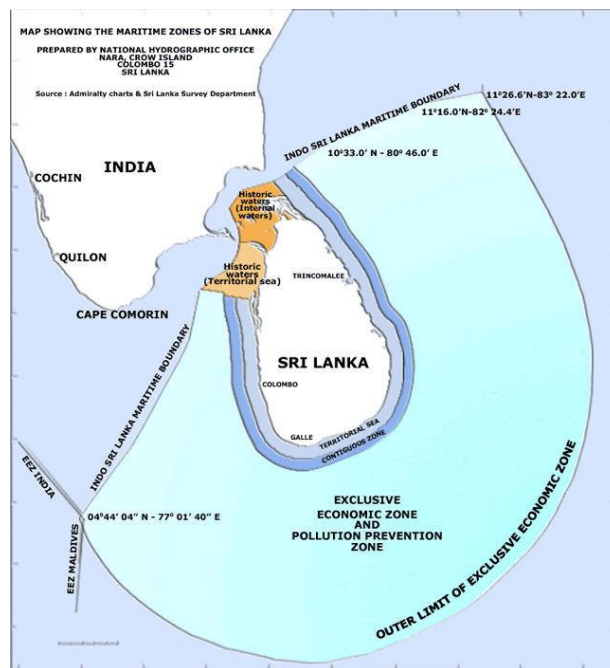


Figure 1: Sri Lankan territory and Exclusive Economic Zone (EEZ)

The fisheries sector in Sri Lanka plays a vital role in economic and social life by providing direct and indirect employment opportunities, providing more than 60% of animal protein requirement of people in the country and earning of foreign exchange to the country (NARA, 2018). In 2016, contribution of the fisheries sector to the Gross Domestic Production (GDP) of the country was 1.3% (CBSL, 2016).

Marine fisheries in Sri Lanka can be broadly subcategorized into coastal and offshore/high seas fisheries. The coastal fishery can be further subdivided into pelagic and demersal fisheries. The total marine fish production of the country in 2016 was 456,990 Mt (NARA, 2018) (Table 1).

Table 1: Annual fish production in Sri Lanka by sub sectors 2012-2016

Sector	2012	2013	2014	2015	2016
Marine sector	417,220	445,930	459,300	452,890	456,990
Coastal	257,540	267,980	278,850	269,020	274,160
Offshore and high seas	159,680	177,950	180,450	183,870	182,330
Inland & Aquaculture	68,950	66,910	75,750	67,300	73,930
Total	486,170	512,840	535,050	520,190	530,920

Source: MFARD, 2017

Status of shark fishery in Sri Lanka during the past and at present

Since 1970s, marine fisheries in Sri Lanka have shown a drastic shift in terms of the exploitation of available fishery resources (Dissanayake, 2005). With the development of multi-day fishing crafts and gears, offshore fishing has expanded rapidly with a substantial increase of marine fish production in the country, especially since 1980s (Maldeniya & Amarasooriya, 1998).

Sharks have traditionally contributed to the marine fish catch in Sri Lanka, but the harvest has mainly confined to the species found in coastal waters within a localized area (Joseph, 1999; Hasarangi, *et al.*, 2012). Exploitation of sharks in Sri Lankan coastal waters gradually extended up to offshore and deep sea areas. Subsequent development and expansion of the bottom trawl fisheries during the 1960s caused to increase the production of the demersal shark species. In addition, large-mesh gillnetting and some of the hook and line fisheries have also caught small quantities of the coastal/inshore pelagic sharks (Joseph, 1999). As a result of the introduction of synthetic gillnets in the late 1950s, the usage of large mesh drift netting for large pelagic fish increased and expanded rapidly. That caused to increase the catch of large pelagic sharks in a significant way since the 1970s (Joseph, 1999). The noticeable increase in shark production reported since 1980's was due to the introduction of multiday large fishing boats with large mesh

gill net and long lines. Thereby a remarkable increase was seen in the shark production after mid 1980's (Jayathilaka & Maldeniya, 2015). In 1990s, shark fishery was one of the target fisheries in Sri Lanka. The peak production was reported in 1999 (Figure 2). However, this has gradually changed and sharks are now considered as a by catch species in tuna fishery.

Pelagic sharks are mostly exploited by the vessels operated in offshore and high sea fisheries whereas demersal sharks are exploited by the few coastal vessels operated in the coastal fishery. 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. Sharks are mostly utilized as fresh meat and dried fish for local consumption while fins and skins are exported. Jaws, and liver oil extracted from dogfish shark are also exported (DFAR, 2013). Shark fishery is always associated with other fisheries.

Since 1999 the annual shark production has shown a considerable decline (Figure 2). This is because fishermen had switched to target tuna since catching of tuna has become more profitable than catching of sharks (Hasarangi, *et al.*, 2012). In addition, some of the conservation & management measures and policy decisions taken by the Sri Lankan government regarding sharks seems to be mainly responsible for declining the shark landings. Some of the more influential implementations by Sri Lanka government are: implementing of Monitoring Control Surveillance (MCS), control of Illegal, Unregulated and Unreported (IUU) fishing, regulations on prohibiting the catching of three thresher shark species, whale shark and oceanic white tip shark, prohibiting the practice of shark finning at sea as well as strengthening law enforcement against the crossing of maritime boundaries.

A sudden drop in the total fish production of all categories including shark production in 2005 could be noted (Figure 2). This is mainly due to the impact of Tsunami disaster on 26th December 2004 on the fishing industry in Sri Lanka (Dissanayake, 2005; Jayathilaka & Maldeniya, 2015).

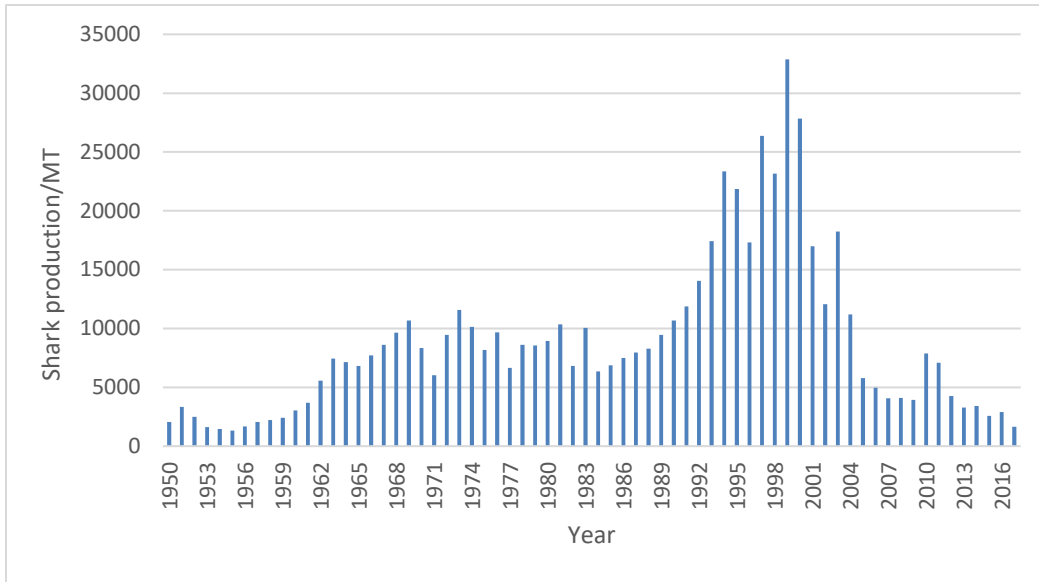


Figure 2: Shark production from 1950- 2012

Average shark production during the last five years has been remained less than 2% to the total large pelagic fish production while tuna remained for more than 65% of the catch and billfish accounted more than 9% of the catch (Figure 3).

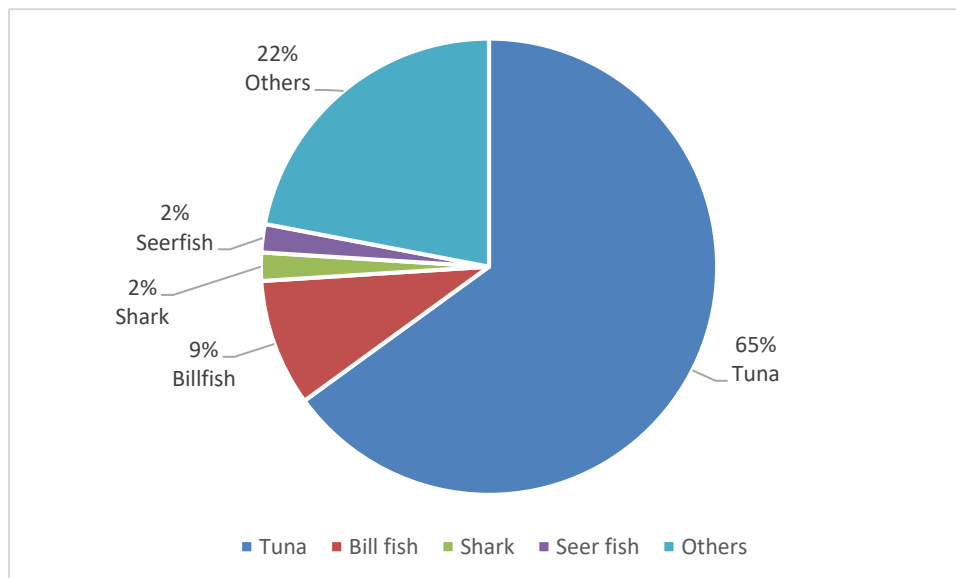


Figure 3: Relative contribution of sharks and other species in large pelagic fish production 2013-2017

Shark catches recorded within Exclusive Economic Zone (EEZ) and beyond Exclusive Economic Zone (BEEZ) are illustrated graphically in Figure 4. Percentage contribution of sharks within EEZ in the total shark production has shown a growing trend. The percentage contribution of sharks within EEZ is nearly 90% of the total shark catch reported in 2016 and 2017.

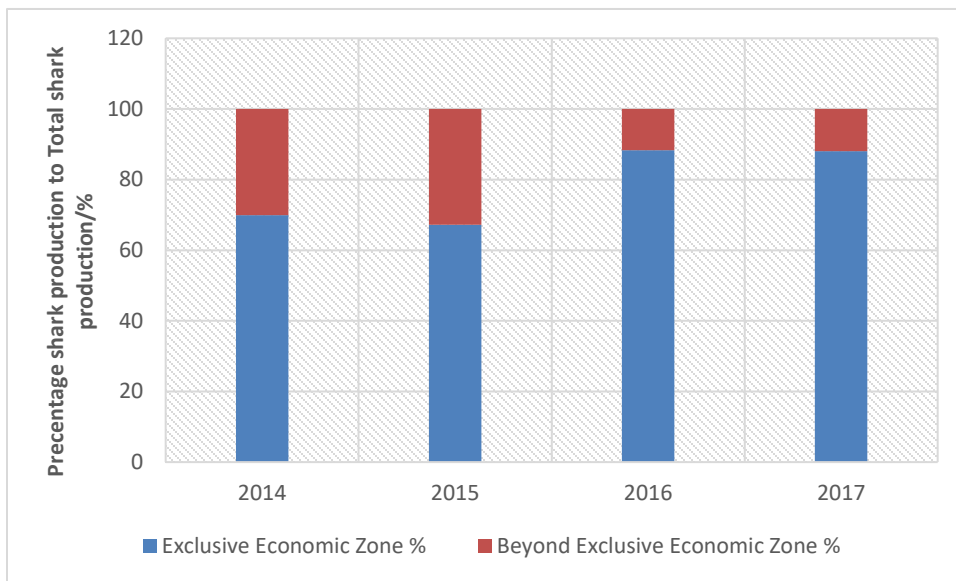


Figure 4: Contribution of sharks within EEZ and Beyond EEZ: to the total shark production - 2014-2017

The only fishery that directly targets shark at present is bottom long line fishery conduct targeting gulper sharks. However, due to the lack of a commercial market for their liver oil, only few coastal boats are at present engaged in this fishery (Jayathilaka & Maldeniya, 2015). Considering the present trend in shark landings, demersal sharks in the total shark catches have become insignificant in recent years.

Apart from tuna longline, some semi industrial/ small scale fisheries operate in tuna fishery (gillnets, ring nets, trolling line and hand line) contribute to the non-target shark landings. Longline contributes for more than 50% of shark landings (Figure 5). Moreover gill net, ring net and trolling line contributes around 35%, 6% and 3% of the shark landings respectively.

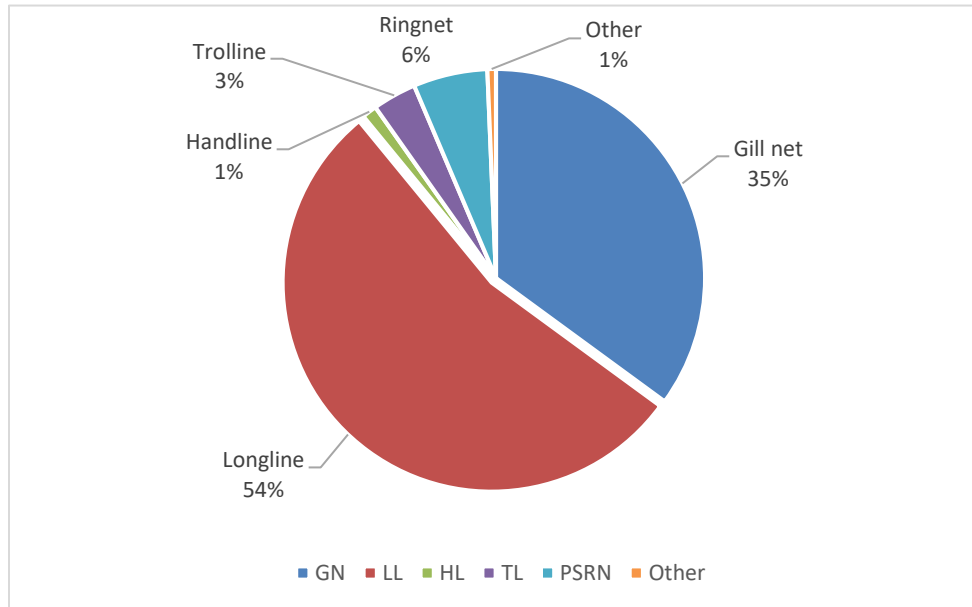


Figure 5: Total shark production by gear types:-2013-2017

During 2013-2017, longline gear operated within the EEZ is responsible for the highest catch of sharks by weight. Figure 6 elaborates contribution of fishing gear responsible for catching of sharks within EEZ and BEEZ.

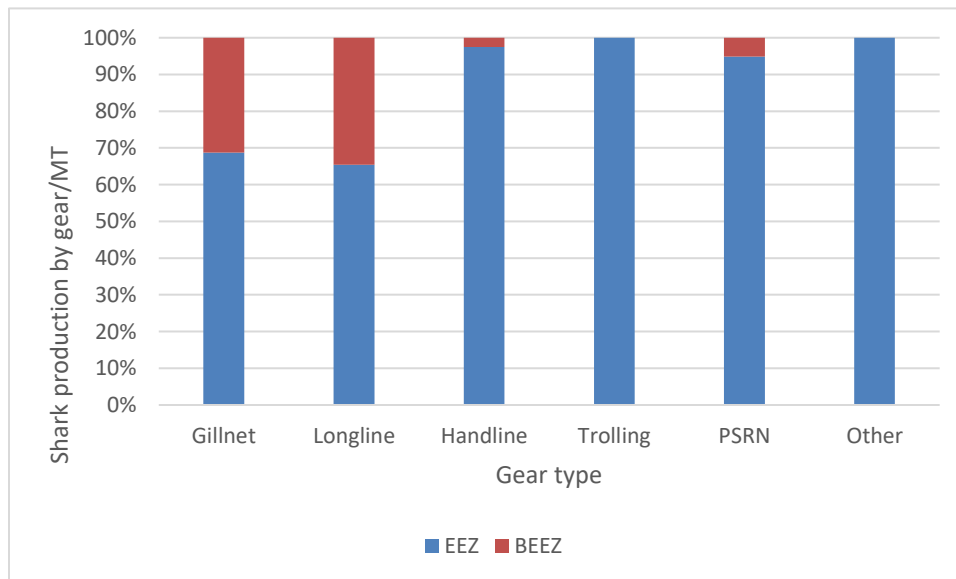


Figure 6: Shark landings by gear type & operated zone:-2013-2017

Considering the shark species recorded in the landings, it has been recorded about sixty shark species during the past (Joseph, 1999). At present, very few species are being recorded.

Silky shark (*Carcharhinus falciformis*) accounts for 57% of the total shark production during 2013-2017 (Figure 7). Blue shark and scalloped Hammerhead (*Sphyrna lewini*) sharks accounted by 24% and 5% respectively. Oceanic white tip sharks were landed until implementing the regulation of prohibiting the catching of Oceanic white tip shark (*Carcharhinus longimanus*) in 2015. In 2011 it represented 6.1% from the total shark landing and remained in around 5% until the prohibition was executed. Contribution of other sharks including Shortfin mako (*Isurus oxyrinchus*), Longfin mako (*Isurus paucus*) sharks to the total shark landings is relatively very small.

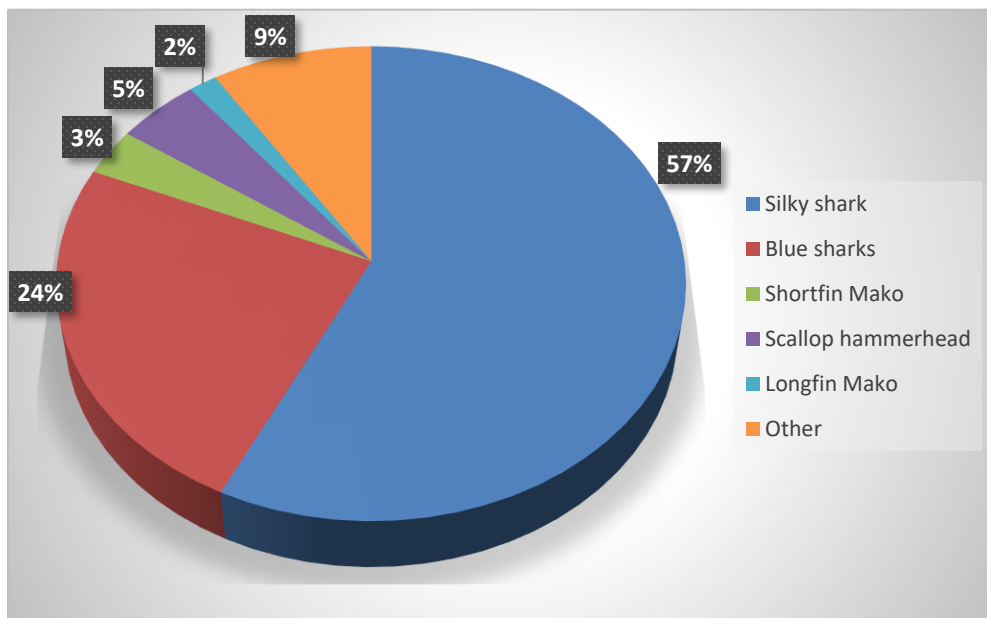


Figure 7: Species wise contribution to total shark production: - 2013-2017

Silky shark (*Carcharhinus falciformis*) was the dominant species among the shark species landing in Sri Lanka and its contribution to total shark landing was nearly 70% during 2013-2015 (Figure 8). Landing of Silky sharks had been peaked in 2013 (1247Mt) and thereafter a considerable decline has been reported. In general, blue shark landings is shown an increasing trend. In 2017 blue shark (*Prionace glauca*) landing has been increased by around 7% than silky shark catch.

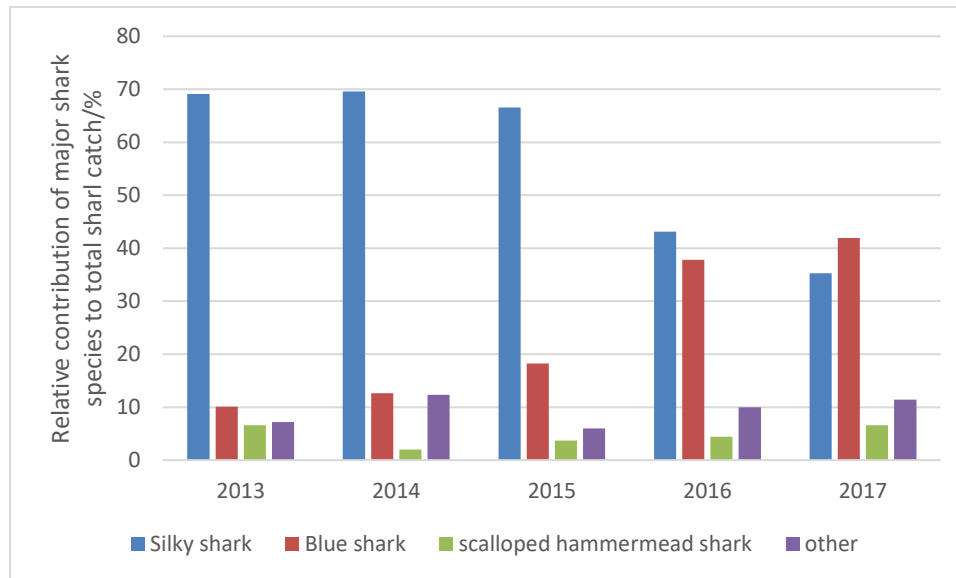


Figure 8: Shark species wise contribution to total shark production: - 2014-2017

Sri Lanka National Plan of Actions (NPOA) for sharks

Due to some biological characteristics such as slow growth rate, low fecundity and late maturity together with other factors like growing of international trade of shark meat and fins, sharks have been made highly vulnerable to the overexploitation. Food and Agriculture Organization (FAO), Conservation on International Trade in Endangered Species of Wild Fauna and Flora (CITES), Indian Ocean Tuna Commission (IOTC) and many other international governmental and non-governmental organizations have initiated several conservation and management measures with the aim of maintaining shark stocks at a sustainable level. Sri Lanka works closely and actively with these management and conservational bodies and the first Sri Lanka National Plan of Action for the conservation and Management of sharks (SL NPOA-Sharks) was prepared and implemented in 2013 in accordance to the guidelines in the FAO code of conduct for responsible fisheries and International Plan of Action for the conservation and management of sharks (IPOA-sharks). SL NPOA- sharks suggested a number of management and conservation measures to be implemented within EEZ of Sri Lanka and high seas. It mainly focused on establishment of necessary capacity, system and databases while managing the fishing effort on shark resources based on an active and progressive precautionary approach in consultation with stakeholders.

Impact of 1st Sri Lanka NPOA of sharks and other conservation & management measures

The annual shark landings in last five years (2013-2017) were estimated at 1804, 1612, 1128, 1499 and 1764 Mt respectively. Accordingly, average shark production in last five years was 1561.4Mt.

Annual shark landings have been declining since 2010. Especially, a clear declining trend in the percentage contribution of shark production to large pelagic fish production could be observed since 2010 (Figure 9).

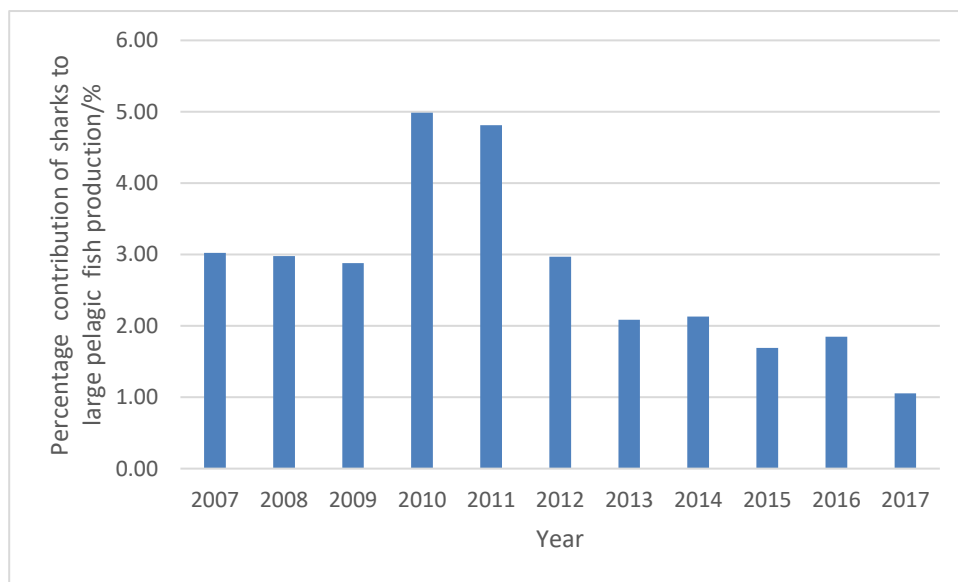


Figure 9: Percentage contribution of sharks to large pelagic fish production: 2007-2017

Implementation of the regulation on banning of three species of thresher shark (*Alopius vulpinus*, *Alopius superciliosus* and *Alopius pelagicus*) in 2012 (Gazette No.1768/36 dated 27-07-2012) have also been affected to declining of shark landing since 2013. In 2010, shark production was around 5% of the total large pelagic fish production. It has dropped up to around 2% during 2013/2014 and further dropped up to 1% in 2017. The banning of Oceanic white-tip shark (*Carcharhinus longimanus*) and the Whale shark (*Rhincodon typus*) in 2015 (Gazette No. 1938/2 of 26 October 2015) has also been impacted to further decline the shark catches.

2013 to 2017 period was very significant because strong implementation of regulations for conservation and management of sharks have been directly affected to reduce the shark landings up to less than 2% of the total large pelagic fish production. At present, Department of Fisheries

and Aquatic Resource (DFAR) and National Aquatic Resources Research and Development Agency (NARA) have involved to prepare a new National Plan of Action for the management and conservation of sharks in next five years (2019-2022). Evaluation of first NPOA and future conservation and management measures will be addressed by the 2nd NPOA-sharks.

Acknowledgment

We express our sincere gratitude to the fishermen who helped us at the field for data collection and sharing their knowledge with us. The staff members of National Aquatic Resources Research and Development Agency (NARA), Department of Fisheries and Aquatic Resource (DFAR) and Ministry of Fisheries and Aquatic Resources Development (MFARD) of Sri Lanka who assisted in port sampling data collection, data entry and data analysis are acknowledged.

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