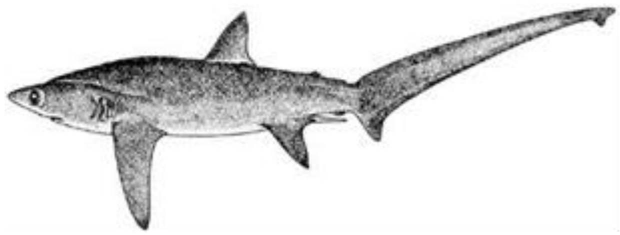
CONVENTION ON INTERNATIONAL TRADE IN ENDANGERED SPECIES
OF WILD FAUNA AND FLORA

Seventeenth meeting of the Conference of the Parties
Johannesburg (South Africa), 24 September – 5 October 2016

CONSIDERATION OF PROPOSALS FOR AMENDMENT OF APPENDICES I AND II

A. Proposal

The proposal concerns the inclusion in Appendix II of *Alopias superciliosus* (bigeye thresher shark) in accordance with Article II paragraph 2(a) of the Convention and satisfying Criterion A in Annex 2a of Resolution Conf. 9.24 (Rev. CoP16); and the inclusion of all other species of thresher sharks, genus *Alopias* spp. in accordance with Article II paragraph 2(b) of the Convention and satisfying Criterion A in Annex 2b of Resolution Conf. 9.24 (Rev. CoP 14).



Qualifying criteria (Res. Conf. 9.24 (Rev. CoP16))

Annex 2a, Criterion A. *It is known, or can be inferred or projected, that the regulation of trade in the species is necessary to avoid it becoming eligible for inclusion in Appendix I in the near future.*

Alopias superciliosus qualifies for inclusion in Appendix II under this criterion because international trade in this species' fins is a major driver of the unsustainable and largely unmanaged fisheries that have caused marked declines in its populations worldwide. These declines, to less than 30% of baseline, meet CITES' guidelines for the application of the decline criterion to commercially exploited aquatic species.

Based upon continuing unsustainable rates of exploitation and ongoing population declines, this species is likely to face an even higher threat of extinction and soon qualify for Appendix I under Criterion Cii unless international trade regulation provides an incentive to introduce or improve monitoring and management measures in order to provide a basis for non-detriment and legal acquisition findings.

Annex 2b, Criterion A. *The specimens of the species in the form in which they are traded resemble specimens of a species included in Appendix II under the provisions of Article II, paragraph 2(a), or in Appendix I, such that enforcement officers who encounter specimens of CITES-listed species, are unlikely to be able to distinguish between them.*

All other species in the genus Alopias (Common thresher (*A. vulpinus*) and pelagic thresher (*A. pelagicus*) sharks) are included in this listing proposal since, in the most commonly form traded (dried, unprocessed shark fins), they closely resemble the fins of *A. superciliosus* and therefore meet the criteria laid out in Article II paragraph 2(b) of the Convention and satisfy Criterion A in Annex 2b of Resolution Conf. 9.24 (Rev. CoP 16).

B. Proponent

Bahamas, Bangladesh, Benin, Brazil, Burkina Faso, the Comoros, the Dominican Republic, Egypt, the European Union, Fiji, Gabon, Ghana, Guinea, Guinea-Bissau, Kenya, Maldives, Mauritania, Palau, Panama, Samoa, Senegal, Seychelles, Sri Lanka and Ukraine*.

C. Supporting statement

1. Taxonomy

1.1 Class: Chondricthyes, subclass Elasmobranchii

1.2 Order: Lamniformes

1.3 Family: Alopiidae

1.4 Genus, species or subspecies, including author and year: *Alopias superciliosus* (Lowe, 1841)

1.5 Scientific synonyms: *Alopias profundus* (Nakamura, 1935)

1.6 Common names:
Afrikaans: Grootoog-sambokhaai
English: Long-tailed shark, whiptail shark, big-eyed thresher shark
French:
German: Drescherha
Spanish: Tiburon zorro, zorro de mar

Table 1. 'Look-alike' species for A. *superciliosus*

Family	Species	Scientific synonym	Common name	IUCN Red List
Alopiidae	*Alopias vulpinus* *(*Bonnaterre, 1788)	*Squalus vulpes* (Gmelin, 1788), *Alopias macrourus* (Rafinesque, 1810), *Squalus alopecias* (Gronow, 1854), *Alopecias chilensis* (Philippi, 1902)	Common thresher shark	Vulnerable
Alopiidae	*Alopias pelagicus* (Nakamura, 1935)	n/a	Pelagic thresher shark	Vulnerable

1.7 Code numbers: N/A

2. Overview

The bigeye thresher shark, *Alopias superciliosis,* qualifies for listing in Appendix II in accordance with Article II paragraph 2(a) because the marked declines in its populations, driven at least partly by the high value of its fins in international trade, satisfy Criterion A in Annex 2a of Resolution 9.24 (Rev CoP 16). The greatest threats to this species are unsustainable target and bycatch fisheries, which have driven these population declines and supply international markets for valuable thresher shark fins.

The biology and very low intrinsic reproductive rate of the thresher sharks, *Alopias* spp., makes them among the most vulnerable of all shark species to anthropogenic mortality worldwide, whether as a target or bycatch species, and threshers are the family at highest risk of extinction of all pelagic sharks (Section 3). Although the bigeye thresher shark was assessed in 2007 for the IUCN Red List of Threatened Species as Vulnerable globally, due to population declines, more recent data indicate that it is more seriously depleted than was realized; this global assessment requires updating. Regional assessments are Endangered in European and Mediterranean waters, the northwest and western central Atlantic; Vulnerable in the Indo-west Pacific; and Near Threatened in the southwest Atlantic.

* *The geographical designations employed in this document do not imply the expression of any opinion whatsoever on the part of the CITES Secretariat (or the United Nations Environment Programme) concerning the legal status of any country, territory, or area, or concerning the delimitation of its frontiers or boundaries. The responsibility for the contents of the document rests exclusively with its author.*

Bigeye thresher shark populations have experienced declines of 70-80% in the Atlantic Ocean and over 80% decline in the Indian and Pacific Oceans within the last three-generation period. There has been a 99% decline from historic baseline for thresher sharks in the Mediterranean. The proportion of thresher shark fins appearing in the Hong Kong shark fin market has declined 77-99% in the past ten to 15 years (section 4).

Recognising declining catches and the threat posed by unmanaged fisheries to thresher sharks, three RFMOs have taken action to restrict catches of these species. ICCAT recommended the release of live bigeye thresher shark bycatch in Atlantic Ocean fisheries in 2008, followed in 2009 by a complete prohibition for this species. The same measure was adopted in Mediterranean fisheries regulated by the GFCM in 2010. In the Indian Ocean, the IOTC prohibited the retention of all thresher sharks in 2012. Despite these measures, thresher sharks catches reported to FAO have continued to rise in the Atlantic (most steeply for bigeye thresher) and have only fallen slightly in the Indian Ocean (section 5).

In 2012, in response to the decision of IOTC to prohibit the retention of thresher sharks, and the growing evidence that bigeye thresher sharks were disappearing from pelagic fisheries catch, Sri Lanka imposed a total ban on catching, retaining on board, transshipping, landing, storing, selling, or offering for sale of any Thresher sharks under the regulation published in Gazette No. 1768/36 (section 7).

Thresher shark fins are sufficiently distinctive in appearance to have the trade name “wu gu” (勿骨) in the Hong Kong dried seafood market. In the early 2000s, they comprised approximately 2.3% of all shark fins, representing between half and three million thresher sharks per year. By 2015, the proportion of thresher shark fins in this market had declined to some 0.03-0.53% (median 0.20%) of all shark species represented (section 6). This, combined with reported catches and other trend data, confirms that thresher shark catches have been significantly underreported, that populations are declining, and that RFMO measures for thresher shark conservation lack compliance monitoring and enforcement.

An Appendix II listing for *Alopias superciliosus* and the other ‘lookalike’ thresher shark species will ensure that international trade is supplied by sustainably managed, accurately recorded fisheries that are not detrimental to the status of the wild populations that they exploit. Trade controls under CITES will complement and reinforce fisheries management and species conservation measures adopted for this species. For example, legal acquisition findings and the application of measures for compliance with Introduction from the Sea will ensure that products do not enter trade from fisheries, protected areas, countries, EEZs or RFMO regions where the capture of thresher sharks is prohibited. The development of non-detriment findings will ensure that fisheries management measures are appropriate and effective.

3. Species characteristics

3.1 Distribution

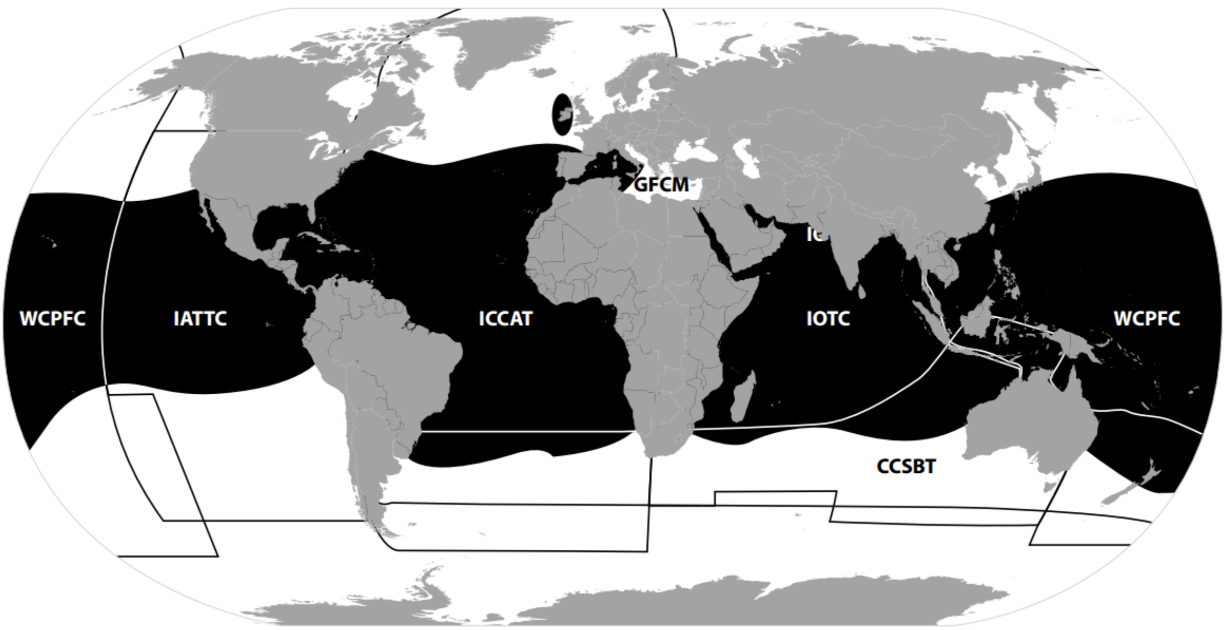


Figure 1. World distribution map for *A. superciliosus* (IUCN Red List) and RFMO convention areas.

Alopias spp. are highly migratory pelagic sharks, with an almost worldwide circumglobal distribution in tropical and temperate oceanic and coastal seas (see Figure 1). Only a few bigeye thresher sharks have been tracked; one moved from the Northeast coast of the US to the Gulf of Mexico, a straight-line distance of 2,767 km (1,719 miles, Weng and Block 2004), another crossed international borders in Central America (Kohin *et al*. 2006). Tag and recapture studies have recorded movements from the US EEZ to the high seas and Central American State EEZs (Kohler *et al*. 1998).

Bigeye thresher *A. superciliosus* occur in the following FAO fishing areas: 21, 27, 31, 34, 37, 41, 47, 51, 57, 61, 67, 71, 77, 81, 87.

Range States are listed in Annex 5.

3.2 Habitat

A. superciliosus is found in all warm and temperate areas of the world's oceans on the continental shelf and in the epipelagic zone, they are also occasionally encountered in shallow coastal waters (Stillwell and Casey 1976; Compagno 2001; Nakano *et al*. 2003; Weng and Block 2004). This species is one of the few sharks to exhibit diel vertical migratory behaviour, generally moving to shallow depths at night to feed (<100 m) and inhabiting deeper waters (between 400 to 600m) during the day (Nakano *et al*. 2003; Weng and Block 2004; Stevens *et al*. 2010). They occur in surface temperatures of 16–25 °C (61–77 °F), but have been tracked as far down as 723m (2,372 ft), where temperatures are around 5 °C (41 °F) (Nakano *et al*. 2003).

3.3 Biological characteristics

The biology and very low intrinsic reproductive rate of all thresher sharks, *Alopias* spp., makes them among the most vulnerable of all shark species to anthropogenic mortality worldwide, whether as a target or bycatch species, and threshers are the family at highest risk of extinction of all pelagic sharks (Oldfield *et al* 2012, Dulvy *et al* 2014). This species is viviparous, giving birth to fully developed young, usually with only two pups per litter (Compagno 2001). Females reach sexual maturity at around 12–14 years (332–341cm) and males slightly earlier between 9–10 years (270–288cm). They have a lifespan of 20–21 years and a 12-month gestation (Liu *et al.* 1998; Moreno and Moron 1992; Compagno 2001). A female bigeye thresher shark will therefore produce fewer than twenty pups in its lifetime (Amorim *et al*., 2009). *A. superciliosus* has the lowest fecundity and the lowest rate of population increase of the three thresher species, with an estimated rate of at 0.016 $year^{-1}$ under sustainable exploitation levels (Smith *et al*. 2008), or 0.002–0.009 $year^{-1}$ (Cortés 2008, Dulvy *et al*. 2008). This exceptionally low reproductive rate makes *A. superciliosus* one of the least fecund species of shark. It therefore has a low capacity to recover from even small levels of exploitation, with their population doubling time estimated at around 25 years (Smith *et al*. 2008).

Cortés (2008), using a density independent demographic approach, calculated population growth rates (λ) of 1.009 yr^{-1} (0.990, 1.028; lower and upper 95% confidence limits, respectively) and generation times (T) of 17.2 yrs (15.9, 18.6). In this study, population growth rates are extremely low when compared with eight other pelagic shark species. Estimates of the intrinsic rate of increase for this species (r=0.028 yr^{-1}) indicated that bigeye thresher shark populations are vulnerable to depletion and are among the least productive of 33 elasmobranchs examined (Smith *et al*., 2008). Combined Ecological Risk and Productivity Assessments for the Atlantic Ocean determined that bigeye thresher sharks are least productive and the fourth most vulnerable to pelagic fisheries of 16 species evaluated (Cortés *et al*. 2012).

A. superciliosus have a very low recovery potential and productivity when compared to 26 other species of sharks and low population growth rates (r<0.14) as defined by Food and Agriculture Organization of the United Nations (FAO). Ecological Risk and Productivity Assessments determined that bigeye thresher sharks ranked fourth in their susceptibility to pelagic fisheries among 12 other Atlantic Ocean species (ICCAT 2008).

A comprehensive outline of documented life history parameters is provided in Annex I.

3.4 Morphological characteristics

Alopias spp. are large, wide-ranging lamniform sharks. Thresher sharks can be most easily identified by the extremely long upper lobe of the caudal fin. The upper caudal lobe can be as long as the body and gives the tail a slender whip-like appearance. The first dorsal fin is tall and erect (on large sub-adult and adult specimens), and the pectoral fins are elongated.

A. superciliosus have large, upward looking eyes extending onto the top of the head, and a pronounced groove on top of the head running from the eye to the level of the gill slits. Unlike the common thresher, it has no labial furrows. The first dorsal fin originates closer to pelvic fins than to the pectoral fins. It is a dark bluish brown (with metallic purple hues) in colour along the dorsal midline, bluish grey along the flanks and white below, with the white not extending above the pectoral fins (unlike the common thresher). Pectoral fins are dark on the dorsal surface, lighter on the ventral surface, with dusky markings along the outer margins. The colouration of all *Alopias* spp. fades to grey after death.

3.5 Role of the species in its ecosystem

Bigeye thresher sharks are a high trophic level predator in ocean ecosystems, feeding mainly on pelagic fishes including herring, mackerel, and small billfishes, as well as squid (Compagno, 1984; Galván-Magaña *et al*., 2013). Cortes (1999) determined the trophic level based on diet for *A. superciliosus* was 4.2 (with a maximum of 5.0). The thresher shark uses its tail to stun its prey (Amorim *et al*., 2009), and its large caudal fin may be caught on pelagic longlines as a result of the shark's attempts to stun the bait (Compagno, 2001).

4. <u>Status and trends</u>

4.1 Habitat trends

Overall, critical habitats and the threats they face are largely unknown for all *Alopias* spp., but habitat trends and status are unlikely to be limiting factors. *Alopias* spp. nursery grounds have been identified in some inshore temperate regions in the Adriatic Sea, northeastern Atlantic, western Mediterranean (Alboran Sea), southern California, and South Africa waters (Moreno *et al*. 1989; Compagno 2001; Notabartolo Di Sciara and Bianchi 1998). A nursery area for *A. superciliosus* is suspected in the waters off the southwestern Iberian Peninsula (Moreno and Moron 1992). None of these possible key habitat areas have any specific protection measures for *Alopias* spp.

4.2 Population size

Unknown.

4.3 Population structure

There is no structuring of populations of *A. superciliosus* within the Pacific Ocean and the existence of separate Indian Ocean and Pacific Ocean stocks is still unconfirmed. There is, however, significant genetic divergence between Atlantic and Indo-Pacific populations (Trejo 2005).

4.4 Population trends

The thresher shark family is among the most vulnerable of all pelagic shark species to any level of fisheries mortality, whether as a target or bycatch species. Because threshers tend to be identified at family level only, there are few species-specific trend data available. Worldwide, however, the *Alopias* species complex has declined by over 70% in almost every area they are found, and the bigeye thresher shark has exhibited population declines throughout its range in every area where sufficient species-specific historical and current population data exist (see Annex 2). Furthermore, the proportion of thresher shark fins in the Hong Kong shark fin market, a more accurately recorded data source, has also declined. Because this member of the family has the highest intrinsic biological vulnerability to overfishing, the trends at higher taxonomic level are considered to be representative, if not conservative, for the bigeye thresher species.

Table 2. **Population trends for *Alopias spp.***

Ocean/Sea	Estimated thresher stock decline	Reference
Atlantic	70-80% (dependent on sub-region) over the last 30 years	Baum *et al*., 2003 and Beerkircher *et al* 2002
Indian	83% (inferred as no confirmed separation from the pacific stock)-88% over the last 20 years	Goldman *et al*., 2014 and FAO 2013
Pacific	83% over the last three generation periods	Ward & Myers, 2005
Mediterranean	99%	Ferretti *et al*., 2008
Global	77-99% decline in proportion of threshers in the Hong Kong shark fin market in the last 10-15 yrs	Fields, submitted

While the bigeye thresher shark is assessed as Vulnerable globally in the IUCN Red List of Threatened Species, due to population declines reviewed in 2007 (Amorim *et al*. 2009), this assessment requires updating – more recent data indicate that stocks are more seriously depleted than was realised ten years ago. Regional Red List assessments are: Endangered in European and Mediterranean waters, the northwest Atlantic and western central Atlantic; Vulnerable in the Indo-west Pacific, eastern and western central Pacific; and Near Threatened in the southwest Atlantic.

Estimates of available trends in abundance of *A. superciliosus* are summarized in Annex 2. Given the difficulties in differentiating *A. superciliosus, A. pelagicus*, and *A. vulpinus,* and the amalgamation of catch records, estimates of trends in abundance are also listed for threshers as a complex.

Atlantic and Mediterranean trends

A. superciliosus and *A. vulpinus* are often grouped together in catch data, making it difficult to distinguish the status of each population, although *A. superciliosus* is the more common of the two species found in this region. An Ecological Risk Assessment (ERA) of pelagic sharks in Atlantic pelagic longline fisheries identified *A. superciliosus* as one of the shark species most at risk from overexploitation in the Atlantic, following six decades of incidental and targeted fishing Cortés *et al*. (2012).

Observed historical declines in the Northwest Atlantic region suggest the population had collapsed, with estimates for *A. superciliosus* and *A. vulpinus* indicating an 80% decrease during 1986 to 2000 (Baum *et al*. 2003; Amorim *et al*. 2009; Goldman *et al*. 2013; Reardon *et al*. 2009). A more recent study in the Northwest Atlantic Ocean shows that thresher shark stocks may have stabilized since 2000 (Baum & Blanchard 2010), possibly as a result of the United States prohibiting thresher shark catch in the Atlantic since 1999, however populations are still significantly below historical baselines, despite these very well-enforced management measures. In other areas of the Atlantic Ocean and globally, declines most likely continue due to far weaker or no management measures.

Studies in the Southeastern United States identified decreases in Catch Per Unit Effort (CPUE) for *A. superciliosus* of 70% from historic baseline (Beerkircher *et al*. 2002). In the western central Atlantic, common and bigeye thresher sharks have undergone a 63% decline in population since 1986 (Cortes *et al*., 2007).

In the southwest Atlantic, Amorim *et al*., (1998) reported a consistent decline in bigeye thresher CPUE over the preceding 30 years.

In the European region, bigeye threshers are estimated to have suffered declines of more than 50% over the last three generation periods (Walls & Soldo, 2015). Ferretti *et al*. 2008 identified a decline from historical baseline of 99% for thresher sharks in the Mediterranean.

Pacific Ocean Trends

In the Eastern Central Pacific, trends for *Alopias spp.* indicate a decline in abundance of 83% from baseline levels, and a decline in biomass to approximately 5% of virgin levels (Ward and Meyers 2005).

In the western and central Pacific, data are incomplete for thresher sharks. However, the bigeye thresher is commonly caught in regional fisheries (Amorim *et al*., 2009) in both legal and illegal directed shark catch (Camhi *et al*., 2007). A 2013 study notes that the stock of *A. pelagicus* in the region had reduced by 34.3% over the past 20 years (slightly more than one generation) and that the stock is under high fishing pressure and overexploited (Liu S-YV 2013). Furthermore, a significant decrease in the median size of thresher sharks caught in the western and central Pacific has been noted in recent years, as well as a decrease in nominal catch rates in portions of the western and central Pacific (Clarke *et al*., 2011).

All *Alopias* spp. are on the WCPFC list of key shark species, but a lack of detailed species-specific data means that no stock assessments have yet been produced (WCPFC Scientific Committee report 2013). However, in a report to the WCPFC Scientific Committee in 2015, Rice *et al* noted that both the proportion presence and high-CPUE time series showed considerable declines over the past five years. A Pacific-wide stock assessment of thresher sharks is currently underway in the WCPFC area and should become available in August 2016.

Indian Ocean Trends

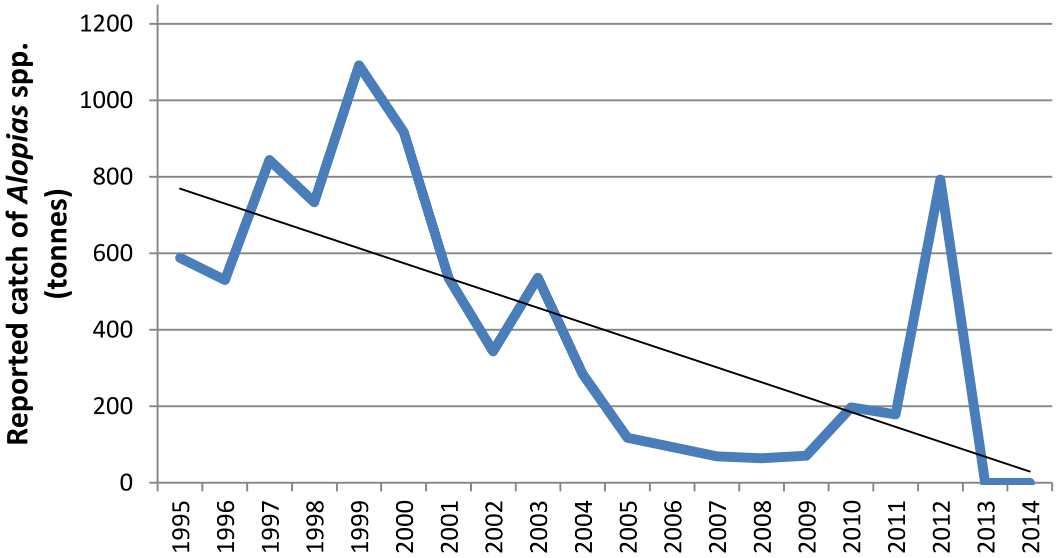
Little detailed information is available on *Alopias* spp*.* in this region; although pelagic fishing effort is high, catches are under-reported. A recent review of fisheries in the Indian Ocean concluded that thresher sharks in this region are overutilized (NOAA 2016). Given the high intrinsic vulnerability of *A. superciliosus*, coupled with continued high levels of exploitation in this region and the declines observed elsewhere in its range, declines are also inferred here (Amorim *et al*. 2009; Goldman *et al*. 2009; Reardon *et al*. 2009).

Historically thresher sharks played an important role in Sri Lanka onshore and offshore shark fisheries, making up nearly 20% of total shark catch by the Sri Lankan fleet in 1994 (Williams, 1995; Dayaratne *et al.* 1996). The catch was made up predominantly of bigeye and pelagic thresher sharks, with bigeye thresher sharks being the second most abundant shark caught in Sri Lankan fisheries (Jayathilaka & Maldeniya 2015).

However Sri Lankan catches declined by over 70% in subsequent years (Figure 2), leading to concerns over the state of thresher shark populations. In 2010, the Indian Ocean Tuna Commission (IOTC) acted in response to the reported drops in thresher shark catches in Sri Lanka and throughout the Indian Ocean by prohibiting the retention of thresher sharks in all fisheries covered by the convention through IOTC Resolution 2010/12. Sri Lanka introduced legislation to implement this measure nationally, prohibiting thresher shark fishing in 2012.

In recognition of the highly uncertain status of shark stocks in the Indian Ocean, the Indian Ocean Tuna Commission's Scientific Committee developed an Ecological Risk Assessment (ERA) to quantify the shark species most at risk from the high levels of pelagic longline fishing pressure (IOTC Scientific Committee 2013). The ERA concluded that *A. pelagicus* and *A. superciliosus* had very high vulnerability rankings (No. 2 and No. 3 respectively) for longline gear because they are two of the least productive shark species, and highly susceptible to capture in longline fisheries. They also noted that the available evidence indicates considerable risk to the status of the Indian Ocean *Alopias spp.* stocks at current effort levels. In 2015, the IOTC Working Party on Ecosystems and Bycatch (WPEB) reviewed the status of the bigeye thresher, concluding that its stock status was uncertain. They considered that maintaining or increasing effort, with associated fishing mortality, can result in declines in biomass, productivity and CPUE, and that concentration of longline fishing effort into the southern and eastern Indian Ocean may result in localized depletion. They recommended that the prohibition on retention be maintained. The ERA will be revisited for *A. superciliosus* in 2018 (IOTC 2015).

Figure 2. *Alopias* spp. catch (t) declines in Sri Lanka (1995-2014; no landings reported in 2013 or 2014) – see Annex 3



Global trade trends

The Hong Kong shark fin market provides the best data against which to assess trends in international trade in shark products (Dent and Clarke 2015). In the early 2000s, thresher shark species made up 2.3% of the fins in trade (Clarke *et al* 2006). By 2015, this had fallen to some 0.03-0.53% of the sharks in the Hong Kong fin market (Fields, submitted). This is a 77-99% decline in thresher shark fins in trade.

4.5 Geographic trends

See 4.4.

5. Threats

The biology and very low intrinsic reproductive rate of all thresher sharks, *Alopias* spp., makes them among the most vulnerable of all shark species to anthropogenic mortality worldwide, whether as a target or bycatch species, and threshers are the family at highest risk of extinction of all pelagic sharks (Oldfield *et al* 2012, Dulvy *et al* 2014).

The principal threat to *Alopias* spp. is unsustainable mortality in target and bycatch fisheries. They are frequently caught by offshore longlines (sometimes hooked by the tail) and pelagic gillnet fisheries, most of which are unregulated and unreported (Dulvy *et al*. 2008). The post release mortality rate of threshers released alive from pelagic fisheries is unknown, but probably high (IOTC 2015). They are also fished with anchored bottom and surface gillnets, and caught as a bycatch of other gear including bottom trawls and fish traps (Maguire *et al.* 2006). International trade demand for the large valuable fins of thresher sharks is a significant driver of mortality in many of these target and bycatch fisheries, although there are also important markets for their meat. The quantity of thresher shark fins identified in Hong Kong fin markets in the early 2000s equated to between 350,000 and 3.9 million individual thresher sharks, or a biomass of 12,000 - 85,000 tonnes being killed and traded per year (Clarke *et al*. 2006 b). At that time, global catches of less than 4,000 t of threshers were being reported to FAO, or 5%–40% of animals entering trade. The most recent reported global thresher shark catches were around 21,200 t in 2013 and 18,800 t in 2014 (FishStat 2016), demonstrating the high level of unreporting in earlier years, while the percentage of thresher sharks in trade have actually declined significantly, to account for some 0.03-0.53% of the sharks in the Hong Kong market in 2015 (Fields, submitted).

Key habitat areas, such as nursery grounds identified in some inshore temperate regions (see section 3.2) are also at risk, in particular from fisheries. None of the potential critical habitats for *Alopias* spp. have any specific protection measures in place.

In the International Commission for the Conservation of Atlantic Tunas (ICCAT) Convention area, retention of bigeye thresher sharks was prohibited in 2009, extended to the Mediterranean by the General Fisheries Commission for the Mediterranean (GFCM) in 2010. Similarly, retention of all thresher sharks has been prohibited in the IOTC Convention area since 2012. However, despite these regional protections, catches of thresher sharks reported to FAO have continued to rise in the Atlantic (most steeply for bigeye thresher) and have only fallen slightly in the Indian Ocean (FAO, 2016; Figures in Annex 3), indicating that these measures are not fully enforced or providing the protection intended (NOAA 2016). Like many sharks, catches of *Alopias* spp. are hugely under-reported globally (Clarke *et al*. 2006; Worm *et al.* 2013) and species-specific trend data are lacking. However, a UN FAO analysis concluded: 'unless demonstrated otherwise, it is prudent to consider these species as being fully exploited or overexploited globally' (Maguire *et al.* 2006). Recent work by TRAFFIC for UK Defra, to develop an assessment framework for exposure and management risk for sharks, found *Alopias* spp. to be in the highest risk category with regard to the level of management in place and their intrinsic vulnerability (Lack *et al* 2014).

Alopias spp. have been widely caught in offshore longlines by the former USSR, Japan, Taiwan (Province of China), Brazil, Uruguay, USA, and others. Furthermore, *A. superciliosus* comprises a large majority of the catch in the Brazilian Santos fishery (Amorim *et al*., 2009). The northwestern Indian Ocean and eastern Pacific are especially important fishing areas (Compagno 2001).

A. superciliosus comprised approximately 11% of the shark catch by Japanese tuna longline vessels in the Pacific Ocean between 1992-2006, making them the second most commonly recorded shark in the fishery, caught by almost 1/3 of the total number of sets each year (Matsunaga & Yokawa 2013). All three thresher species were estimated to make up 13% of the total shark, skate, and ray bycatch of the tuna longline industry, of which 98.9% were finned and then discarded (Bromhead *et al*., 2012). It has been estimated that fishing mortality in the northwest Atlantic would need to be reduced by ~40%, as a minimum baseline, to ensure the survival of bigeye thresher sharks (Myers and Worm 2005)-

6. Utilization and trade

Thresher sharks are taken as a utilised bycatch and a target species in many coastal and oceanic pelagic fisheries. This catch is utilised in domestic markets and enters trade legally, unless taken in contravention of national legislation or regional fisheries management measures (see section 7). Unfortunately very few Parties report catches to FAO and Regional Fisheries Bodies at species level, or even by genus. Furthermore, because data on the international shark product trade are not documented to the species or genus level in the Harmonized Tariff Schedule, there is no species-specific information on the quantity and/or value of imports or exports, or on exporting and importing countries.

Consumption of shark products may fluctuate over time with changes in demand: (fashion, medical knowledge, and the availability of substitutes), supply and price. Widespread under reporting and a lack of species-specific catch and trade data makes it almost impossible to quantify such trends. For example, none of the 14 commodity categories used by FAO for chondrichthyan fishes are taxon-specific, with the exception of four categories for various forms of dogfish sharks (family Squalidae). Information on trade in bigeye or other thresher shark products, apart from fins, is therefore mostly from early TRAFFIC surveys or other field researchers. (TRAFFIC 1996; Worm *et al*. 2013; FAO landings data; Clarke *et al*. 2006 a and b; Amorim *et al*. 2009; Goldman *et al*. 2009; Reardon *et al*. 2009.) The principal drivers of thresher shark catch and trade are national market demand for meat (which may be consumed in preference over that of other shark species), and international demand for fins. Other products, including skin, liver oil, cartilage, and teeth, are lower grade commodities. These are not utilised or traded in large quantities and are not separately recorded in trade statistics (Clarke 2004).

While there has been a decline in reported shark fin trade and consumption, there is debate regarding the causes, which may include increased regulation of catches, declining stocks and catch per unit effort, or falling consumer demand. For example, the overall shark fin trade volume reported in Hong Kong 2012 has dropped by 22% from the average of 2008–2010 (Eriksson & Clarke, 2015), but the total average reported shark fin volume traded into Hong Kong was still at least 6,000 metric tons from 2012-2015. There are no data to demonstrate that these trade volumes are sustainable. Instead, these overall trade declines may be an indicator of dwindling wild populations, unable to support fisheries at previous levels. The latter appears likely in the case of thresher sharks, which comprised 2.3% of the total shark fin trade in the early 2000s (Clarke *et al* 2006) but only 0.03-0.53% (median 0.20%) in 2015 (Fields submitted). No other study has been undertaken to investigate whether the volumes of thresher shark fins are sustainable.

6.1 National utilization

Thresher sharks are mostly utilised nationally for their meat. This is often marketed fresh/chilled or frozen in Europe, North America (including from a target fishery off California), Australia, New Zealand, Japan and Taiwan (Province of China). It is often dried, salted, smoked, cooked or processed in other regions.

Bigeye thresher sharks comprise 5.8% of the average shark landings in Taiwan (Province of China) (Vanson *et al*., 2013). The meat of *Alopias* spp. is heavily consumed here, with 23% of sampled shark products coming from *A. pelagicus* (Liu S-YV 2013). Elsewhere in East Asia, shark meat is used in the domestic production of minced fish products, such as fish balls and tempura. In China it is used to produce salted shark meat, canned meat, and shark meatballs (Parry-Jones *et al*.; 1996). In areas where immediate refrigeration or freezing facilities are not available, meat is often salted and dried; for example in eastern and southern Africa, where it supplies domestic and intra-regional demand. The processing of juvenile sharks into "meat dough" has been reported in Somalia. In the Philippines, *Alopias* spp. meat historically sold for around €2.75/kg and dried fins for €18.30/kg (TRAFFIC 1996).

Other lesser-used products include liver oil, cartilage, skin for leather, and jaws for curios. Fins are only utilised in the country of origin if there are domestic fin processing facilities. Otherwise they enter international trade (see below).

Thresher sharks are an important recreational sports fishing resource in some countries, including the United States (particularly California), southern United Kingdom, New Zealand and elsewhere in the Pacific. The pelagic thresher (*A. pelagicus*) is very valuable for dive tourism in the Philippines.

6.2 Legal trade

Thresher shark products enter trade legally, unless taken in contravention of national legislation or regional fisheries management measures (see sections 6.4 and 7).

6.3 Parts and derivatives in trade

Fins are the main product in international trade; meat is of lesser importance. Dent and Clarke (2015) provide conservative estimates of the average declared value of total world shark fin imports. These were about USD$ 22.5/kg from 2000 to 2011, but had risen to USD$ 25.6/kg in 2011. In contrast, shark meat imports averaged about USD$ 3/kg. These are average, not species-specific values.

Thresher shark fins are readily identifiable in trade by genus, whether fresh (FAO 2016) or dried (Abercrombie *et al*. 2013, Clarke *et al*. 2006a, Abercrombie 2016, Annex 6). Hong Kong shark fin traders use 30–45 market categories of fins (Yeung *et al*. 2000), but the Chinese names of these categories do not always correspond to the Chinese taxonomic names of shark species (Huang 1994). Fortunately, in the case of thresher sharks, genetic analyses have demonstrated a close correspondence between the trade name "wu gu" (勿骨) and fins from the three species in the genus Alopias (which made up 74% of this trade classification). Using commercial data on traded weights and sizes of fins and the trade name for thresher sharks, coupled with DNA and Bayesian statistical analysis to account for missing records, Clarke *et al*. (2006a, 2006b) estimated that thresher shark fins comprised at least 2.3% of the global trade in fins from 1980 to 1990, and that between 350,000 and 3.9 million individual thresher sharks, or a biomass of 12,000-85,000 tonnes, were being killed and traded annually to supply the shark fin market.

In contrast, global thresher shark catches reported to FAO were less than 4,000 tonnes per annum before 2005. The most recent reported global thresher shark catches had risen to around 21,200 t in 2013 and 18,800 t in 2014, (FishStat 2016), despite the prohibitions introduced by RFMOs. The high level of under-reporting in earlier years is demonstrated by the percentage of thresher sharks in trade, which has declined by 77-99% since the early 2000s (Fields, submitted).

There are a few reports of international trade in thresher shark meat. These include exports of frozen shark meat from the Seychelles, and of both fins and meat traded either frozen or salted and dried in Southeast Asia (TRAFFIC 1996). Because the fins are overwhelmingly the most important product that enters trade, successful implementation of a CITES Appendix II listing for the thresher sharks will depend upon the effective regulation of the fin trade rather than management of the limited trade in thresher meat.

6.4 Illegal trade

Most Regional Fisheries Management Organizations (RFMOs) and many countries prohibit finning sharks (retaining the fins and discarding the carcass at sea). Other countries prohibit the catch of and/or trade in sharks and their products, and the bigeye thresher is a prohibited species in ICCAT, GFCM and IOTC fisheries. Thresher sharks or thresher shark products that have been obtained in violation of the above, or any other measure listed in the table in Annex 4, are illegal if traded. The extent of illegal trade activities is unknown, because there is very little compliance monitoring and enforcement of RFMO management measures and no other trade management exist for the thresher sharks. However, it is apparent from catch data submitted to FAO (FishStat 2016) that reported Atlantic catches of bigeye thresher increased steeply after the adoption of the ICCAT and GFCM recommendations prohibiting this species, and Indian Ocean catches of all thresher sharks fell only 20% following the IOTC Recommendation (Annex 3). Trade in products from RFMO-managed fisheries in these oceans will have been illegal. A CITES listing would support compliance monitoring and enforcement of these RFMO measures, because it would not be possible to make a legal acquisition finding for introductions from the sea or international trade in products taken in these convention areas and fisheries.

6.5 Actual or potential trade impacts

International market demand for thresher shark fins is a significant driver of the unsustainable mortality rates that have caused steep declines in *A. superciliosus* populations and fisheries. Regulation of international trade through an Appendix II listing of the thresher sharks is necessary to monitor compliance with and enforce fisheries and biodiversity management measures, to ensure that fisheries and trade become sustainable, and to allow stocks to recover.

7. Legal instruments

See Annex 4 for a list of national and international instruments that currently manage *Alopias spp.*

7.1 National

The Fisheries and Aquatic resources Act, No.2 of 1996 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. Thresher shark management is conducted under this act, and the subsequent Gazette No. 1768/36.

In 2012, in response to the decision of IOTC, and the growing evidence that bigeye thresher sharks were disappearing from pelagic fisheries catch, Sri Lanka imposed a total ban on catching, retaining on board, transshipping, landing, storing, selling or offering for sale of any Thresher sharks under the regulation published in Gazette No. 1768/36. The regulation applies to all Sri Lankan vessels, and any boats fishing in the high seas that land into Sri Lankan ports. Penalty for non-compliance is imprisonment of either description for a term not exceeding six months or a fine not exceeding LKR 25 000 or both such imprisonment and fine.

The catch of *Alopias* spp. is regulated under domestic fisheries legislation in the U.S, New Zealand and Australia.

Within U.S. waters of the Atlantic Ocean, *Alopias superciliosus* is a prohibited species. Several U.S. states also have laws regulating *Alopias* spp. The West Coast Highly Migratory Species Fishery Management Plan co-manages *A. vulpinus* and *A. superciliosus* off the coast of California with federal, tribal, and state regulatory agencies through the Pacific Fishery Management Council (PFMC). Federal regulations established under the Plan's framework set a harvest guideline for *A. vulpinus* of 340 mt for the U.S. West Coast. Landings are tracked through the federal PacFIN database from state catch records for Washington, Oregon, and California and reported annually through the PFMC management process (Stock Assessment and Fishery Evaluation/SAFE) (http://www.pcouncil.org/highly-migratory-species/stock-assessment-and-fishery-evaluation-safe-documents/).

7.2 International

In response to growing concern over the status of large pelagic sharks, a number of RFMOs have taken measures to improve data collection at species level, reduce bycatch, control finning, and prohibit landings of the most threatened species. A few have begun shark stock assessments for some species.

In 2008, the International Commission for the Conservation of Atlantic Tunas (ICCAT) Standing Committee on Research and Statistics (SCRS) recommended that ICCAT reduce the mortality of bigeye thresher shark, in view of the vulnerability of this species, and that the prohibition of landings could be considered. Recommendation (2008-07) requiring the release of live bycatch of the species was adopted. This was superseded by Recommendation 2009-07, which prohibited any retention, landing and sale of *A. superciliosus* (ICCAT 2009). The General Fisheries Commission for the Mediterranean adopted the same measure in 2010. The Indian Ocean Tuna Commission (IOTC) has also, in 2012, prohibited the retention, landing, and sale of any part or whole carcass of all species of the family *Alopiidae*. However, despite these regional protections, catches of thresher sharks reported to FAO have continued to rise in the Atlantic and have only fallen slightly in the Indian Ocean (FAO, 2016 – see Figure 1 & 2 in Annex 3).

The conservation and management of sharks in EU waters falls under the remit of the European Common Fishery Policy, which manages fish stocks through a system of annual catch quotas and effort control. The Community Action Plan for the Conservation and Management of Sharks (EU COM 2009) establishes a goal of rebuilding depleted shark stocks utilised by the EC fleet within and outside EC Waters. However, there are no additional management measures for *Alopias* spp*.* under the Common Fisheries Policy in EC and international waters, aside from those transposed from ICCAT and IOTC.

In 2014, the 120 Parties to the Convention on the Conservation of Migratory Species of Wild Animals (CMS) listed *Alopias spp.* on Appendix II of the Convention, thereby identifying *Alopias* spp. as shark species in need of conservation action. In 2016 the 40 Signatories added thresher sharks to the Annex of the CMS Memorandum of Understanding on Migratory Sharks. Member and MOU signatory governments now must, *inter alia*, coordinate through global or regional agreements, organizations, and fora to better protect and manage these migratory species.

8. Species management

8.1 Management measures

While some management measures and prohibitions exist at national and regional level (Annex 4), they do not extend throughout its entire range, nor is international trade regulated. *A. superciliosus* are likely to be pushed closer to extinction and qualify for CITES Appendix 1 under criterion Cii, unless globally applicable, enforceable measures are adopted globally to protect the species from overexploitation. These should include bycatch avoidance, in view of the high suspected bycatch mortality (IOTC 2015).

A CITES Appendix II listing would complement fisheries management measures and obligations under CMS, by regulating international trade in thresher shark products - ensuring that the species is harvested sustainably, and its products that enter trade are legally acquired.

8.2 Population monitoring

Population monitoring requires collection of catch data as initial input for a stock assessment. In 1996, ICCAT began requesting that its contracting Parties submit shark data using a form that lists eight species of pelagic sharks. Other RFMOs have followed suit and request data on shark catches, particularly those most commonly caught. Each member of IATTC is required to annually report data for catches, effort by gear type, landing and trade of sharks by species. WCPFC requests data on sharks to be submitted to the Commission, particularly on the key shark species, such as bigeye thresher shark. In 2011, the IOTC Working Party on Ecosystems and Bycatch recommended that all members be required to submit catch data by species from longline, purse seine, and gillnet fishing vessels of the most commonly caught shark species, including thresher sharks (IOTC 2011). However, IOTC (2015) noted: “there are few data to estimate CPUE trends [for bigeye thresher], in view of IOTC Resolution 12/09 and reluctance of fishing fleet to report information on discards/non-retained catch."

8.3 Control measures

8.3.1 International

Other than through obligations under CMS, the IOTC measures, and recommendations by ICCAT and GFCM (see Section 7.2), there are no focused species-specific international management measures in place for bigeye thresher sharks; the species is unmanaged over much of its range.

IOTC Resolution 2010/12 notes that the international scientific community has identified the bigeye thresher shark (*Alopias superciliosus*) as particularly endangered and vulnerable, and as such fishing vessels flying the flag of an IOTC Member or Cooperating Non-Contracting Party (CPCs) are prohibited from retaining on board, transhipping, landing, storing, selling or offering for sale any part or whole carcass of thresher sharks of all the species of the family Alopiidae. ICCAT (Rec. 2009/07, adopted by the GFCM in 2010) noted scientific advice to prohibit retention and landings of bigeye thresher and recommended that its CPPs[1] adopt similar measures.

8.3.2 Domestic

N/A

8.4 Captive breeding and artificial propagation

N/A

8.5 Habitat conservation

N/A

8.6 Safeguards

N/A

9. Information on similar species

Because of the difficulty in identification of thresher species, catches of *A. superciliosus* are often amalgamated with *A. vulpinus* and *A. pelagicus*. As fins in trade, *A. vulpinus* and *A. pelagicus* fins are morphologically similar to *A. superciliosus*. Fins from all three species are grouped and identified and sold as "*Wu gu*" in the Hong Kong market and are not differentiated between the species (Clarke, 2006).

See Annex 6 on how to identify thresher sharks in trade.

10. Consultations

Under Resolution Conf. 8.21 (Rev. CoP16), the Secretariat conducted the range State consultations on behalf of Sri Lanka (Notification to the Parties No. 2016/003).

Range States	Support Indicated (Yes/No/ Undecided/ No Objection)	Summary of Information Provided
Bangladesh	Yes	Support and co-sponsor the proposal
Canada	Undecided	Will review proposal in more detail over coming

[1] *Contracting Parties, and Cooperating non-Contracting Parties, Entities or Fishing Entities*

Range States	Support Indicated (Yes/No/ Undecided/ No Objection)	Summary of Information Provided
		months but feels proposal is comprehensive.
The Comoros	Yes	Support and co-sponsor the proposal
Dominican Republic	Yes	Support and co-sponsor the proposal
Egypt	Yes	Support and co-sponsor the proposal
The European Union and its Member States	Yes	Support and co-sponsor the proposal
Fiji	Yes	Support and co-sponsor the proposal
Gabon	Yes	Support and co-sponsor the proposal
Ghana	Yes	Support and co-sponsor the proposal
Guinea	Yes	Support and co-sponsor the proposal
The Maldives	Yes	Support and co-sponsor the proposal
Mauritania	Yes	Support and co-sponsor the proposal
New Zealand	Undecided	New Zealand has a strong interest in ensuring conservation and sustainable trade of all sharks, including threshers. New Zealand scientists require further time to undertake an in-depth analysis of the proposal.
Palau	Yes	Support and co-sponsor the proposal
Samoa	Yes	Support and co-sponsor the proposal
Senegal	Yes	Support and co-sponsor the proposal
The Seychelles	Yes	Support and co-sponsor the proposal
The United Arab Emirates	Yes	Support and co-sponsor the proposal
The USA	Undecided	Comments provided and integrated into proposal
Japan	No	Japan believes that the conservation and management of fishery resources must be implemented through appropriate management of fisheries by each country or by international organizations such as Regional Fisheries Management Organizations (RFMOs).
Burkina Faso	Yes	Support and co-sponsor the proposal
Ukraine	Yes	Support and co-sponsor the proposal

Additional comments received from TRAFFIC

11. Additional remarks

12. References

Amorim, A., Baum, J., Cailliet, G.M., Clò, S., Clarke, S.C., Fergusson, I., Gonzalez, M., Macias, D., Mancini, P., Mancusi, C., Myers, R., Reardon, M., Trejo, T., Vacchi, M. & Valenti, S.V. 2009. *Alopias superciliosus*. The IUCN Red List of Threatened Species 2009: e.T161696A5482468. http://dx.doi.org/10.2305/IUCN.UK.2009-2.RLTS.T161696A5482468.en. Downloaded on 25 April 2016.

Baum, J. K. *et al*. 2003. Collapse and conservation of shark populations in the northwest Atlantic. *Science* 299: 389-392.

Baum, J.K., Blanchard, W. Inferrring shark population trends from generalized linear mixed models of pelagic longline catch and effort data. *Fisheries Research*. 102: 229-239. 2010

Beerkircher, L.R., E. Cortés, and M. Shivji. 2002. Characterisitics of shark bycatch observed on pelagic longlines off the southeastern United States, 1992-2000. Marine Fisheries Review 64 (4): 40-49.

Bromhead, D., S. Clarke, S. Hoyle, B. Muller, P. Sharples, and S. Harley. 2012. Identification of factors influencing shark catch and mortality in the Marshall Islands tuna longline fishery and management implications. *Journal of Fish Biology.* 80:1870-1894.

Camhi, M.D., Valenti, S.V., Fordham, S.V., Fowler, S.L. and Gibson, C. 2009. The Conservation Status of Pelagic Sharks and Rays: Report of the IUCN Shark Specialist Group Pelagic Shark Red List Workshop. IUCN Species Survival Commission Shark Specialist Group. Newbury, UK. x + 78p.

Clarke, S.C., S. Harley, S. Hoyle, and J. Rice. 2011. An indicator-based analysis of key shark species based on data held by SPC-OFP. WCPFC-SC7-2011/EB-WP-01.

Clarke, S.C., J.E. Magnussen, D.L. Abercrombie, M.K. McAllister, and M.S. Shivji. 2006a. Identification of shark species composition and proportion in the Hong Kong shark fin market based on molecular genetics and trade records. *Conservation Biology* 20(1): 201-211. DOI: 10.1111/j.1523-1739.2006.00247.x

Clarke, S.C., M.K. McAllister, E.J. Milner-Gulland, G.P. Kirkwood, C.G.J. Michielsens, D.J. Agnew, E.K. Pikitch, H. Nakano, and M.S. Shivji. 2006b. Global estimates of shark catches using trade records from commercial markets. Ecology Letters 9: 1115-1126. doi: 10.1111/j.1461-0248.2006.00968.x

Compagno, L.J.V. 1984. Sharks of the World. An annotated and illustrated catalogue of shark species to date. Part II (Lamniformes). FAO Fisheries Synopsis No. 125, Vol. 4, Part II. FAO, Rome.

Compagno, L.J.V. 2001. Sharks of the World: An Annotated and Illustrated Catalogue of Shark Species Known to Date, vol. 2. Bullhead, mackerel, and carpet sharks (heterodontiformes, lamniformes and orectolobiformes) FAO species catalogue for fishery purposes, no. 1. FAO, Rome.

Cortés E. 1999. Standardized diet compositions and trophic levels of sharks. ICES Journal of Marine Science 56:707–17

Cortés, E., F. Arocha, L. Beerkircher, F. Carvalho, A. Domingo, M. Heuperl, H. Holtzhausen, M.N. Santos, M. Ribera, and C. Simpfendorfer. 2010. Ecological risk assessment of pelagic sharks caught in Atlantic pelagic longline fisheries. *Aquatic Living Resources* 23: 25-34. DOI: 10.1051/alr/2009044

Cortés, E., C.A. Brown, L. R. Beerkircher. 2007. Relative abundance of pelagic sharks in the western north Atlantic Ocean, including the Gulf of Mexico and Caribbean Sea. *Gulf and Caribbean Research* 19(2): 37-52.

Cortés, E. 2008. Catches of pelagic sharks from the western North Atlantic Ocean, including the Gulf of Mexico and Caribbean Sea. ICCAT Collective Volume of Scientific Papers 62(5): 1434–1446.

Cortés, E., Arocha, F., Beerkircher, L., Carvalho, F., Domingo, A., Heupel, M., Holtzhausen, H., Santos, M.N., Ribera, M., Simpfendorfer, C., 2010. Ecological risk assessment of pelagic sharks caught in Atlantic pelagic longline fisheries. Aquat. Liv. Resour., 23: 25-34.

Cortés, E. A. Doming, P. Miller, R. Forselledo, F. Mas, F. Arocha, S. Campana, R. Coelho, C. Da Silva, F.H.V. Hazin, H. Hotzhausen, K. Keene, F. Lucena, K. Ramirez, M.N. Santos, Y. Semba-Murakami, and K. Yakowa. Expanded Ecological Risk Assessment of Pelagic Sharks Caught in Atlantic Pelagic Longline Fisheries. *Collected Volume of Scientific Papers.* ICCAT. 71(6): 2637-2688 (2015).

Dayaratne, P., Maldeniya, R. and Amarasooriya, D. 1996. Large Pelagic Fisheries in Sri Lanka, Annual Fishery statistics 1995. *National Aquatic Resources Agency*, Colombo, Sri Lanka.

Dent, F. & Clarke, S. 2015. *State of the global market for shark products.* FAO Fisheries and Aquaculture Technical Paper No. 590. Rome, FAO. 187pp.

Dulvy, N.K., J.K. Baum, S. Clarke, L.J.V. Compagno, E. Cortés, A.Domingo, S. Fordham, S. Fowler, M.P. Francis, C. Gibson, J. Martínez, J.A. Musick, A. Soldo, J.D. Stevens, and S. Valenti. 2008. You can swim but you can't hide: The global status and conservation of oceanic pelagic sharks and rays. *Aquatic Conservation: Marine and Freshwater Ecosystems* 18(5): 459–482.

Dulvy NK, Fowler SL, Musick JA, Cavanagh RD, Kyne PM, *et al*. (2014) Extinction risk and conservation of the world's sharks and rays. Elife 3: e00590–e00590 doi:10.7554/eLife.00590.

FAO FishStat (2016). Global landing statistics: http://www.fao.org/fishery/statistics/global-production/en

Fernandez-Carvalho, J., Coelho, R., Mejuto, J.*, et al.* 2015. Pan-Atlantic distribution patterns and reproductive biology of the bigeye thresher, Alopias superciliosus. *Reviews in Fish Biology and Fisheries*.

Ferretti, F., Myers, R. A., Serena, F. and Lotze, H. K. (2008), Loss of Large Predatory Sharks from the Mediterranean Sea. *Conservation Biology*, 22: 952–964. doi: 10.1111/j.1523-1739.2008.00938.x

Fields, A. T., Fisher, G. A., Shea, S. K. H., Zhang, H., Abercrombie, D. L., Feldheim, K. A., Babcock, E. A., Chapman, D. D. (submitted). Species composition of the global shark fin trade.

Galván-Magaña, F., C. Polo-Silva, S. Berenice Hernández-Aguilar, A. Sandoval-Londoñ0, M. R. Ochoa-Díaz, N. Aguilar-Castro, D. Castañeda-Suárez, A. C. Chavez-Costa, A. Baigorrí-Santacruz, Y.E. Torres-Rojas, L. A. Abitia-Cárdenas. 2013. Shark predation on cephalopods in the Mexican and Ecuadorian Pacific Ocean. *Tropical Studies in Oceanography.* 95: 52-62.

Goldman, K.J., Baum, J., Cailliet, G.M., Cortés, E., Kohin, S., Macías, D., Megalofonou, P., Perez, M., Soldo, A. & Trejo, T. 2009. *Alopias vulpinus*. The IUCN Red List of Threatened Species 2009: e.T39339A10205317. http://dx.doi.org/10.2305/IUCN.UK.2009-2.RLTS.T39339A10205317.en. Downloaded on 18 April 2016.

Hideki Nakano, Hiroaki Matsunaga, Hiroaki Okamoto, and Makoto Okazaki. 2003. National Research Institute of Far Seas Fisheries, Japan. Acoustic tracking of bigeye thresher shark Alopias superciliosus in the eastern Pacific Ocean. Marine Ecology Progress Series Vol. 265: 255–261.

ICCAT 2008. An Integrated Approach to Determining the Risk of Overexploitation for Data-Poor Pelagic Atlantic Sharks. Report of an expert working group – SCRS/2008/140. Available online at: http://www.iccat.int/documents/meetings/docs/scrs/scrs-08-140_simpfendorfer_et_al_rev.pdf

ICCAT 2009. Recommendation 09.07 on the conservation of thresher sharks caught in association with fisheries in the ICCAT Convention Area. Available online at: https://www.iccat.int/Documents/Recs/compendiopdf-e/2009-07-e.pdf

ICES WGEF Report 2007. ICES Advisory Committee on Fishery Management ICES CM 2007/ACFM: 27 REF. LRC

Inter-American Tropical Tuna Commission, 2013. Tunas and billfishes in the eastern Pacific Ocean in 2012. Fishery Status Report No. 11.

Indian Ocean Tuna Commission, 2015. Status of the Indian Ocean bigeye thresher shark. 2015. http://www.iotc.org/sites/default/files/documents/science/species_summaries/english/Bigeye%20thresher%20shark%20Executive%20Summary.pdf

IOTC–SC16 2013. Report of the Sixteenth Session of the IOTC Scientific Committee. Busan, Rep. of Korea, 2–6December 2013. IOTC–2013–SC16–R[E]: 312 pp.

IOTC Scientific Committee advice on pelagic and bigeye thresher sharks (2013): http://www.iotc.org/sites/default/files/documents/science/species_summaries/Bigeye%20thresher%20shark%20%5BE%5D.pdf

Kohin, S., R. Arauz, D. Holts, and R. Vetter. 2006. Preliminary results: Behavior and habitat preferences of silky sharks (*Carcharhinus falciformis*) and a bigeye thresher shark (*Alopias superciliosus*) tagged in the Eastern Tropical Pacific. *Índice de Contenidos* 17-19. Available online at: http://www.pretoma.org/downloads/pdf/avistamientos/memoria-final.pdf#page=17

Kohler, N.E., J.G. Casey, and P.A. Turner. 1998. NMFS Cooperative Tagging Program, 1962-93: An atlas of shark tag and recapture data. *Marine Fisheries Review* 60(2): 1-87. Available online at: http://spo.nwr.noaa.gov/mfr6021.pdf

Jayathilaka, R. A. M and Maldeniya, R. 2015. Impact of policies on the conservation of sharks in the large pelagic fishery. Indian Ocean Tuna Commission. September 2015. IOTC–2015–WPEB11–18 Rev_1

Lack, M. Sant, G., Burgener, M., and Okes, N. 2014. Development of a Rapid Management-Risk Assessment Method for Fish Species through its Application to Sharks: Framework and Results. Report to the Department of Environment, Food and Rural Affairs. Defra Contract No. MB0123.

Liu, K.-M., Chiang, P.-J., Chen, C.-T. 1998. Age and growth estimates of the bigeye thresher shark, *Alopias superciliosus*, in northeastern Taiwan waters. *Fishery Bulletin* 96**,** 482-491.

Liu, K. M., Changa, Y. T., Ni, I. H., Jin, C. B. 2006. Spawning per recruit analysis of the pelagic thresher shark, *Alopias pelagicus*, in the eastern Taiwan waters. *Fisheries Research* 82: 52–64.

Liu S-YV, Chan C-LC, Lin O, Hu C-S, Chen CA. 2013. DNA Barcoding of Shark Meats Identify Species Composition and CITES-Listed Species from the Markets in Taiwan. *PLoS ONE* 8(11): e79373. doi:10.1371/journal.pone.0079373

Maguire, J.-J., M. Sissenwine, J. Csirke, and R. Grainger. 2006. The state of the world highly migratory, straddling and other high seas fish stocks, and associated species. FAO Fisheries Technical Paper, No. 495. Rome: FAO. 2006. 77 pp.

Matsunaga, H. and and K. Yokawa. 2013. Distribution and ecology of bigeye thresher *Alopias superciliosus*. *Japanese Society of Fisheries Science*. 79: 737-748

Moreno, J.A., J.L. Parajua, and J. Moron. 1989. Breeding biology and phenology of *Alopias vulpinus* (Bonnaterre, 1788) (Alopiidae) in the north-eastern Atlantic and western Mediterranean. Scientia Marina (Barcelona) 53(1): 37–46.

Moreno, J.A., Moron, J. 1992. Reproductive biology of the bigeye thresher shark, *Alopias superciliosus* (Lowe, 1839). *Aust. J. Mar. Freshwater Res.* 43**,** 77-86.

Myers, R.A. and B. Worm. 2005. Extinction, survival or recovery of large predatory fishes. *Phil. Trans. R. Soc. B.* 360: 13–20. doi:10.1098/rstb.2004.1573.

NOAA. 2016. Endangered and Threatened Wildlife and Plants; Notice of 12-Month Finding on Petitions to List the Common Thresher Shark and Bigeye Thresher Shark as Threatened or Endangered Under the Endangered Species Act (ESA); Document 81 FR 18979. Available online at: https://federalregister.gov/a/2016-07440

Notabartolo De Sciara, G. & I. Bianchi. 1998. Guida dcgli Squali e dellc Razze del Mediterráneo (Guide of sharks and rays from the Mediterranean). Franco Muzzio,Padova, 338 pp.

Oldfield, T.E.E., Outhwaite, W., Goodman, G. and Sant, G. 2012. Assessing the intrinsic vulnerability of harvested sharks. Available online at: http://www.cms.int/sites/default/files/document/MOS1_Inf_11_Intrinsic_Vulnerability_of_sharks_UK_Rpt_Eonly_0.pdf

Parry-Jones, R. 1996. Traffic report on shark fisheries and trade in Hong Kong. In: Rose, D. (Ed.), The World Trade in Sharks: A Compendium of Traffic's Regional Studies, Vol. I. Traffic International, Cambridge, UK, pp. 87–143 (http://www.traffic.wcmc.org.uk)

Smith, S.E., R.C. Rasmussen, D.A. Ramon and G.M. Cailliet. 2008. The biology and ecology of thresher sharks (Alopiidae). Pp. 60–68. In: Sharks of the Open Ocean: Biology, Fisheries and Conservation (eds M.D. Camhi, E.K. Pikitch and E.A. Babcock). Blackwell Publishing, Oxford, UK.

Stevens, J.D., R.W. Bradford, G.J. West. 2010. Satellite tagging of blue sharks (Prionace glauca) and other pelagic sharks off eastern Australia: depth behavior, temperature experience and movements. *Mar. Biol.* 157 (3): 575–591.

Stevens, J. 2005. Sharks, Rays and Chimaeras: The Status of the Chondrichthyan Fishes (eds S.L. Fowler, R.D. Cavanagh, M. Camhi, G.H. Burgess, G.M. Cailliet, S.V. Fordham, C.A. Simpfendorfer and J.A. Musick). IUCN/SSC Shark Specialist Group. IUCN, Gland, Switzerland and Cambridge, UK. x + 461 pp.

Stillwell, C. and J. G. Casey. 1976. Observations on the bigeye thresher shark, Alopias superciliosus, in the western North Atlantic. *Fish. Bull.* 74: 221-225.

Thorpe, T. 1997. First occurrence and new length record for the bigeye thresher shark in the north-east Atlantic. *Journal of Fish Biology* 50: 222–224.

TRAFFIC - World Shark Catch, Production & Trade 1990 – 2003 By Mary Lack and Glenn Sant: http://www.traffic.org/fish/

Trejo, T. 2005. Global phylogeography of thresher sharks (*Alopias* spp.) inferred from mitochondrial DNA control region sequences. M.Sc. thesis. Moss Landing Marine Laboratories, California State University.

Vanson Liu, S-Y, *et al.* 2013. DNA barcoding of shark meats identify species composition and CITES-listed species from markets in Taiwan. *PLOS One* 8 (11): 1-8 e79373.

Reardon, M., Márquez, F., Trejo, T. & Clarke, S.C. 2009. *Alopias pelagicus*. The IUCN Red List of Threatened Species 2009: e.T161597A5460720. http://dx.doi.org/10.2305/IUCN.UK.2009-2.RLTS.T161597A5460720.en. Downloaded on 18 April 2016.

Rice J., Tremblay-Boyer L., Scott R., Hare S. and Tidd A. 2015. Analysis of stock status and related indicators for key shark species of the Western Central Pacific Fisheries Commission. Working Paper EB-WP-04, Eleventh Meeting of the Scientific Committee, WCPFC, 5–13 August 2015, Pohnpei, Federated States of Micronesia. Accessed online at https://www.wcpfc.int/node/21719

Walls, R. & Soldo, A. 2015. Alopias superciliosus. Regional Assessment for Europe. The IUCN Red List of Threatened Species 2015: e.T161696A48907814. . Downloaded on 13 April 2016.

Ward, P., and Myers, R. A. 2005. Shifts in open-ocean fish communities coinciding with the commencement of commercial fishing. *Ecology* 86:835–847. http://dx.doi.org/10.1890/03-0746

Weng, K.C. and Block, B.A. 2004. Diel vertical migration of the bigeye thresher shark (Alopias superciliosus), a species possessing orbital retia mirabilia. *Fish Bull* 102:221–229.

Williams, H. 1995. Field document 1: Review of sampling strategies, data needs and estimation procedures for monitoring the Sri Lankan fishery for large pelagic species. *FAO/TCP/2251*, FAO: Rome.

Worm B., B. Davis, L. Kettemer, C.A. Ward-Paige, D. Chapman, M. R. Heithaus, S. T. Kessel, S. H. Gruber. 2013. Global catches, exploitation rates, and rebuilding options for sharks. Mar. Policy 40, 194–204.

Life history parameters for bigeye thresher shark *Alopias superciliosus*

Region	Size at sexual maturity	Age at sexual maturity	Litter size	Gestation period	Generation period	Reference
Northeast Atlantic	Male: 276 cm TL Female: 340 cm TL		2			Moreno & Moron 1992
Atlantic Ocean	Male: 159.2 cm FL Female: 208.6 cm FL		2		17.8 years	Cortes 2012, Fernandez-Carvalho *et al*., 2015
Northeast Pacific	Male: 182 cm Female: 180 cm	13 years	2			NMFS 2011
Northwest Pacific	Male: 270-288 cm TL Female: 332-341 cm TL	Male: 9-10 years Female: 12.3-13.4				Liu *et al*. 1998
West Africa			2			Cadenat 1956
Indian Ocean	Male: 270-300 cm TL Female: 332-355 cm TL	Male: 12-13 years Female: 9-10 years	2-4	12 months	~ 15 years	Indian Ocean Tuna Commission 2015
General	Male: 270-400 cm Female: 355-430 cm		2-4	12 months	17 years	Compagno 2001, Amorim *et al*, 2009

Summary of population and abundance trend data for *Alopias spp.*

Year	Location	Data	Trend	Reference
1992-2005	NW Atlantic Ocean	Commercial pelagic fishery logbook	**63%** decline*	Cortés *et al.* (2007)
1992-2003	NW Atlantic Ocean	Commercial pelagic fishery logbook	**80%** decline*	Baum *et al.* (2003)
1992-2000	NW Atlantic Ocean	Fishery survey and commercial pelagic longline observer program	**70%** decline*	Beerkircher *et al.*(2002)
1899-2007	NE Atlantic Ocean	Commercial and Recreational fisheries landings, scientific surveys and sighting records	**99%** decline	Ferretti *et al.* (2008)
1951-1958 and 1999-2002	Central Pacific Ocean	Fishery survey and commercial pelagic longline observer program	**83%** decline*	Ward and Myers (2005)
1951-1958 and 1999-2002	Central Pacific Ocean	Average size	**41%** decline	Ward and Myers (2005)
1995–2000 and 2004–2006	Central Pacific Ocean	Commercial pelagic longline observer program	**9.5%** decline in deep sets **43%** decline in shallow sets	Walsh *et al.* (in press)
1995–2014	Indian Ocean	Sri Lankan thresher catches	**>70%** declining catch trend	FAO FishStat data, Figure 2, Annex 3 (this document)
Early 2000s to 2015	Hong Kong shark fin market	Proportion of threshers in fin trade	**77-99%** decline	Clarke *et al.* 2006a & 2006b, Fields, submitted.

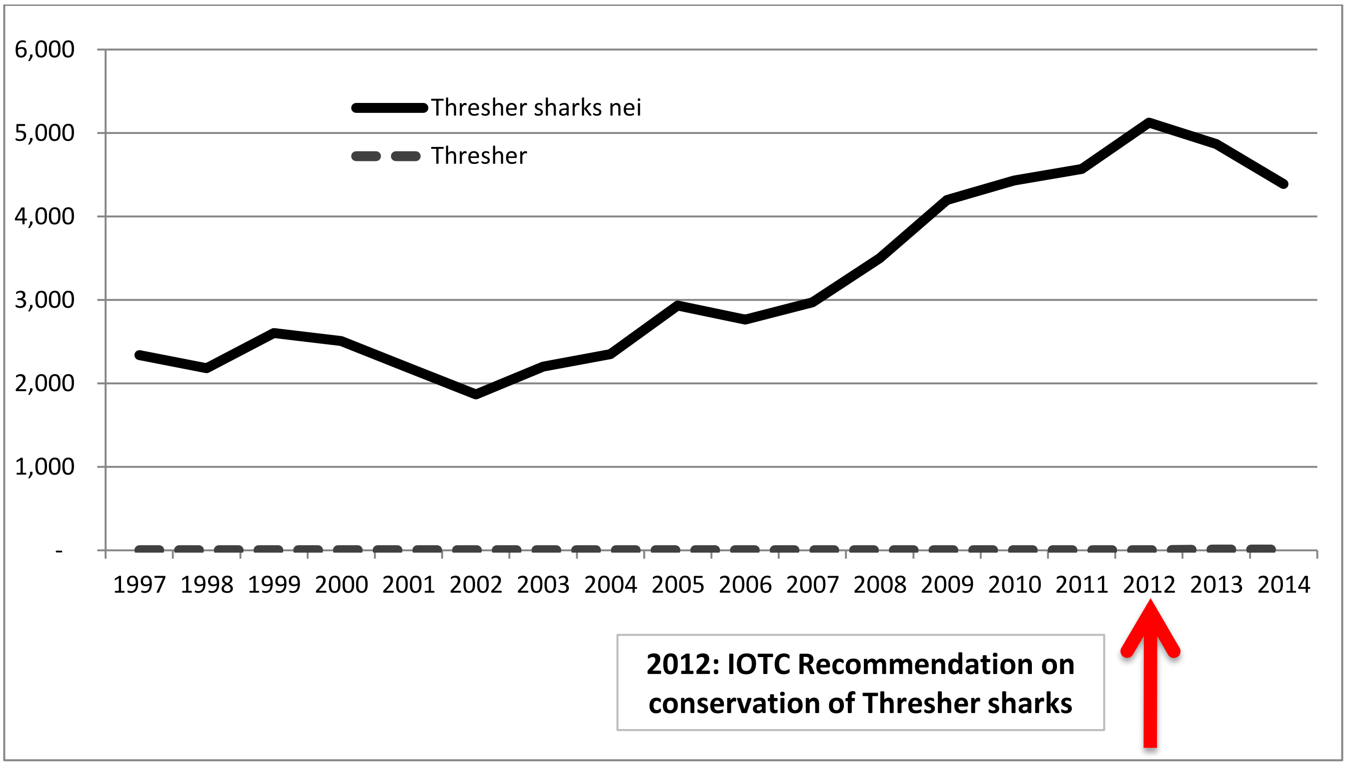
*Indicates the data has undergone a statistical standardization to correct for factors unrelated to abundance

Table 1 - FAO catch data for *Alopias spp.* 1995-2014 (tonnes)

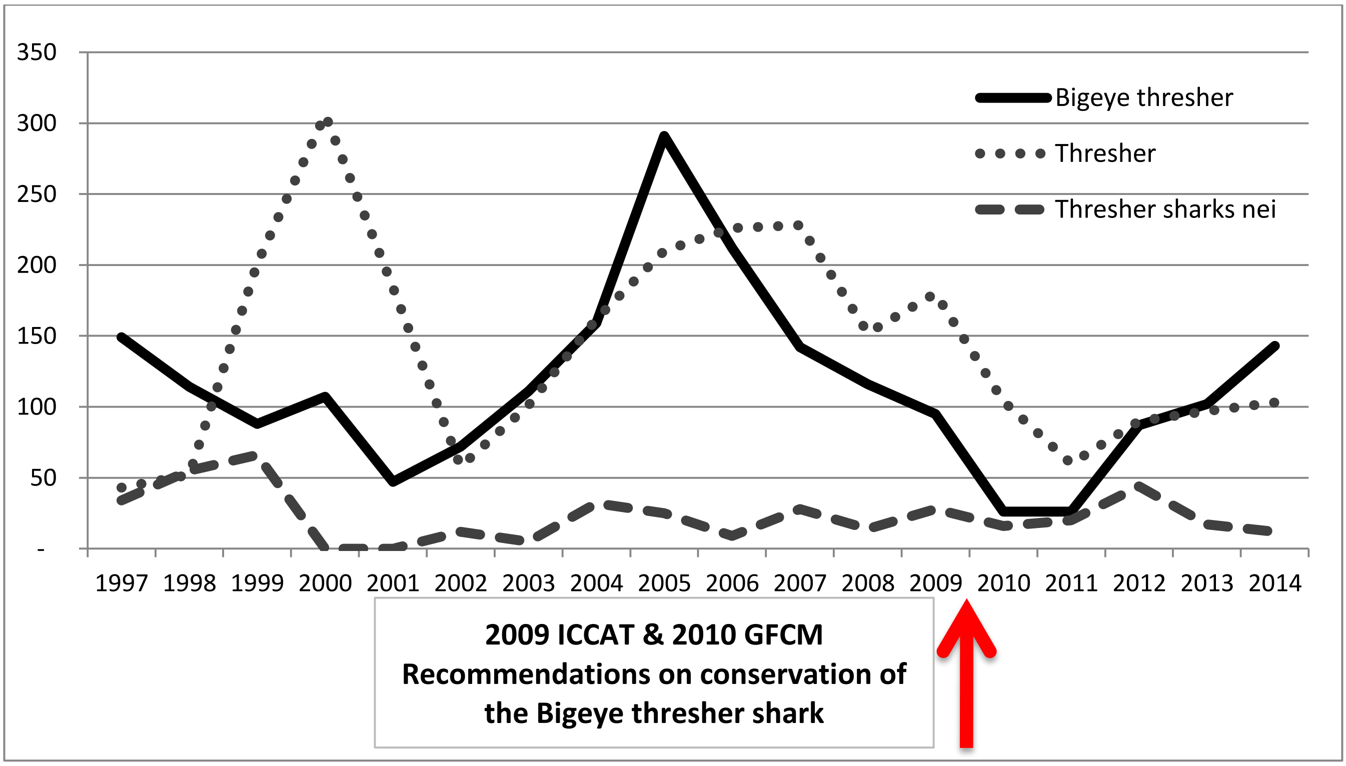
Country	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Indonesia			1,494	1,448	1,514	1,590	1,651	1,525	1,667	2,068	10,295	16,374	11,526	6,071	9,812	14,292	21,292	12,034	13,876	12,399
Ecuador	1,113	510	126	586	390	519	599	454	714	487	675	1,180	2,954	4,688	1,766	3,358	...	...	7,020	6,102
Sri Lanka	588	530	844	734	1,092	917	535	344	536	284	118	94	69	64	71	197	179	793	0	0
United States of America	1		...	331	269	310	388	363	354	182	227	209	273	204	152	134	109	135	118	106
Spain			213	214	146	4	...	...	2	171	126	78	79	85	122	0 0	0 0	0 0	...	0 0
Brazil			...	...	8	100	47	72	111	83	113	83	69	85	17	22	22	1	9	4
France	13	7	13	7	35	128	132	24	28	23	31	33	38	11	44	27	43	33	33	43
Mexico	...	...	...	...	...	7	...	...	...	...	119	124	52	4	4	4	4	86	93	139
Portugal			...	...	15	20	39	23	17	34	86	109	103	65	70	20	...	1	1	2
New Zealand	15	13	24	21	32	51	57	53	69	40	33	25	36	32	25	19	19	19	19	18
Liberia	...	...	...	...	151	146	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Namibia	...	...	...	...	...	...	...	2	...	18	17	6	25	3	20	9	17	42	14	9
Uruguay	...	...	...	...	...	...	...	...	45	9	20	4	1	3	...	...	...	...	...	-
Italy	...	...	...	...	...	...	...	...	...	...	...	...	8	6	14	4	...	...	21	3
Korea, Republic of	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	33	...	...	...	...
Trinidad and Tobago	...	...	...	...	...	...	...	10	5	3	2	1	1	1	0 0	1	1	1	2	1
South Africa	-	-	-	-	-	-	2	...	...	...	4	1	3	5	2	3	1	1	2	2
Maldives			...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	9	9
Fiji, Republic of	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	3	3 F	3 F	3 F
United Kingdom	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	2	1	1	1	2
Others	-	-	-	-	-	-	-	1	2	1	-	-	-	-	-	-	3	-	-	-
Totals - Quantity (tonnes)	**1,730**	**1,060**	**2,714**	**3,341**	**3,652**	**3,792**	**3,450**	**2,870**	**3,548**	**3,402**	**11,866**	**18,321**	**15,237**	**11,328**	**12,120**	**18,125**	**21,691**	**13,150**	**21,221**	**18,842**

Figures on following page.

Figure 1 – Catches of thresher shark (t) in the Indian Ocean, 1997-2014 (FishStat 2016)



ANNEX 3. Figure 2 – Catches of thresher shark (t) in the Atlantic Ocean, 1997-2014 (FishStat 2016)



Existing protections for *Alopias spp.*

Country/RFMO	Protection for thresher sharks	Protection for all sharks	Trade in shark products is prohibited
American Samoa	Yes	Yes	Yes
The Bahamas			Yes
The British Virgin Islands	Yes	Yes	Yes
Commonwealth of Northern Marianas Islands	Yes	Yes	Yes
The Cook Islands	Yes	Yes	Yes
Egypt	Yes	Yes	Yes
European Union	No	No	No
Guam	Yes	Yes	Yes
Honduras	Yes	Yes	Yes
India	No	No	Yes
International Convention for the Conservation of Atlantic Tunas (ICCAT)	Yes	No	No
Indian Ocean Tuna Commission (IOTC)	Yes	No	No
French Polynesia	Yes	Yes	Yes
Israel	Yes	Yes	Yes
The Maldives	Yes	Yes	Yes
The Marshall Islands			Yes
Federated States of Micronesia	Yes	Yes	Yes
New Caledonia	Yes	Yes	Yes
Palau	Yes	Yes	Yes
Batangas City, Philippines	Yes	Yes	Yes
Saudi Arabia	Yes	Yes	No
Spain	Yes	No	No
Sri Lanka	Yes	No	No
United Arab Emirates	No	No	Yes
United States (Atlantic Side)	Yes	No	No

Range States for bigeye thresher sharks with RFMO and CMS membership

Country	IOTC Member	ICCAT Member	GFCM Member	CMS Party	CMS Sharks MoU Signatory
Algeria		YES	YES	YES	
Angola		YES		YES	
Argentina					
Australia	YES			YES	YES
Bahamas					
Bangladesh				YES	
Barbados		YES			
Belize	YES	YES			
Bolivia				YES	
Brazil		YES		YES	
Cabo Verde		YES		YES	
Cambodia					
Cameroon				YES	
China	YES	YES			
Colombia					YES
Comoros	YES				YES
Congo				YES	YES
Costa Rica				YES	YES
Cote D'Ivoire		YES		YES	
Cuba				YES	
Dominican Republic					
Ecuador				YES	
Egypt		YES	YES	YES	YES
El Salvador		YES			
European Union	YES	YES	YES	YES	YES
Federated States of Micronesia					
Fiji				YES	
France	YES	YES	YES	YES	
French Guiana					
French Polynesia					
Gabon		YES		YES	
Ghana		YES		YES	YES
Greece			YES	YES	
Guadeloupe					
Guatemala		YES			
Guinea	YES	YES		YES	YES
Guyana					
Haiti					
Honduras		YES		YES	
India	YES			YES	

Country	IOTC Member	ICCAT Member	GFCM Member	CMS Party	CMS Sharks MoU Signatory
Indonesia	YES				
Iran	YES			YES	
Iraq					
Israel			YES	YES	
Italy			YES	YES	YES
Jamaica					
Japan	YES	YES	YES		
Kenya	YES			YES	YES
Kiribati					
Kuwait					
Liberia		YES		YES	
Madagascar	YES			YES	
Malaysia	YES				
Maldives	YES				
Marshall Islands					
Mauritania		YES		YES	YES
Mauritius	YES			YES	
Mexico		YES			
Morocco		YES	YES	YES	
Mozambique	YES			YES	
Myanmar					
Namibia		YES			
New Caledonia					
New Zealand				YES	YES
Nicaragua		YES			
Nigeria		YES		YES	
Oman	YES				
Pakistan	YES			YES	
Panama		YES		YES	
Papua New Guinea					
Peru				YES	
Philippines	YES	YES		YES	YES
Portugal				YES	YES
Samoa				YES	YES
Saudi Arabia				YES	
Senegal		YES		YES	YES
Seychelles	YES			YES	
Sierra Leone	YES	YES			
Solomon Islands					
Somalia	YES			YES	
South Africa	YES	YES		YES	YES
Spain			YES	YES	
Sri Lanka	YES			YES	
Sudan	YES				YES
Suriname					

Country	IOTC Member	ICCAT Member	GFCM Member	CMS Party	CMS Sharks MoU Signatory
Taiwan, Province of China					
Tanzania	YES				
Thailand	YES				
Trinidad and Tobago		YES			
Tunisia		YES	YES	YES	
Turkey		YES	YES		
Turks and Caicos					
United Arab Emirates					YES
United Kingdom	YES	YES		YES	YES
United States		YES			YES
Uruguay		YES		YES	
Vanuatu		YES			YES
Venezuela		YES			
Vietnam					
Yemen	YES			YES	YES

How to identify thresher sharks in trade (an excerpt from *Identifying Shark Fins: Silky and Threshers)*

START

↓

Pectoral fin with ventral surface that is white or little to no coloration → **YES** → **STOP** This is not a silky or a thresher pectoral fin

↓ **NO**

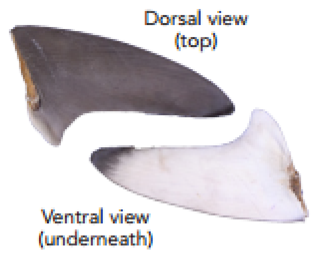
Pectoral fin with black markings concentrated at the apex and diffusing along **more than** 1/3 of the center or trailing edge of the ventral surface. → **YES** → **STOP** This is not a silky or a thresher pectoral fin

↓ **NO**

Pectoral fin with dusky markings concentrated at the apex and/or diffusing along **more than** 1/3 of the center or trailing edge of the ventral surface. → **YES** → **STOP** This is not a silky or a thresher pectoral fin

↓ **NO**

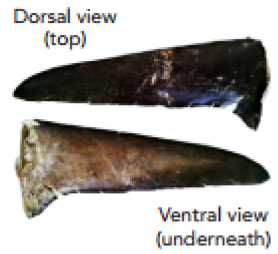
Pectoral fin with dusky markings concentrated at the apex and diffusing along **less than** 1/3 of the center or trailing edge of the ventral surface. → **YES** →



This is a silky pectoral fin. Go to page 7 for further information.

↓ **NO**

Pectoral fin with ventral surface only slightly lighter than the dorsal surface. → **YES** →



This is a thresher pectoral fin. Go to page 8 for more information.

↓ **NO**

STOP This is not a silky or a thresher pectoral fin

Distinguishing thresher pectoral fins from longfin mako fins

Thresher pectoral fins are easily differentiated from those of other species due to the similar coloration on both the dorsal and ventral surfaces of the fin.

Longfin mako pectoral fins have similar countershading around the edges, but the ventral surface is still mostly white unlike those of thresher species.

Bigeye pectoral fins

Longfin Mako pectoral fins