MEMORANDUM OF UNDERSTANDING ON THE CONSERVATION OF MIGRATORY SHARKS

CMS/Sharks/MOS2/Doc.8.2.7

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Agenda Item 8

PROPOSAL FOR THE INCLUSION OF THE GREAT HAMMERHEAD SHARK, *SPHYRNA MOKARRAN*, IN ANNEX 1 OF THE CMS MEMORANDUM OF UNDERSTANDING ON THE CONSERVATION OF MIGRATORY SHARKS

(Prepared by the Secretariat)

1. The present proposal for the inclusion of the entire population of the Great Hammerhead Shark (*Sphyrna mokarran*), in Annex 1 to the MOU represents the original proposal for inclusion of the species in CMS Appendix II, submitted as UNEP/CMS/COP11/Doc.24.1.15 by the Government of Costa Rica and the Government of Ecuador to the 11th Meeting of the Conference of the Parties (CMS COP11). The proposal was subsequently adopted by the Parties.

2. As agreed at the 1st Meeting of the Signatories (MOS1) and in line with the procedure explained in CMS/Sharks/MOS2/Doc.8.2.1, the original proposal is now being resubmitted for consideration by the Second Meeting of the Signatories (MOS2). Signatories are requested to consider the inclusion of *Sphyrna mokarran* in Annex 1 of the Memorandum of Understanding on the Conservation of Migratory Sharks (Sharks MOU) based on the information provided in this document.

3. The Advisory Committee of the MOU has presented a review of the proposal in CMS/Sharks/MOS2/Doc.8.2.10 in which the Committee recommends the entire population of *Sphyrna mokarran* for inclusion in Annex 1.

PROPOSAL FOR INCLUSION OF SPECIES ON THE APPENDICES OF THE CONVENTION ON THE CONSERVATION OF MIGRATORY SPECIES OF WILD ANIMALS

(Originally submitted as UNEP/CMS/COP11/Doc.24.1.15 to CMS COP11 by Government of Costa Rica and the Government of Ecuador on 11 August 2014)

Abstract: The great hammerhead shark (*Sphyrna mokarran*) is the largest and longest lived species in the Sphyrnidae family. The species' conservation status is listed by the IUCN's Red List as endangered worldwide with a "Decreasing" population trend and a "Very High Risk of Extinction". The principal conservation problem facing this species is its population decline. This problem, driven by the high economic value of its large dorsal fins has led to the species being overfished during all stages of its lifecycle. *Sphyrna mokarran* is a costal-pelagic and semi-oceanic shark species native to coastal warm temperate and tropical seas. Its migratory nature in and through multiple Range States' EEZs, slow growth, and lengthy gestation period place this common bycatch species at risk to fishing practices along continental shelves and throughout coastal birth zones. Because of its longevity, the species is at a higher risk to the bioaccumulation of physiologically altering levels of mercury and arsenic. Given these current anthropogenic threats, in addition to a lack of management strategies by RFMOs, high rates of *Sphyrna mokarran* captures pose a serious threat to the specie's survival. Because of difficulties in differentiating between the genus' species, estimates of trends in abundance are often grouped together as a complex. Abundance trend analyses of catch-rate data for the hammerhead complex of *Sphyrna mokarran*, including *Sphyrna lewini* and *Sphyrna zygaena*, have reported large declines, ranging from 60-99% over recent years. Given *S. mokarran*'s present situation, one that includes its overutilization, inadequacy of existing regulatory mechanisms, and other natural or manmade threats, inclusion of the species in CMS Appendix II is necessary in order to begin to restore its populations.

A. **PROPOSAL:** Inclusion of the great hammerhead shark, *Sphyrna mokarran*, in Appendix II of the Convention on the Conservation of Migratory Species of Wild Animals (CMS).

B. **PROPONENT**: The Government of Costa Rica and the Government of Ecuador.

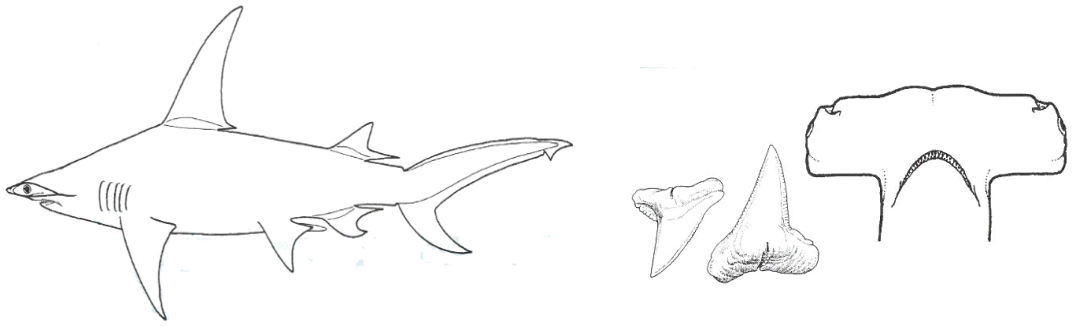

Figure 1 and 2. Sketch of body position of the fins, head and teeth of a great hammerhead. Source: Illustration by Marc Dando.

C. SUPPORTING STATEMENT

1. Taxon

1.1 Class: Chondrichthyes, subclass Elasmobranchii
1.2 Order: Carcharhiniformes
1.3 Family: Sphyrnidae
1.**4 Genus/Species** *Sphyrna mokarran*
1.5 Common Name: English: Great hammerhead shark
French: Grand requin-marteau
Spanish: Tiburón martillo gigante
German: Großer Hammerhai
Italian: Pesce martello maggiore

2. Biological data

Sphyrna mokarran is the largest hammerhead shark. The first dorsal fin is very tall with a pointed tip and strongly falcate in shape, while the second dorsal is also high with a strongly concave rear margin (Figure 1). The origin of the first dorsal fin is opposite or slightly behind the pectoral fin axil with the free rear tip falling short to above the origin of the pelvic fins. The rear margins of the pelvic fins are concave and falcate in shape, not seen in scalloped hammerheads. The posterior edge of the anal fin is deeply notched. The font margin of the head is nearly straight with a shallow notch in the center in adult great hammerheads, distinguishing it from *S. lewini* and *S. zygaena* (Figure 2). The teeth of this hammerhead are triangular and strongly serrated unlike *S. lewini*'s oblique cusps.

2.1 Distribution

The *S. mokarran*'s habitat ranges widely throughout the tropical waters of the world, from latitudes 40°N to 35°S (Last and Stevens 1994). It is apparently nomadic and migratory, with some populations moving towards the poles in the summer (Compagno 1984). It is a coastal-pelagic and semi-oceanic species of hammerhead occurring close inshore and well offshore, over the continental shelves, island terraces, and in passes and lagoons of coral atolls, as well as over deep water near land (Compagno et al. 2005) where it co-exists with the scalloped hammerhead *S. lewini*, also an inhabitant of the tropic, and the smooth hammerhead *S. zygaena*, which favors cooler waters (Cliff 1995, Bass et al. 1975).

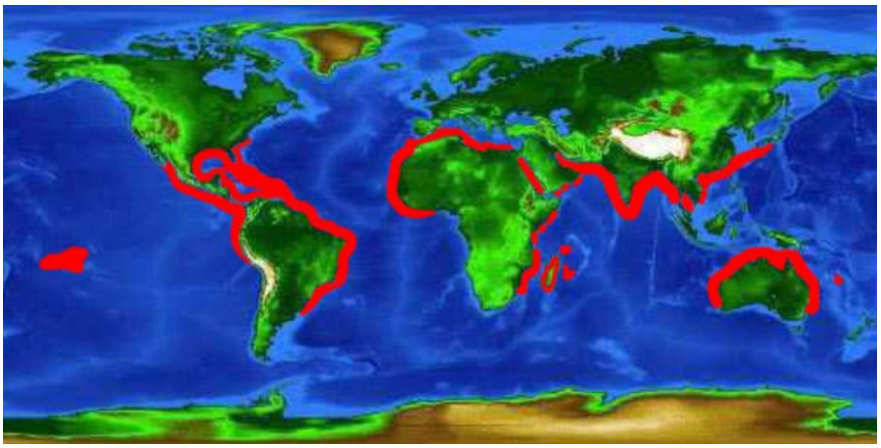

Figure 3. S. mokarran global distribution map. Source: FMNH

2.2 Population

Great hammerhead sharks are viviparous with a reported maximum total size of 550 to 610 cm (Compagno et al. 2005), though 450 cm is more common for a mature adult (Last and Stevens 2009). Litter size ranges from 6 to 33 (maximum 42) and pups are born after 11 months gestation with females breeding only once every two years thus increasing the species' susceptibility to population depletion (Stevens and Lyle 1989). Great hammerheads have one of the oldest reported ages for any elasmobranch (44 years) but grow at relatively similar rates to other large hammerhead species (Piercy et al. 2010). In waters off Australia, males reach maturity at a length of 7.4 feet (2.25 m) corresponding to a weight of 113 pounds (51 kg) and females are mature at a total length of 6.9 feet (2.10 m) corresponding to a weight of 90 pounds (41 kg) (Stevens and Lyle 1989).

Due to the distinctive head shape of this genus, it is typical for catches to be reported at the genus level, *Sphyrna* spp. Therefore, it is rare to find population statistics specific to one species of hammerhead shark. Due to the great hammerhead's preference for warmer waters, it can be expected to make up a greater portion of tropical catches of hammerheads than more temperate fisheries, most notably that of *S. zygeana*. *S. mokarran* is taken by target and bycatch, fisheries (Dudley and Simpfendorfer 2006, Zeeberg *et al*. 2006) and is regularly caught in the tropics, with longlines, fixed bottom nets, hook-and-line, and possibly with pelagic and bottom trawls. Hammerhead sharks, *S. mokarran* in particular, have been noted as a favored target species due to the size of their fins (CITES, 2013). On this note, fin prices are rising, driven by the Asian Fin market (CITES, 2013).

In Hayes (2008), the Schaefer model estimated a virgin population size (in 1982) of 190,000 (range = 140,000 – 290,000) and a population of 14,100 in 2005. The Fox model estimated a virgin population size of 230,000 (range = 210,000 – 380,000) and a population of 9,460 individuals in 2005 in NW Atlantic.

Great hammerhead shark populations have suffered tremendous commercial fishing pressure from both target and bycatch fisheries (IUCN 2014). In addition to extremely high bycatch mortality in incidental fisheries (greater than 90%), great hammerheads are also targeted for their characteristic large fins, which are prized in Asian seafood markets. The fact that this species has such high market value likely leads to high retention rates of sharks caught incidentally as bycatch. Less than 10% of great hammerheads survive capture – many of that 10% are likely killed and stripped of their fins so that fishers can take advantage of the incidental profit. As a result of these fishing pressures, and in response to significant population declines, the IUCN recognizes great hammerheads as "endangered" globally.

In the United States, this is partially due to the fact that great hammerheads are caught in the pelagic longline, bottom longline, and net fisheries in the Northwest Atlantic and Gulf of Mexico, as well as in the U.S. recreational fishery (IUCN, 2014). Pelagic longline data from the U.S. Northwest and Western Central Atlantic shows that Sphyrnidae populations have declined by 89% since 1986 (Camhi et al. 2009). The U.S. pelagic fishery logbook data has shown a decline close to 90% in *S. mokarran*, however this data-set is known for inaccurate reporting because many caught individuals are finned and never recorded as part of the catch (Beerkircher et al. 2002). Heithaus et al. (2007) also note historically low population trends for a variety of shark species including *S. mokarran* in the Florida Keys.

In Central America and the Caribbean Sea, there is little available data, however; hammerhead sharks were heavily fished in the 1980s and early 1990s in the waters of Belize before a dramatic decline in the size and abundance of hammerheads led to closure of the fishery. Despite this action, illegal, unreported, and unregulated (IUU) fishing in Belizean waters continues from neighbouring countries (CITES, 2013). In fact, IUU shark fishing is a global concern with the practice skewing catch statistics (Fisher et al., 2012).

The Mediterranean Sea has experienced a greater than 99% decline of three Sphyrna species including *S. mokarran* since the early 19th century (Camhi et al. 2009).

In the Eastern Atlantic off the coast of West Africa, the great hammerhead population is believed to have fallen 80% as a result of unmanaged and unmonitored fisheries (Camhi et al. 2009, IUCN 2014). As in other areas, great hammerheads in the Eastern Atlantic are caught both as bycatch and as a targeted species. While little specific data is available, the Sub-Regional Fishing Commission for West Africa released a plan of action for sharks. The plan noted that landings of great hammerheads have collapsed and listing the species as one of the four most threatened species in the region and deserving of the greatest attention for recovery (IUCN 2014). Accordingly, the IUCN assessed this population specifically as "critically endangered" (IUCN 2014).

In the Southwest Indian Ocean, the great hammerhead population has also declined sharply. The species is widely distributed throughout the Southwest Indian Ocean, but migrates in the summer to KwaZulu-Natal off the east coast of South Africa (Cliff 1995). Data from KwaZulu-Natal show a 79% decline in great hammerheads in the past 25 years (Camhi et al. 2009, Piercy et al. 2010).

2.3 Habitat

S. mokarran is a costal-pelagic and semi-oceanic shark found throughout the world's oceans in depths ranging from 1-300 m. (Ebert et al. 2013). It is found over continental shelves, but more often in coastal zones near island terraces, in passes and lagoons of coral atolls and on coral reefs. Inshore areas are utilized by early life-stages of the species (Pikitch et al. 2005).

2.4 Migration

The species is listed on Annex I, Highly Migratory Species, of the UN Convention on the Law of the Sea. *S. mokarran* is not usually found in aggregations like other members of the Sphyrnidea family, but rather it is nomadic and migratory in its worldwide coastal-pelagic tropical range. A recent study (Hammerschalg et al., 2011) revealed that during a 62 day journey an individual, travelled 1,200 km from the coast of South Florida (USA) to the mid-Atlantic off the coast of New Jersey (USA). The evidence that great hammerhead sharks are capable of traveling such large distances in a relatively short time also indicates that the species could potentially be migrating into international waters. In the Bahamas, the species has been observed using designated locations or stop-offs along what are believed to be migratory paths for these animals.

3. Threat data

Great hammerhead shark populations are threatened by the destruction and modification of their habitats and ranges, the overutilization of the species for commercial purposes, a high propensity for contaminate (mercury and arsenic) absorption, and the lack of adequate regulatory mechanisms.

3.1 Direct threats to the population

There was a directed shark fishery operated by Taiwan around the Northern coast of Australia that regularly caught great hammerheads up until 1986 (Stevens and Lyle 1989). Other possible threats include sport fishing (Pepperell 1992) and capture in anti-shark measures around the beaches of Australia and South Africa (Paterson 1990, Cliff 1995). Bonfil (1994) gives an overview of global shark fisheries. This species is mentioned specifically with reference to fisheries in Brazil, the Eastern USA and Mexico; however, *Sphyrna* spp. are mentioned in the majority of tropical fisheries cited.

West Africa

S. mokarran in Western Africa is by and large taken by drift gillnet and bottom gillnet fisheries, in addition to longline, hook and line, pelagic and bottom trawl fisheries (Schneider 1990). Traditionally, it is not a target species of industrial and artisanal fishing sectors, although a specialized artisanal fishery for charcharhinid and sphyrnid species was introduced in Sierra Leone in 1975, and since then fishing pressure has not decreased (CITES, 2013). The Subregional workshop for sustainable management of sharks and rays in West Africa, 26-28 April 2000 in St Louis, Senegal (Ducrocq 2002) noted the high threat to sharks in the West African region and a noticeable decline in the CPUE of total sharks and rays. This workshop identified *S. mokarran* as particularly threatened. The subsequent sub-regional plan of action for sharks of West Africa (member states of the Sub Regional Fishing Commission) states that landings of *S. mokarran* have collapsed and lists great hammerheads as one of the four most threatened species, deserving the greatest attention in the region (Ducrocq 2002).

Previously observed from Mauritania to Angola and reportedly abundant from November to January in Senegal, and in October in Mauritania according to Cadenat and Blache (1981), recent scientific trawl surveys off Guinea-Bissau, Mauritania, Senegal, Gambia and Guinea-Conakry between 20 to 1,000 m have failed to record the species, except in very low numbers off Guinea-Conakry and one record from Senegal in 1995 (Fisheries Management Act 2011). Anecdotal evidence from interviews with fishermen in Senegal, Guinea-Bissau and Guinea suggest there was a large decline in all shark species during the 1990s and that *S. mokarran* is almost extirpated from these areas (Fisheries Management Act 2011).Although little species specific data collection is occurring in the region, hammerheads have traditionally been a target species given their large dorsal fins, a valued commodity of the shark fin trade. Increased targeting of sharks began in the 1970s, when a Ghanaian fishing community settled in the Gambia and established a commercial network throughout the region, encouraging local fishermen to target sharks for exportation to Ghana. By the 1980s many fishermen were specializing in catching sharks, resulting in a decline in overall shark populations (Walker *et al.* 2005). There has been rapid growth in the shark fin market in this region, for export to the Far East, and yearly production of dried fins exported from Guinea-Bissau alone is estimated at 250 t (dry weight) (Walker *et al.* 2005). *Sphyrna* species combined represented 42% of bycatch in the European industrial pelagic trawl fishery off Northwest Africa (Zeeberg 2006).Although there are very little species specific data available, the absence of recent records and region-wide recognition of the extent of the decline give cause to suspect that the population has decreased by at least 80% in the past 25 years. Fisheries in this region remain largely unmonitored and unmanaged, leading to an assessment of Critically Endangered in the Eastern Atlantic (Fisheries Management Act 2011).

Southwest Indian Ocean

This species is widely distributed in the Southwest Indian Ocean and is a summer migrant to KwaZulu-Natal (KZN) (East coast of South Africa), where the annual catch in the KZN shark nets is 11 sharks (1978 to 1999), consisting mainly of adolescents and adults. Over this period there has been a significant decline in annual catch (18 to 4 sharks) and catch rate (0.5 to 0.2 sharks.km-net^{-1}.yr^{-1} (Dudley 2002). A continued decline in catch rate was reported for the period 1978 to 2003 (Dudley and Simpfendorfer 2006). Over this period, regression of catch and catch rate/year revealed a significant decline in annual catch from 18 to two sharks (89%) and in catch rate from 0.44 to 0.09 sharks.km-net^{-1}.yr^{-1} (79%) (S. Dudley pers. obs. 2006). It is uncertain whether these declines reflect highly localized stock depletion or whether they reflect a general decline in the Southwest Indian Ocean, but large numbers of longline vessels have been reported to be operating illegally in coastal waters of the Western Indian Ocean where they are targeting primarily hammerhead sharks and giant guitarfish *Rhynchobatus djiddensis* (IOTC 2005 in Dudley and Simpfendorfer 2006). This species is generally regarded as solitary, and is therefore unlikely to be abundant wherever it occurs. This is in contrast to other large hammerheads, including *Sphyrna lewini*, which form large schools. *Sphyrna mokarran*, like other hammerheads, readily takes baited hooks. Based on these characteristics, together with the decline of 79% in catch rates in the KZN shark nets, this species is assessed as Endangered in the Southwest Indian Ocean (IUCN 2014).

Western Atlantic

This species of hammerhead is caught primarily as bycatch in the pelagic longline, bottom longline and net fisheries along the Northwest Atlantic and Gulf of Mexico. It is also caught in local recreational fisheries. The species represents 0.7% of the total catch and suffers from greater than 90% at-vessel fishing mortality in the U.S. bottom longline fishery (Commercial Shark Fishery Observer Program unpubl. data). Both the pelagic and bottom longline observer programs have recorded a 2 to 3:1 ratio for *S. Lewini* to *S. mokarran*. While *Sphyrna* spp. meat has little economic value, its large fins are considered to be high in quality and bring in premium prices in Asian markets, thus finning still occurs in the U.S. fishery.

Interviews with shark fishermen in Belize indicate that hammerheads (*S. mokarran* in particular) are a favored target species for their large fins (R.T. Graham pers. obs.). Fin prices are rising above US$50/lb in the neighbouring countries of Guatemala, driven by Asian buyers, according to these interviews (R.T. Graham pers. obs). This species is probably caught in other fisheries but is usually placed in a general hammerhead category. In fact, species identification (*S. mokarran* vs. *S. lewin*i) is a major obstacle to the proper population assessment of this species. The high at-vessel fishing mortality for both species of hammerhead makes the threat of fishing even greater for this species. In the Pacific Ocean off Guatemala this species is caught as by-catch in the commercial longline fishery.

There is little data for landings and catch effort for this species in Central America and the Caribbean. Off the coast of Belize hammerheads were fished heavily by longline fishers in the 1980s and early 1990s. Interviews with fishermen indicate that the abundance and size of Sphyrnids has declined dramatically in the past 10 years as a result of over exploitation, leading to a halt in the Belize based shark fishery (R.T. Graham pers. obs). However, the pressure is still sustained by fishers entering Belizean waters from Guatemala (R.T. Graham pers. obs). The Cuban directed shark fishery (longline) between 1983 and 1991 recorded *S. mokarran* (subadults and juveniles) as one of 23 species caught. Since 1992 small increases in

mean sizes were noted, indicating partial recovery of the species. In Mexico between November 1993 and December 1994 (Tamaulipas, Veracruz, Tabasco, Campeche and Yucatan) 901 vessels were monitored daily with *S. mokarran* representing 86% of the total shark catch.

In the Northwest Atlantic this species is listed as Endangered under criterion A2 based on a suspected decline >50% over the past 10 years (IUCN 2014). The decline is poorly documented and has not been curtailed.

Australia

There has been a large increase in IUU fishing in northern Australia in the last few years (J. Stevens pers. obs.). Several initiatives are underway to identify which species are being taken and in what quantities. Hammerheads are omnipresent in the catches, and are suspected targets for their large valuable fins, although no specific data are available. Some domestic boats are also suspected to be targeting species for their fins in the Northern Territory, and this likely includes hammerheads (J. Stevens pers. obs). It is not a productive species and is currently being assessed as "high-risk" recent Risk Assessments of Northern Australian elasmobranchs (J. Stevens pers. obs). There is concern that this species is being increasingly targeted, and therefore an urgent need to obtain data to form an accurate assessment of the population in this region.

Pacific

There is little specific information for *S. mokarran* in the Pacific.

3.2 Habitat destruction

Coastal ecosystems that serve as nurseries for multiple species of sharks including hammerheads face both environmental and anthropogenic threats to their integrity (Knip et al. 2010). Environmental threats include fluctuations in temperature and salinity due to rising water temperatures and other climate change factors (Masselink et al. 2008) while fishing practices (Pauly et al. 1998) and habitat degradation and loss caused by human settlement initiatives including dredging, construction, pollution and deforestation are among the major man made threats to coastal shark populations (Suchanek 1994; Vitousek et al. 1997). And it is this decline of great sharks from coastal ecosystems that has caused trophic cascades with marked ecological consequences (Baum at al. 2003).

3.3 Indirect threat

A 30 year old study by Lyle (1984) indicated that *S. mokarran* had the highest concentrations of mercury in muscle tissue (>4 mg kg^{-1}) in in Australian waters than any other shark species tested. As the largest hammerhead, often reaching over 20 feet, and a very long-lived species, often living 20-30 years, great hammerheads are particularly susceptible to mercury accumulation and have been observed with exceptionally high levels of mercury in their tissue (Lyle 1984). Lyle (1986) also determined that great hammerhead embryo has levels of mercury contamination near the health limits for human seafood consumption.

Furthermore, climate change will continue to cause the destruction of important great hammerhead coral reef habitat through bleaching events and other impacts associated with increased concentrations of greenhouse gases in the atmosphere. Anthropogenic climate change will also raise ocean temperatures and cause great hammerheads to absorb more mercury than they would in cooler waters, thus subjecting them to severe health problems associated with high levels of mercury in the body. Increasing amounts of airborne mercury rise from Chinese power plants, cross the Pacific Ocean, and deposit on or near American shores (Geiger 2011). This trend suggests that the biological effects of mercury on great hammerhead sharks will only increase. High levels of arsenic, a compound with carcinogenic potential, have also been reported in hammerheads (Storelli et al. 2003).

If left unchecked, population growth will lead directly to an increase in fishing pressure on the great hammerhead population in the future.

3.4 Threats related to migration

Species-specific population numbers for great hammerheads are rarely available (Camhi et al. 2009, Piercy et al. 2010). Due to the similar appearance and head shape among the species of hammerhead sharks, there is often confusion as to which hammerhead has been caught and catch numbers are typically reported at the genus level, e.g. *Sphyrna* as part of a complex (Camhi et al. 2009). Population levels of all large hammerhead sharks have registered significant declines in virtually all oceans (Camhi et al. 2009) as their long migration routes commonly put them in contact with multiple coastal and continental shelf fisheries. Abundance trend analyses of catch-rate data specific to *S. mokarran* and to a hammerhead complex of *S. mokarran*, including *S. lewini* and *S. zygaena*, have reported large declines in abundance ranging from 60-99% over recent years.

Because *S. mokarran* regularly migrates between the EEZs of different Range States and into the high seas, no part of any stock can benefit fully from any management measures that are introduced within its waters by a single Range State.

3.5 National and international utilisation

National utilization

According to Vannuccini (1999), countries documented to consume hammerhead meat (usually salted or smoked) include Mexico, Mozambique, Philippines, Seychelles, Spain, Sri Lanka, China (Taiwan), Tanzania, and Uruguay. In other regions recreational and sport fisheries target great hammerheads. These areas mainly include the entire Southeast coast of the United States. In addition, Vooren et al. (2005) report an expanding recreational hammerhead fishery in the State of Rio Grande do Sul, in southern Brazil.

Fins

Hammerhead shark fins are highly desired in the international trade because of the fin size and high needle (ceratotrichia) count (Rose 1996). According to Japanese fin guides (Nakano 1999), *S. zygaena* fins, which are morphologically similar to *S. lewini*, are thin and falcate with the dorsal fin height longer than its base. Because of the higher value associated with the larger triangular fins of hammerheads, traders sort them separately from carcharhinid fins, which are often lumped together. An assessment of the Hong Kong SAR shark fin market has

revealed that various Chinese market categories contain fins from hammerhead species: ‘‘Bai Chun’’ (*S. lewini*),‘‘Gui Chun’’ (*S. zygaena*), ‘‘Gu Pian’’ (*S. mokarran*), and the general category ‘‘Chun Chi’’ containing both *S. lewini* and *S. zygaena* in an approximately 2:1 ratio, respectively. Abercrombie et al. (2005) reported that traders stated that hammerhead fins were one of the most valuable fin types on the market. Using commercial data on traded weights and sizes of fins, the Chinese category for hammerhead shark fins, coupled with DNA and Bayesian statistical analysis to account for missing records, Clarke et al. (2006a,b) estimated that between 1.3 and 2.7 million sharks of these species, equivalent to a biomass of 49,000–90,000t, are taken for the fin trade each year.

Illegal trade

There is little regulation of trade in these species, and the extent of illegal trade activities is unknown. While CITES lists *S. lewini*, *S. mokarran*, and *S. zygaena* in Appendix II, its implementation was delayed 18 months (September 2014) and five countries filed reservations (Canada, Guyana, Japan, Yemen) (CITES, 2014).

Most RFMO regulations and some national laws prohibit finning sharks at sea (discarding the carcass and transhipping the fins at sea). With the exception of finning sharks at sea, which is prohibited under most Regional Fisheries Management Organizations' regulations and some national laws, there is little control of trade in this species (however, see 2010 ICCAT provision below). Other countries have an outright ban on the trade of sharks. For example, The Bahamas banned the sale, import, and export of sharks, shark parts, and shark products within its waters. The Maldives and Marshall Islands also prohibit the trade of sharks, while Honduras has declared a moratorium on shark fishing in the country's waters. In addition, Guam and the Commonwealth of the Northern Mariana Islands (U.S. territories) both prohibit the sale or trade of shark fins within their waters. ICCAT members are prohibited from retaining, transhipping, landing, storing, selling, or offering for sale any part or whole carcass of hammerhead sharks from the family Sphyrnidae (except *S. tiburo*). While developing coastal States are exempt from this prohibition, they are to ensure that Sphyrnidae do not enter international trade. Thus, there should be no trade occurring from ICCAT fisheries. To date, the ICCAT Compliance Committee has not reviewed the contracting Parties' implementation of this measure. All ICCAT Parties have not reported on their domestic implementation, so their level of international trade that may be out of compliance is unknown. It is likely possible that neither potential exporting nor importing countries of these products have not implemented domestic regulations to monitor or prevent such trade. Furthermore, not all potential importing countries are parties to ICCAT and may not be aware of or required to comply with this measure.

Hammerhead sharks have been documented in IUU fishing activities. For example, about 120 longline vessels were reportedly operating illegally in coastal waters of the western Indian Ocean prior to 2005, and this number was expected to increase (IOTC 2005). These vessels were primarily targeting *Sphyrna* spp and *Rhynchobatus djiddensis* for their fins (Dudley and Simpfendorfer, 2006). IUU fishing by industrial vessels and shark finning are reported in other areas of the Indian Ocean (Young, 2006).

There has also been a large increase in IUU fishing in Northern Australia in the last few years (J. Stevens, pers. obs.).

In Belém, Northern Brazil, in May 2012, a surveillance operation apprehended a non-declared load of over 7 tons of fins of several species, without their respective carcasses. Through the photos of the apprehension it is possible to distinguish "tall" fins taken from hammerhead sharks.

4. Protection status and needs

4.1 National protection status

In 1998 the Brazilian Institute for the Environment and Natural Renewable Resources (IBAMA) made the first all-out effort to control shark finning (cutting the fins from the body and throwing the carcass overboard (Portaria IBAMA 121 dated 24/08/1998), by prohibiting that practice in all operating vessels in Brazilian waters (Kotas et al. 2000). As the execution of this law proved to be difficult and it was subsequently recommended that vessels land the carcasses with the fins attached to the bodies, a legislative model adopted from Costa Rica's Shark finning amendment to its National Fisheries Law.

Honduras decreed its national waters as a "Shark Sanctuary" in July 18, 2011, prohibiting capture of all species of sharks and the practice of finning.

S. mokarran should benefit from legislation enacted by French Polynesia (2006), Palau (2003, 2009), Maldives (2010), Honduras (2011), The Bahamas (2011), Tokelau (2011), and the Marshall Islands (2011) to prohibit shark fisheries throughout their Exclusive Economic Zones. Other countries have protected areas where no shark fishing is allowed, such as Cocos Island (Costa Rica), Malpelo Sanctuary (Colombia), and the marine reserve of Galapagos Islands (Ecuador). Countries including the United States, Chile, and Costa Rica require sharks to be landed with their fins naturally attached. Shark finning bans implemented by 21 countries, the European Union, and nine RFMOs could also help reduce some shark mortality (Camhi et al., 2009).

Camhi et al. (2009) reported that finning bans had been implemented by 19 countries and the European Union (EU) that do not allow the total weight of shark fins landed or found on board to exceed 5 percent of the total weight of shark carcasses landed or found on board. The countries include: Australia, Brazil, Canada, Cape Verde, Colombia, Costa Rica, Ecuador, Egypt, El Salvador, French Polynesia, Israel, Japan, Mexico, Namibia, Nicaragua, Oman, Palau, Panama, Seychelles, South Africa, Spain, and the United States. Since 2008 additional or more restrictive bans have been implemented in Honduras, United States, Chile, Mexico, Taiwan Province of China and the Bolivarian Republic of Venezuela.

In an effort to help stop the illegal finning occurring in the Galapagos, the Ecuadorian Government issued a decree in 2004 prohibiting fin export from Ecuador.

Elsewhere around the world the Moroccan management measures include a 5% maximum total harvest, logbook requirements, prohibition on manipulation of sharks on board fishing vessels, and the prohibition of finning and oil extraction. In November 2011, the European Commission proposed a more complete shark finning ban in EU waters and by EU fishermen worldwide.

In the United States, great hammerheads are managed as part of the Atlantic Large Coastal Shark Complex with a separate stock assessment. It is overfished and undergoing overfishing (NMFS 4th Quarter 2011 stock status). For all three species in the complex there are quotas, limited entry, time-area closures, recreational bag limits, and the requirement that all sharks

be offloaded from vessels with their fins naturally attached. The requirement to land sharks with their fins naturally attached was adopted in January 2011 with passage of the Shark Conservation Act. In August 2011, the United States published a final rule to prohibit the retention of great, smooth and scalloped hammerhead sharks caught in associations with ICCAT fisheries.

4.2 International protection status

The IUCN defines *S. mokarran*'s conservation status as endangered worldwide with a "decreasing" population trend and "Very High Risk of Extinction" (IUCN 2014). Regionally, the species is endangered in the Northwest Atlantic, Gulf of Mexico and critically endangered in the Eastern Atlantic.

This decline and susceptibility has led to a global effort to enhance the species' management and conservation. In March 2013 *S. mokarran* was added to CITES (Convention on International Trade in Endangered Species) Appendix II. *S. mokarran* was also listed on Annex I, Highly Migratory Species, of the UN Convention on the Law of the Sea, which urges States to cooperate over their management. NOAA Fisheries Service HMS Division has also identified Florida's coastal waters as Essential Fish Habitat (EFH) for many species of sharks. This includes *S. mokarran*, which was recently added by the Florida Fish and Wildlife Conservation Commission (FWC) to the list of shark species prohibited from harvest in Florida state waters.

Also of relevance is the FAO International Plan of Action for the Conservation and Management of Sharks (IPOA-Sharks) which recommends that RFMOs carry out regular shark population assessments and that member States cooperate on joint and regional shark management plans. Countries which are implementing IPOA-Sharks are Argentina, Brazil, France, Japan, Malaysia, Mexico, New Zealand, Portugal, Spain, Thailand, U.K., and the USA. Like other sharks, however, international regulations for hammerheads are limited and few countries regulate hammerhead shark fishing.

It is prohibited to retain onboard, tranship, land, store, sell, or offer for sale any part of whole carcass of any hammerhead shark of the family Sphyrnidae within the fisheries covered by the Convention area of ICCAT (2010) (except for *S. tiburo*). Although developing coastal States are exempt from this prohibition, they are to ensure that hammerhead sharks do not enter into international trade. RFMOs have adopted finning bans, which require full utilization of captured sharks and encourage the live release of incidentally caught sharks. If effectively enforced, this measure could help to reduce the number of hammerheads killed exclusively for their fins. Regulations by RFMOs only pertain to the entities that are contracting Parties and to the fisheries that are within the scope of the Convention; thus the catch and trade of hammerhead sharks is largely unmanaged and unregulated.

In 2008, the European Community proposed a prohibition on retention of all hammerhead species under ICCAT, but the measure met with opposition and was defeated. Most Regional Fisheries Management Organizations have implemented finning bans which, if effectively enforced, could reduce the number of hammerheads killed exclusively for their fins. RFMOs with finning bans are: ICCAT, GFCM, IOTC, IATTC, NAFO, SEAFO, WCPFC, CCAMLR, and NEAFC. In November 2011, the eight member countries of the Central American Integration System (SICA: Belize, Costa Rica, Dominican Republic, El Salvador, Guatemala, Honduras, Nicaragua and Panama) adopted a common binding regulation outlawing shark

finning. Unlike finning bans in many countries, the Regulation OSP-05-11 (effective 1 January 2012) applies not only to domestic and foreign vessels that catch and land sharks in SICA countries, but also to vessels fishing in international waters that fly the flag of a SICA member country. Member governments can only permit landing sharks when the fins are still naturally attached to the whole body or to a portion of the shark body.

In 2011, ICCAT adopted a recommendation that requires any party that does not report specific shark data to submit a data collection improvement plan to the SCRS by July 2012 (Recommendation 11-08). To date, the ICCAT Compliance Committee has not reviewed the contracting Parties' implementation of this measure. All ICCAT Parties have not reported on their domestic implementation, so their level of international trade that may be out of compliance is unknown. It is possible that importing and exporting countries of these products have not implemented domestic regulations to monitor or prevent such trade.

Furthermore, not all potential importing countries are parties to ICCAT and may not be aware of or required to comply with this measure (IOTC resolution 08/04) requiring logbook records of catch from longline vessels be recorded and presented upon request. Recommendation 11/06 expands this requirement to all purse seine, gillnet and pole and line fishing vessels as well. The IOTC rejected a hammerhead retention ban.

The Council of the European Union adopted a proposal to amend Regulation (EC) No 1185/2003 on the removal of fins of sharks. Since 6 June 2013 sharks' fins must remain attached to the body while on board vessels.

4.3 Additional protection needs

Extensive global fishing, coastal development, and human population growth all present seemingly insurmountable threats to the survival of *S. mokarran*. Proactive, precautionary policy decisions are need to attenuate the steep declines in the species' populations witnessed over the past few decades. An Appendix II listing for *S. mokarran* would offer an unequivocal statement of concern for the species and commitment towards population rebuilding strategies.

5. Range States

5.1 Party Range States

Algeria; Antigua and Barbuda; Australia (Ashmore-Cartier Is., Australian Capital Territory, Coral Sea Is. Territory, New South Wales, Northern Territory, Queensland); Bangladesh; Cape Verde; Costa Rica (Cocos I.); Cuba; Djibouti; Ecuador; Egypt (Sinai); Eritrea; France (Clipperton I.. New Caledonia; French Guiana; Saint Martin; Martinique; French Polynesia (Marquesas, Society Is., Tuamotu, Tubuai Is.); French Southern Territories (Mozambique Channel Is.), Guadeloupe; Saint Barthélemy); Honduras (Honduran Caribbean Is.); India (Andhra Pradesh, Goa, Gujarat, Karnataka, Kerala, Maharashtra, Orissa, Pondicherry, Tamil Nadu, West Bengal); Iran, Islamic Republic of; Israel; Jordan; Kenya; Libya; Madagascar; Mauritius (Rodrigues); Morocco; Mozambique; Netherlands (Aruba; Curaçao; Netherlands Antilles: Bonaire, Netherlands Leeward Is.); Pakistan; Palau; Panama; Philippines; Saudi Arabia; Senegal; Seychelles (Aldabra); Somalia; South Africa (KwaZulu-Natal); Spain; Sri Lanka; Tanzania; Tunisia; United Kingdom (Anguilla; British Indian Ocean Territory,

Cayman Islands; Montserrat; Pitcairn; Turks and Caicos Islands;); Yemen (North Yemen, Socotra, South Yemen).

5.2 Non-Party Range States

Bahamas; Belize; Brazil (Alagoas, Amapá, Bahia, Ceará, Espírito Santo, Fernando de Noronha, Maranhão, Pará, Paraíba, Paraná, Pernambuco, Piauí, Rio de Janeiro, Rio Grande do Norte, Rio Grande do Sul, Santa Catarina, São Paulo, Sergipe); Cambodia; China (Hong Kong; Fujian, Guangdong, Guangxi, Hainan, Macao; Shanghai, Taiwan, Province of China (Kin-Men, Ma-tsu-Pai-chuan), Zhejiang); Colombia; Dominica; Dominican Republic; El Salvador; ; Grenada; Guatemala; Guyana; Haiti; Indonesia; Iraq; Jamaica; Japan; Kuwait; Malaysia (Peninsular Malaysia, Sabah, Sarawak); Micronesia, Federated States of ; Myanmar; Nicaragua (Nicaraguan Caribbean Is.); Oman; Qatar; Saint Kitts and Nevis; Saint Lucia; Saint Vincent and the Grenadines; Sudan; Suriname; Trinidad and Tobago; United Arab Emirates; United States (Alabama, California, Florida, Georgia, Louisiana, Mississippi, North Carolina, Puerto Rico (Navassa I.); South Carolina, Texas); Venezuela, Bolivarian Republic of (Aves I., Venezuelan Antilles); Viet Nam.

6. Comments from Range States

7. Additional Remarks

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