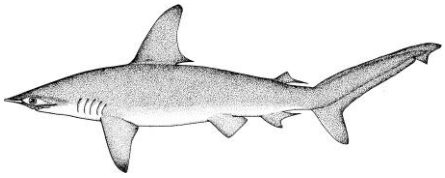
DRAFT EXECUTIVE SUMMARY: SCALLOPED HAMMERHEAD SHARK

Indian Ocean Tuna Commission
Commission des Thons de l'Océan Indien
iotc ctoi



Status of the Indian Ocean Scalloped Hammerhead Shark (SPL: *Sphyrna lewini*)

CITES APPENDIX II species

TABLE 1. Status of scalloped hammerhead shark (*Sphyrna lewini*) in the Indian Ocean.

Area[1]	Indicators		2015 stock status determination
Indian Ocean	Reported catch 2014: Not elsewhere included (nei) sharks[2]: Average reported catch 2010–2014: Not elsewhere included (nei) sharks[2]:	42 t 41,417 t 89 t 48,872 t	
	MSY (1,000 t) (80% CI): F_{MSY} (80% CI): SB_{MSY} (1,000 t) (80% CI): F_{2014}/F_{MSY} (80% CI): SB_{2014}/SB_{MSY} (80% CI): SB_{2014}/SB_0 (80% CI):	unknown	

[1]Boundaries for the Indian Ocean = IOTC area of competence
[2]Includes all other shark catches reported to the IOTC Secretariat, which may contain this species.

Colour key	Stock overfished($SB_{year}/SB_{MSY}< 1$)	Stock not overfished ($SB_{year}/SB_{MSY}\geq 1$)
Stock subject to overfishing($F_{year}/F_{MSY}> 1$)		
Stock not subject to overfishing ($F_{year}/F_{MSY}\leq 1$)		
Not assessed/Uncertain		

TABLE 2. IUCN threat status of scalloped hammerhead shark (*Sphyrna lewini*) in the Indian Ocean.

Common name	Scientific name	IUCN threat status[1]		
		Global status	WIO	EIO
Scalloped hammerhead	*Sphyrna lewini*	Endangered	Endangered	–

IUCN = International Union for Conservation of Nature; WIO = Western Indian Ocean; EIO = Eastern Indian Ocean
Sources: IUCN 2007, Baum 2007

INDIAN OCEAN STOCK – MANAGEMENT ADVICE

Stock status. The current IUCN threat status of 'Endangered' applies to scalloped hammerhead sharks globally and specifically for the western Indian Ocean (Table 2). The ecological risk assessment (ERA) conducted for the Indian Ocean by the WPEB and SC in 2012 (IOTC–2012–SC15–INF10 Rev_1) consisted of a semi-quantitative risk assessment analysis to evaluate the resilience of shark species to the impact of a given fishery, by combining the biological productivity of the species and its susceptibility to each fishing gear type. Scalloped hammerhead shark received a low vulnerability ranking (No. 14) in the ERA rank for longline gear because it was estimated as one of the least productive shark species, but was also characterised by a lower susceptibility to longline gear. Scalloped hammerhead shark was estimated as the sixth most vulnerable shark species in the ERA ranking for purse seine gear, but with lower levels of vulnerability compared to longline gear, because the susceptibility was lower for purse seine gear. There is a paucity of information available on this species and this situation is not expected to improve in the short to medium term. Scalloped hammerhead sharks are commonly taken by a range of fisheries in the Indian Ocean. They are extremely vulnerable to gillnet fisheries. Furthermore, pups occupy shallow coastal nursery grounds, often heavily exploited by inshore fisheries. Because of their life history characteristics – they are relatively long lived (over 30 years), and have relativity few offspring (<31 pups each year), the scalloped hammerhead shark is vulnerable to

[1] The process of the threat assessment from IUCN is independent from the IOTC and is presented for information purpose only

overfishing. There is no quantitative stock assessment or basic fishery indicators currently available for scalloped hammerhead shark in the Indian Ocean therefore the stock status is **uncertain** (Table 1).

Outlook. Maintaining or increasing effort can result in declines in biomass and productivity. The impact of piracy in the western Indian Ocean has resulted in the displacement and subsequent concentration of a substantial portion of longline fishing effort into certain areas in the southern and eastern Indian Ocean. It is therefore unlikely that catch and effort on scalloped hammerhead shark will decline in these areas in the near future.

Management advice. A precautionary approach to the management of scalloped hammerhead shark should be considered by the Commission. Mechanisms need to be developed by the Commission to encourage CPCs to comply with their recording and reporting requirement on sharks, so as to better inform scientific advice.

The following key points should be noted:

- **Maximum Sustainable Yield (MSY)**: Unknown.
- **Reference points**: Not applicable.
- **Main fishing gear** (2011–14): Gillnet; Handline; Trolling; longline.
- **Main fleets** (2011–14): Indonesia; EU,Spain.

APPENDIX I

SUPPORTING INFORMATION

(Information collated from reports of the Working Party on Ecosystems and Bycatch and other sources as cited)

CONSERVATION AND MANAGEMENT MEASURES

Shark in the Indian Ocean are currently subject to a number of Conservation and Management Measures adopted by the Commission:

- Resolution 15/01 *on the recording of catch and effort data by fishing vessels in the IOTC area of competence* sets out the minimum logbook requirements for purse seine, longline, gillnet, pole and line, handline and trolling fishing vessels over 24 metres length overall and those under 24 metres if they fish outside the EEZs of their flag States within the IOTC area of competence. As per this Resolution, catch of all sharks must be recorded (retained and discarded).
- Resolution 11/04 *on a Regional Observer Scheme* requires data on shark interactions to be recorded by observers and reported to the IOTC within 150 days. The Regional Observer Scheme (ROS) started on 1st July 2010.
- Resolution 05/05 *Concerning the conservation of sharks caught in association with fisheries managed by IOTC* includes minimum reporting requirements for sharks, calls for full utilisation of sharks and includes a ratio of fin-to-body weight for shark fins retained onboard a vessel.
- Resolution 15/02 *Mandatory statistical reporting requirements for IOTC Contracting Parties and Cooperating Non-Contracting Parties (CPCs)* indicated that the provisions, applicable to tuna and tuna-like species, are applicable to shark species.

Extracts from Resolutions 15/01,15/02, 11/04 and 05/05

RESOLUTION 15/01 ON THE RECORDING OF CATCH AND EFFORT DATA BY FISHING VESSELS IN THE IOTC AREA OF COMPETENCE

Para. 1. Each flag CPC shall ensure that all purse seine, longline, gillnet, pole and line, handline and trolling fishing vessels flying its flag and authorized to fish species managed by IOTC be subject to a data recording system.

Para. 10 (start). The Flag State shall provide all the data for any given year to the IOTC Secretariat by June 30th of the following year on an aggregated basis.

RESOLUTION 11/04 ON A REGIONAL OBSERVER SCHEME

Para. 10. Observers shall:

b) Observe and estimate catches as far as possible with a view to identifying catch composition and monitoring discards, by-catches and size frequency

Resolution 15/02 MANDATORY STATISTICAL REPORTING REQUIREMENTS FOR IOTC CONTRACTING PARTIES AND COOPERATING NON-CONTRACTING PARTIES (CPCS)

Para. 2. Estimates of the total catch by species and gear, if possible quarterly, that shall be submitted annually as referred in paragraph 7 (separated, whenever possible, by retained catches in live weight and by discards in live weight or numbers) for all species under the IOTC mandate as well as the most commonly caught elasmobranch species according to records of catches and incidents as established in Resolution 15/01 *on the recording of catch and effort data by fishing vessels in the IOTC area of competence* (or any subsequent superseding Resolution).

RESOLUTION 05/05 CONCERNING THE CONSERVATION OF SHARKS CAUGHT IN ASSOCIATION WITH FISHERIES MANAGED BY IOTC

Para. 1. CPCs shall annually report data for catches of sharks, in accordance with IOTC data reporting procedures, including available historical data.

Para. 3. CPCs shall take the necessary measures to require that their fishermen fully utilise their entire catches of sharks. Full utilisation is defined as retention by the fishing vessel of all parts of the shark excepting head, guts and skins, to the point of first landing.

FISHERIES INDICATORS

Scalloped hammerhead shark: General

Scalloped hammerhead shark (*Sphyrna lewini*) is widely distributed and common in warm temperate and tropical waters (**Fig. 1**). It is also found in estuarine and inshore waters. In some areas, the scalloped hammerhead shark forms large resident populations. In other areas, large schools of small-sized sharks are known to make seasonal migrations polewards. Their aggregating habit makes large schools highly vulnerable to fishing. Large CPUEs can be recorded even when stocks are severely depleted (Baum et al. 2007). An assessment of population rebound potential of 26 shark species in the Pacific Ocean ranked *Sphyrna lewini* as one of the species with the poorest ability to recover from increased mortality (Smith et al. 1998). Scalloped hammerhead sharks feeds on pelagic fishes, rays and occasionally

other sharks, squids, lobsters, shrimps and crabs. Table 3 outlines some of the key life history traits of scalloped hammerhead shark in the Indian Ocean.

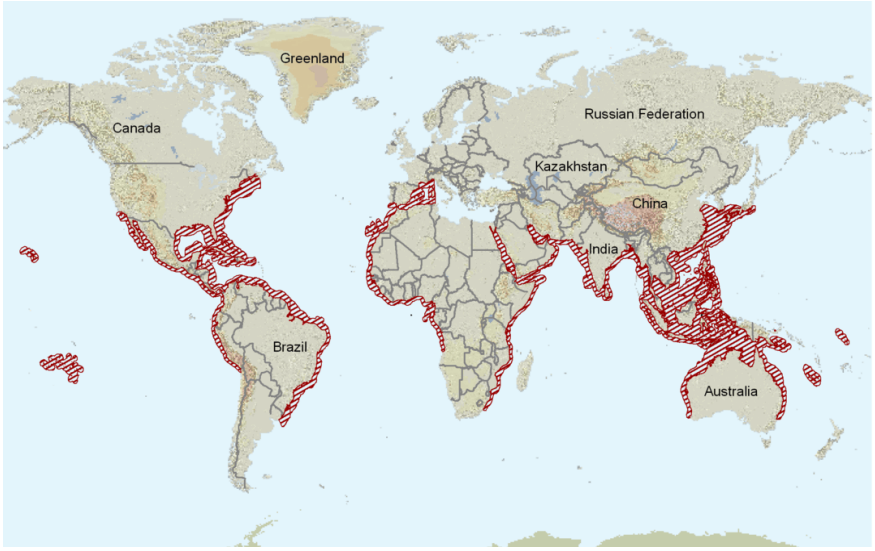


Fig. 1. Scalloped hammerhead shark: The worldwide distribution of the scalloped hammerhead shark (source: www.iucnredlist.org)[2].

TABLE 3. Scalloped hammerhead shark: Biology of Indian Ocean scalloped hammerhead shark (*Sphyrna lewini*).

Parameter	Description
Range and stock structure	The scalloped hammerhead shark is widely distributed and common in warm temperate and tropical waters down to 900 m. It is also found in estuarine and inshore waters. In some areas, the scalloped hammerhead shark forms large resident populations. In other areas, large schools of small-sized sharks are known to migrate seasonally polewards. Area of overlap with IOTC management area = high. There is no information available on stock structure.
Growth and Longevity	The maximum age for Atlantic Ocean scalloped hammerheads is estimated to be over 30 years with the largest individuals reaching over 310 cm TL. In the Eastern Indian Ocean, females are reported to reach 350 m TL
Maturity (50%)	Males in the Indian Ocean mature at around 140-165 cm TL. Females mature at about 200-220 cm TL. In the northern Gulf of Mexico females are believed to mature at about 15 years and males at 9–10 years.
Reproduction	The scalloped hammerhead shark is viviparous with a yolk sac-placenta. Litters consist of 13–41 pups, varying by area. The reproductive cycle is annual and the gestation period is 9–10 months. The nursery areas are in shallow coastal waters. • Fecundity: medium (<41 pups) • Generation time: 17–21 years • Gestation Period: 9–10 months • Reproductive cycle is annual
Size (length and weight)	The maximum size for Atlantic Ocean scalloped hammerheads is estimated to be over 310 cm TL. In the Eastern Indian Ocean, females are reported to reach 350 m TL New-born pups are around 45–50 cm TL at birth in the eastern Indian Ocean.

Sources: Stevens & Lyle 1989, De Bruyn et al. 2005, White et al. 2008, Jorgensen et al. 2009, Kembaren et al. 2013.

Scalloped hammerhead shark: Fisheries

Scalloped hammerhead sharks are often targeted or taken as an incidental bycatch by some semi-industrial, artisanal and recreational fisheries and often for industrial fisheries (pelagic longline tuna and swordfish fisheries and purse seine fishery) (**Table 4**). There is little information on the fisheries prior to the early 1970s, and some countries continue not to collect shark data while others do collect it but do not report it to IOTC. It appears that significant catches of sharks have gone unrecorded in several countries. Furthermore, many catch records probably under-represent the actual catches of sharks because they do not account for discards (i.e. do not record catches of sharks for which only the fins are kept or of sharks usually discarded because of their size or condition) or they reflect dressed weights instead of live weights. FAO also compiles landings data on elasmobranchs, but the statistics are limited by the lack of species-specific data and data from the major fleets.

[2] Map of distribution in the Indian Ocean is not correctly represent species distribution, which is much wider, including Madagascar, Seychelles – whole Mascarene shoals and islands chain (E. Romanov pers com) and to Maldives (Randall and Anderson 1993).

The IUCN assessment for each of the major geographic regions where the scalloped hammerhead occurs (Baum et al. 2007), suggests a 64% decline in abundance over the study period, based largely on the observations by De Bruyn et al. (2005) and Dudley & Simpfendorfer (2006) which indicate that in localised areas of the western Indian Ocean catch-per-unit-effort of *Sphyrna lewini* declined significantly from 1978–2003 in shark net catches off the beaches of Kwa-Zulu Natal, South Africa. It observed that *Sphyrna lewini* is captured throughout much of its range in the Indian Ocean, including illegal targeting of the species in several areas. Landings reported to FAO by Oman, surveys of landings sites in Oman and interviews with fishers also suggest that catches of *Sphyrna lewini* have declined substantially (IUCN 2007, Baum op. cit. 2007). The species faces heavy fishing pressure in the region, and similar declines in abundance are also inferred in other areas of its range. Papers presented at IOTC WPEB in 2013 show harvesting of scalloped hammerhead neonates and juvenile pups in the artisanal fisheries of both Kenya and Indonesia.

The practice of shark finning is considered to be regularly occurring and on the increase for this species (Clarke et al. 2006, Clarke 2008, Holmes et al. 2009) and the bycatch/release injury rate is unknown but probably high.

TABLE 4. Estimated frequency of occurrence and bycatch mortality in the Indian Ocean pelagic fisheries.

Gears	PS	LL		BB/TROL/HAND	GILL	UNCL
		SWO	TUNA			
Frequency	rare	common		absent	common	unknown
Fishing Mortality	unknown	unknown	unknown	unknown	unknown	unknown
Post release mortality	unknown	unknown	unknown	unknown	unknown	unknown

Sources: Romanov 2002, 2008, Dudley & Simpfendorfer 2006, Romanov et al. 2008

Scalloped hammerhead shark: Catch trends

The catch estimates for scalloped hammerhead (**Table 5**) are highly uncertain as is their utility in terms of minimum catch estimates. Five CPCs have reported detailed data on sharks (i.e. Australia, EU (Spain, Portugal and United Kingdom), I.R. Iran, South Africa, and Sri Lanka) while thirteen CPCs have reported partial data or data aggregated for all species (i.e. Belize, China, Japan, Rep. of Korea, Indonesia, Malaysia, Oman, Seychelles, Mauritius, Philippines, UK-territories, Vanuatu).

TABLE 5. Catch estimates for scalloped hammerhead shark* in the Indian Ocean for 2012 to 2014.

Catch		2012	2013	2014
Most recent catch (reported)	Scalloped hammerhead shark	80 t	128 t	42 t
	nei-sharks	47,641 t	47,752 t	41,417 t

* catches likely to be misidentified with the smooth hammerhead shark (*S. zygaena*) which is an oceanic species.
Nei-sharks: sharks not elsewhere included

Note that the catches recorded for sharks are thought incomplete. The catches of sharks are usually not reported and when they are they might not represent the total catches of this species but simply those retained on board. It is also likely that the amounts recorded refer to weights of processed specimens, not to live weights. In 2014 two countries reported catches of scalloped hammerhead sharks in the IOTC region.

A recent project estimated possible hammerhead shark catches for fleets/countries based on the ratio of shark catch over target species by metier (Murua et al 2013). The estimation was done using target species nominal catch from the IOTC database and assuming that target catches have been accurately declared. The estimated catch from this study highlighted that the possible underestimation of oceanic whitetip shark in the IOTC database is considerable (i.e. the estimated catch is around 80 times higher than the declared/report and contained in the IOTC database). Although this figure needs to be further investigated, it gives a global figure of the level of underreporting for scalloped hammerhead shark in the Indian Ocean.

Scalloped hammerhead shark: Nominal and standardised CPUE Trends

Data not available at the IOTC Secretariat. However, Indian longline research surveys, in which scalloped hammerhead sharks contributed up to 6% of regional catch, demonstrate declining nominal catch rates over the period 1984–2006 (John & Varghese 2009). Nominal CPUE in South African protective net shows steady decline from 1978.

Scalloped hammerhead shark: Average weight in the catch by fisheries

Data not available.

Scalloped hammerhead shark: Number of squares fished

Catch and effort data not available.

STOCK ASSESSMENT

No quantitative stock assessment for scalloped hammerhead shark has been undertaken by the IOTC Working Party on Ecosystems and Bycatch.

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