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CMFRI Marine Fisheries Policy Series No.13/2019
ISSN 2394-8019

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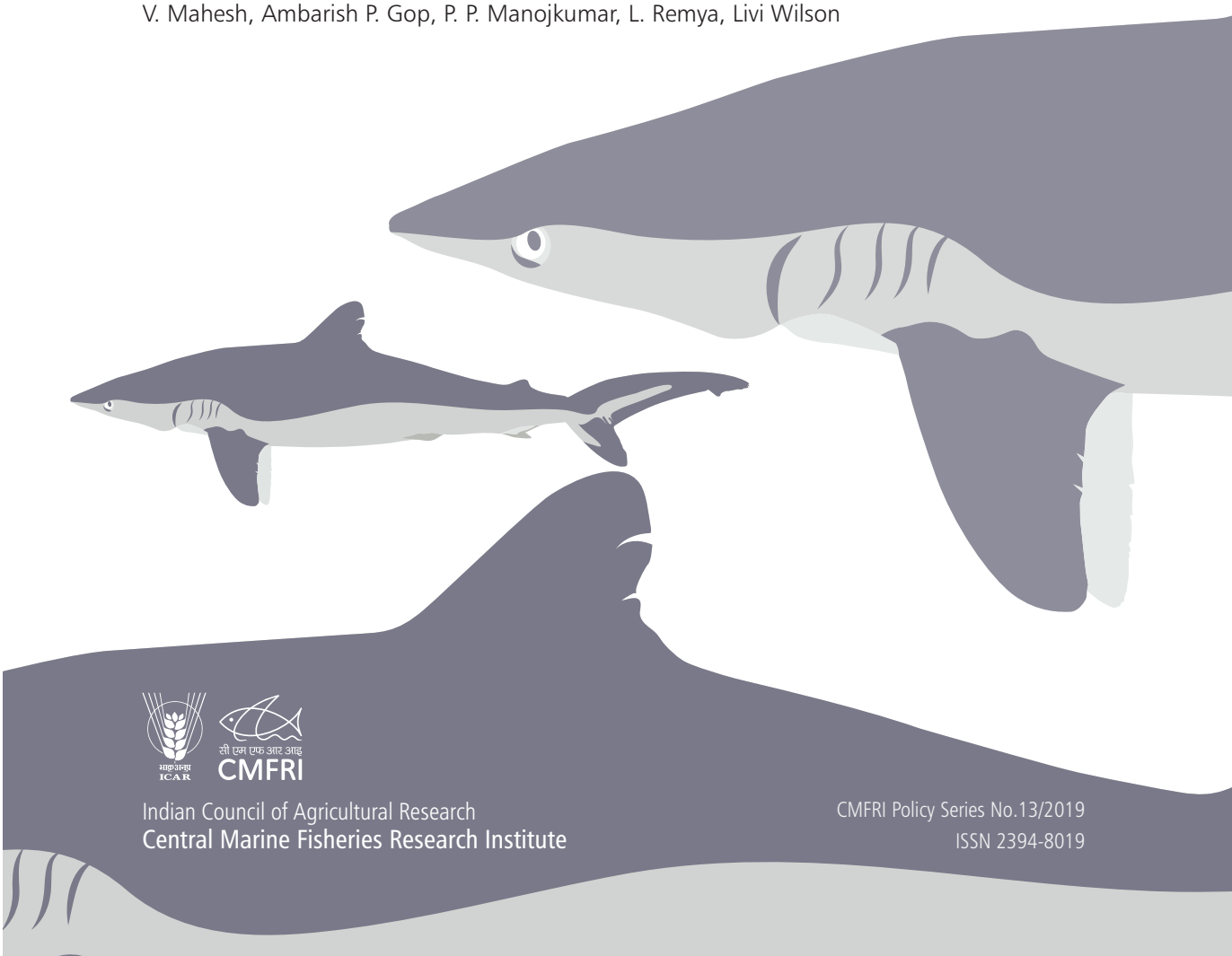

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India Non-Detriment Finding (NDF) for
silky shark, *Carcharhinus falciformis*, in the Indian Ocean

Published by
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Design: Blackboard, Kochi
Printed at: PrintExPress, Kaloor, Kochi

Publication, Production & Co-ordination
Library & Documentation Centre, CMFRI

CMFRI Marine Fisheries Policy Series No.13
ISSN 2394-8019

Citation: CMFRI, 2019. India Non-Detriment Finding (NDF) for silky shark, *Carcharhinus falciformis*, in the Indian Ocean. CMFRI Marine Fisheries Policy Series No.13. ICAR-Central Marine Fisheries Research Institute, Kochi. 54 pp.

Foreword

Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES) is an international global treatise aimed at ensuring that sustainable international trade of wild flora and fauna does not threaten their survival. Although it is legally binding on the signatory parties, it does not constitute or replace national laws, and the countries are advised to implement CITES regulations within the ambit of their own legislations.

India as part of its commitment to CITES, has to bring out Non-Detriment Findings (NDFs) on species listed under Appendix II of CITES to allow for legal international trade of the species from/to India. ICAR-Central Marine Fisheries Research Institute being the recognized Scientific Authority of CITES in India for marine resources, has already brought out NDFs on three species of hammerhead sharks, the oceanic white tip shark and two species of Manta rays which were included in Appendix II of CITES in 2013. Four shark species and all devil rays were included in Appendix II of CITES at the 17th Meeting of the Conference of the Parties (CoP17, Johannesburg) in 2016. The current NDF is on the silky shark Carcharhinus falciformis which is harvested from the Indian EEZ and which is listed in Appendix II of CITES.

The silky shark is an oceanic and coastal-pelagic shark with a circumglobal distribution in tropical waters, and contributing significantly to India's shark landings particularly along the southern coast. The findings and suggestions presented in this document will be a foundation to evolve and implement measures to manage the fishery of silky shark in Indian waters while allowing for international trade from/to the country, within the permits of existing national legislations on trade in shark commodities.

I complement the Demersal Fisheries Division for the effort taken in bringing out this important document. I also place on record the scientific assistance given by Sarah Fowler, Scientific Adviser, Vice-Chair for International Treaties, Save Our Seas, International Union for Conservation of Nature (IUCN) and Daniel Fernando, Co-founder, Blue Resources Trust, in the preparation of this document.

Dr. A. Gopalakrishnan
Director, CMFRI

Contents

Summary

This document was created by the designated Indian CITES Scientific Authority, the Central Marine Fisheries Research Institute (CMFRI), and is the result of a workshop that took place in May 2018 in Kochi, India. The following NDF guideline was used:

Mundy-Taylor, V., Crook, V., Foster, S., Fowler, S., Sant, G., and Rice, J. 2014. CITES Non-detriment findings guidance for shark species. 2nd, revised version. A framework to assist Authorities in making Non-detriment Findings (NDFs) for species listed in CITES Appendix II. Report prepared for the Germany Federal Agency for Nature Conservation (Bundesamt fur Naturschutz, BfN). Available at https://cites.org/eng/prog/shark/Information_resources_from_Parties_and_other_stakeholders.

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Experts:

Sarah Fowler, Scientific adviser, vice chair for international treaties, Save Our Seas, International Union for Conservation of Nature (IUCN)

Daniel Fernando, Co-founder, Blue Resources Trust, Sri Lanka

Marie Saleem, Environmental Consultant, Reefscapers Pvt. Ltd, Maldives

Outcome:

This silky shark (*Carcharhinus falciformis*) NDF for India is "**positive with conditions**" to enable trade (of non-fin commodities) to continue for this newly-listed species while improvements are made to existing fisheries and trade management and monitoring frameworks, and while additional research activities and management measures are adopted as outlined in Section 6 of this document.

This NDF will be re-evaluated after 3 years, to gauge progress against the recommendations in Section 6 and update it with newly acquired data, before agreeing to a new NDF for 2023-2026.

Section 1. Preliminary considerations			
1.1 (a) Is the specimen subject to CITES controls?			
Species name	Product form	CITES Appendix	Source of identification
Silky Shark (*Carcharhinus falciformis*) FAO Code: FAL	Fins (export of shark fins of all shark species prohibited from India). Meat (fresh and dried salted for human consumption) – *more data is required to confirm international trade of meat.* Cartilage (data lacking). Skin (international trade - leather) – *more data is required.* Liver oil (mixed with oil from other shark species, but domestic use only). Jaws & teeth (international trade).	Appendix II	*Detached fins can be identified using:* FAO shark fin guide or iSharkFin software (FAO, 2016a or http://www.fao.org/ipoa-sharks/tools/software/isharkfin/en/). Abercrombie, 2016: http://www.pewtrusts.org/~/media/assets/2016/09/pewsharkguidesilkyandthresherenglishprint.pdf. *For whole animal identification:* Pillai and Parakal, 2000. Kizhakudan *et al.*, 2015. FAO Guides and expert identification by CMFRI. ICAR-CMFRI, unpublished. *Utilisation:* Compagno, 1984b. Clarke *et al.*, 2006a. ICAR- CMFRI, unpublished.
In view of the above, is the specimen subject to CITES controls?	YES		GO TO Question 1.1(b)
Concerns and uncertainties:	There is a low risk that the species has been incorrectly identified; silky sharks are an important commercially fished species, comprising 30-35% of shark catch landed in Kochi, south-west coast of India. Species-specific traceability is lacking in respect to silky shark product trade.		
	Lacking sufficient information on the export of meat, jaws, oil, cartilage, and hide.		

1.1 (b) From which stock will the specimen be taken/was the specimen taken?		
	Description/comments	Sources of information
Ocean basin	Indian Ocean	
Stock location/ distribution/ boundaries	There is some information on distribution and population parameters in the Indian EEZ, but stock parameters and stock structure information are not available. Bonfil (2008) proposed a global distribution for this species (see IUCN Red List distribution map annexed). Galvan-Tirado *et al.* (2013) provided evidence of the existence of distinct Eastern and Western Pacific Ocean populations but it was not possible to definitively reject the hypothesis of panmixia due to the small differences registered as a result of the low levels of mtDNA genetic variation. Preliminary results from ongoing genetic studies suggest that, for management purposes, silky shark in the Eastern Pacific Ocean should be divided into two stocks, approximately along the equator.	Raje *et al.*, 2007. Bonfil, 2008. Kizhakudan *et al.*, 2012. Galvan-Tirado *et al.*, 2013. Aires-da-Silva *et al.*, 2014. Kumar *et al.*, 2015. IOTC Silky Shark Executive summary (IOTC, 2015). Rigby *et al.*, 2017: http://dx.doi.org/10.2305/IUCN.UK.2017-3.RLTS.T39370A117721799.en and http://maps.iucnredlist.org/map.html?id=39370).
Is this a shared stock (i.e. occurring in more than one EEZ[1] and/or the high seas)?	Yes, straddling stock ranging between India's EEZ, the high seas and likely other Indian Ocean EEZ's (e.g. Sri Lanka, Maldives). However, stock studies are needed for the Indian Ocean to confirm the presence of multiple stocks, which may or may not be shared.	Kohler *et al.*, 1998. Mejuto *et al.*, 2005. Kohin *et al.*, 2006. Galvan-Tirado *et al.*, 2013. Aires-da-Silva *et al.*, 2013.
If the stock occurs in more than one EEZ, which other Parties share this stock?	The stock occurs in the EEZ of the other littoral states of the Indian Ocean.	http://www.iotc.org/about-iotc/structure-commission
If a high seas stock, which other Parties fish this stock?	In addition to the above, the following IOTC Contracting Parties: China, Belize, European Union, Guinea, Japan, Republic of Korea, and Cooperating Non-Contracting Party (CNCP): Liberia.	www.iotc.org
Which, if any, RFB(s) [2] cover(s) the range of this stock?	With respect to the Indian Ocean region: * Indian Ocean Tuna Commission (IOTC), *Asia-Pacific Fishery Commission (APFIC), *The Bay of Bengal Programme Inter-Governmental Organisation (BOBP-IGO), *Commission for the Conservation of Southern Bluefin Tuna (CCSBT), *the Regional Organization for the Conservation of the Environment in the Red Sea and Gulf of Aden (PERSGA), * Regional Commission for Fisheries (RECOFI), * South Indian Ocean Fisheries Agreement (SIOFA), and *Southwest Indian Ocean Fisheries Commission (SWIOFC).	http://iotc.org http://www.apfic.org http://www.bobpigo.org https://www.ccsbt.org/ http://www.persga.org/ http://www.fao.org/fishery/rfb/recofi/en http://www.fao.org/fishery/rfb/siofa/en http://www.fao.org/fishery/rfb/swiofc/en

Are all Parties listed above (which fish or share the stock concerned) Members of the relevant RFB(s)?	Yes. They are Members or Cooperating Non-Contracting Parties of IOTC. Most are CITES Parties and/or CMS, and some are also Signatories of the CMS Sharks MoU.	https://cites.org/eng/disc/parties/chronolo.php http://www.cms.int/sharks/en/signatories-range-states
Are there geographical management gaps?	Regional management: Retention of silky shark is prohibited in ICCAT and WCPFC but is not prohibited in the Indian Ocean/IOTC. All Tuna RFMOs have adopted prohibitions on finning and encourage the release of live sharks (of all species) where possible. International measures: The FAO IPOA-Sharks (International Plan of Action-Sharks) underscores the responsibilities of fishing to coastal states for sustaining shark populations, ensuring full utilisation of retained shark species and improving shark data collection and monitoring. The formally adopted FAO Port State Measures Agreement is an agreement to prevent, deter and eliminate Illegal, Unreported and Unregulated (IUU) fishing. This agreement requires that any inspections conducted on fishing vessels entering ports includes verification that all species exploited have been taken in compliance with international law, international conventions and measures of RFMOs. National measures in the Indian Ocean: The management measures currently in place in the Indian Ocean vary across countries and are not implemented uniformly. Management measures in India are restricted to coastal waters. In India, finning and export of shark fins is prohibited. The Republic of Maldives has protected silky sharks throughout their EEZ prohibiting the capture, killing or harming of any shark species since 1998. The Chagos Archipelago has a shark no-take zone.	https://www.iccat.int/en/RecsRegs.asp–Recommendation Silky Sharks 2011-08 http://www.wcpfc.int/sharks CITES listing proposal, CoP17 Prop-42: https://cites.org/sites/default/files/eng/cop/17/prop/060216/E-CoP17-Prop-42.pdf. Shinoj and Ramachandran, 2017 Ministry of Environment and Forest (Wildlife Division) F. No.4-36/2013 WL. 21 Aug 2013 Govt. of India. Notification number 110/(RE-2013) 2009-14, dt 6 Feb 2015 and 111/(RE-2013) 2009-14, dt 6 Feb 2015 Maldives Ministry of Fisheries and Agriculture–No. FA-A1/29/98/39, 1998. Maldives Ministry of Fisheries and Agriculture–No. FA-D/29/2009/20, 2009. Maldives Ministry of Fisheries and Agriculture – No. 30-D2/29/2010/32.
How reliable is the information on origin?	High.	
Is information on origin sufficiently detailed for Question 1.2 to be answered? (Apply this answer at end of Question 1.2)		YES

1.2 Was (will) the specimen (be) legally obtained and is export allowed?			
Is the species:	Description/comments		Sources of information
Protected under wildlife legislation, a regional biodiversity Agreement, or (for a CMS[3] Party) listed in CMS Appendix I?	Not protected under India's legislation or a regional agreement. Sharks have to be landed with all fins attached (since 2013). Appendix II of CMS (2014) and CMS MOU Sharks (2016). India has been a CMS Party since 1983. Appendix II of CITES (2017).		http://www.cms.int/en/page/appendix-i-ii-cms http://www.cms.int/en/parties-range-states http://www.cms.int/sharks/en/species https://cites.org/eng/prog/shark/sharks.php#ts
Sourced from illegal fishing activities (e.g. in contravention of finning regulations, or where a TAC[4] is zero or exceeded)?	No.		
Taken from a no-take marine protected area or during a closed season?	No.		
Taken in contravention of RFB recommendations, if any?	Not in the Indian Ocean/IOTC. N.B. WCPFC and ICCAT prohibit silky shark catch.		http://www.wcpfc.int/sharks https://www.iccat.int/en/RecsRegs.asp
Listed as a species whose export is prohibited?	No, except for fins (see below).		
Of concern for any other reason?	Regulation prohibits all export of shark fins.		Govt. of India. Notification number 110/(RE-2013) 2009-14, dt 6 Feb 2015 and 111/(RE-2013) 2009-14, dt 6 Feb 2015.
In view of the above and the final section of the Worksheet for Question 1.1(b), was the specimen legally acquired and can exports be permitted?	YES	GO TO Question 1.3	
Concerns and uncertainties:	Exports can only be permitted for non-fin products.		

[1] Exclusive Economic Zone

[2] Regional Fisheries Body

[3] Convention on Conservation of Migratory Species.

[4] Total Allowable Catch

1.3 What does the available management information tell us?

Part 1. Global-level information

	Description/comments	Sources of information
Reported global catch	This species is caught in both Indian Ocean FAO Areas (51 and 57). Reported catch in 2014 and 2015: 2,894t and 3,204t. Average reported catch 2011–2015: 3,700t. Nine countries declared silky shark catches to IOTC in 2014 (see Appendix 2 reported catches tables and charts). These values are considered a significant underestimate. Silky shark contributed 0.14-6.66% of the annual shark landings in India during 2010-2017 (average 2.6%). It forms 16-30% of the total shark landing along southern coast of India (Chennai and Kochi).	http://www.fao.org/fishery/area/search/en http://www.iotc.org/data/datasets Unpublished data - Demersal Fisheries Division (DFD), ICAR-CMFRI.
Species distribution	Silky sharks are highly migratory and mostly pelagic species distributed from continental slopes to open ocean. They are found throughout the coastal waters of India. The species also ranges to inshore areas, edges of continental shelves, and over deep-water reefs. It demonstrates strong fidelity to seamounts and natural or man-made objects (e.g. FADs- Fish Aggregating Devices) floating at the sea surface associated with schools of tuna.	Compagno, 1984a. Compagno *et al.*, 2005. Raje *et al.*, 2007. Bonfil, 2008. Clarke *et al.*, 2011a. Filmalter *et al.*, 2013.
Known stocks/ populations	Population dynamics and structure are poorly known, although life history parameters seem to vary geographically, perhaps reflecting the existence of distinct stocks for different ocean basins. In the Bay of Bengal, 9.66 % of the longline surveys between 2004-2010 recorded silky sharks. In the Arabian Seas it forms 13% by number of sharks caught in longline surveys, and in the Lakshadweep Sea, 90 % of the total shark caught by experimental longline surveys from 2009 to 2011. Three groups, likely constituting distinct populations are identifiable: a distinct group in the Northwest Atlantic, another in the west and central Pacific, and a third in the eastern Pacific.	Bonfil, 2008. Aires-da-Silva *et al.*, 2014. Varghese *et al.*, 2015a. Kumar *et al.*, 2015. Rigby *et al.*, 2017: http://dx.doi.org/10.2305/IUCN.UK.2017-3.RLTS.T39370A117721799.en
Main catching countries	The main catching countries (reporting catch) are members of IOTC: Eastern IO (Area 51): India, Sri Lanka, Taiwan, China, and Indonesia. Western IO (Area 57): India, Iran I.R; Taiwan, and China.	MRAG, 2012. Murua *et al.*, 2013. IOTC, 2015. Jayathilaka and Maldeniya, 2015.
Main gear types by which the species is taken	Tropical tuna purse seine using fish aggregating devices (FADs – although these are not used by Indian fishers), tuna longline; gillnet, and ring-nets. In India, theses sharks are caught by gillnets and hook and lines, longlines, and low numbers as bycatch in trawlers and other gears.	Amande *et al.*, 2010. MRAG, 2012. Murua *et al.*, 2013. Moazzam and Nawaz, 2014. NMFDC ICAR-CMFRI(unpublished data).

Global conservation status	Current IUCN Status: Globally: Vulnerable (November 2017) Arabian seas and adjacenet waters: Near Threatened (2017) Previous IUCN Status: Globally: Near Threatened (2009)	Rigby *et al.*, 2017: http://dx.doi.org/10.2305/IUCN.UK.2017-3.RLTS.T39370A117721799.en Jabado *et al.,* 2017
Multilateral Environmental Agreements	Silky shark is listed on the Convention on Migratory Species (CMS) Appendix II, and on Annex 1 of the Memorandum of Understanding on the Conservation of Migratory Sharks (since 20 February 2016).	Convention on Migratory Species: http://www.cms.int/en/species http://www.cms.int/sharks/en/mos2

Part 2. Stock/context-specific information		
	Description/comments	Sources of information
Stock assessments	No quantitative stock assessment or fishery indicators of status are currently available for silky shark in the Indian Ocean, therefore the stock status is highly uncertain. An ecological risk assessment (ERA) was conducted for the Indian Ocean by the IOTC Working Party on Ecosystem and Bycatch (WPEB) and the Scientific Committee (SC) in 2012. Silky shark received a high vulnerability ranking (No. 4) in the ERA rank for longline gear because it was estimated as one of the least productive shark species, and with a high susceptibility to longline gear. Silky shark was estimated as the second most vulnerable shark species in the ERA ranking for purse seine gear, due to its low productivity and high susceptibility for purse seine gear. However, there is no Indian tuna purse seine fishery. Stock assessment and stock status indicators conducted elsewhere showed that populations are in decline: The Scientific Committee of the Western Central Pacific Fisheries Commission (WPFC) stock assessment, based on 1995-2009 data, stated that overfishing is occurring and it is highly likely the silky shark stock is overfished. "Current estimates of stock depletion are that the total biomass has been reduced to 30% of theoretical equilibrium virgin biomass" (Rice and Harley, 2013). An update to the silky shark standardised catch-per-unit-effort (CPUE) in the Western Central Pacific Ocean extended the data series to 2014 and reported a decline since 2010; the stock likely maintains their overfished status and an updated stock assessment is warranted (Rice *et al.*, 2015).	IOTC–2012–SC15–INF10 Rev_1. Rice and Harley, 2013. Aires-da-Silva *et al.*, 2013, 2014. Rice *et al.*, 2015. IOTC-2015-SC18-ES21 [E] http://www.iotc.org/documents/status-indian-ocean-silky-shark-fal-carcharhinus-falciformis-0 Lennert-Cody *et al.*, 2016, 2017. Silky shark supporting Information: http://www.iotc.org/science/status-summary-species-tuna-and-tuna-species-under-iotc-mandate-well-other-species-impacted-iotc#sh

	In the eastern Pacific Ocean, a stock assessment has been in process for a couple of years and stock status indicators show the population is in decline, especially in the south.	
Main management bodies	National fisheries management agencies in India: Ministry of Agriculture, the Ministry of Environment, Forest and Climate Change, and the State Department of Fisheries. IOTC: Working Party on Ecosystems and Bycatch; Scientific Committee; Commission. CITES, CMS, BOBLME (Phase 2), CBD, and FAO–IPOA.	
Cooperative management arrangements	In addition to arrangements and support to scientific bodies and expert groups for the implementation of the Common Fisheries Policy (ICES- International Council for Exploration of the Sea, STECF Scientific Technical and Economic Committee for Fisheries, JRC-Joint Research Centre etc.), the European Union supports through voluntary contributions scientific research for sharks and mitigation of bycatch in the RFMOs to which it is Party (e.g. IOTC, WCPFC, IATTC, ICCAT). The Areas Beyond National Jurisdiction Program (ABNJ) aims to improve cooperation between tuna RFMOs. The IOTC and WCPFC are trialling a Bycatch Data Exchange Protocol Template (BDEP) that aims to provide a framework for consistent management of bycatch data within RFMOs. A 2016 IOTC report recommends that this BDEP continue in 2017 for the Indian Ocean (IOTC–2016–WPDCS12–28 Rev_1).	http://www.commonoceans.org/tuna-biodiversity/en/ UNCLOS Annex 1 Highly Migratory species www.un.org/unlcos/annex1 IOTC–2016–WPDCS12–28 Rev_1. http://www.iotc.org/documents/bycatch-data-exchange-protocol-indian-ocean
Non-membership of RFBs	All of the main catching countries (India, Sri Lanka, Taiwan, China, Indonesia, Iran I.R) are Members of IOTC.	MRAG, 2012. Murua *et al.*, 2013. http://www.iotc.org
Nature of harvest	Silky sharks are taken in Indian waters as a secondary (retained) catch in drift gillnet and longline fisheries targeting large pelagics, and to a lesser extent as bycatch by trawlers. Sri Lanka takes large quantities of silky shark as bycatch in artisanal (gillnet) and semi-industrial (longline/gillnet) fisheries. Elsewhere in the Indian Ocean, by other IOTC members, they are taken in industrial fisheries (pelagic longline tuna, swordfish fisheries, and the tuna purse seine fishery). Indirect threats to silky sharks include entanglement in artificial FADs and ghost nets.	NMFDC, ICAR-CMFRI Pers. comm. NARA & DFAR (Sri Lanka) IOTC, 2015.

Fishery types	In India, the majority of silky sharks are caught as secondary catch in longline and drift gillnet fisheries for large pelagics, with a small bycatch by trawlers. By other fleets (non Indian) they are taken in tuna longline and gill net fisheries, and by the tropical tuna purse seine fishery using FADs (with large bycatch of juveniles).	NMFDC. ICAR-CMFRI. Taquet *et al.*, 2007. Amandè *et al.*, 2011. Clarke *et al.*, 2011b. Filmalter *et al.*, 2011 and 2013. MRAG, 2012. IOTC, 2015. Moreno *et al.*, 2016.
Management units	In the Indian Ocean, the main RFMO responsible is IOTC.	http://www.iotc.org
	India manages the silky shark stock within the nation's EEZ through state and national authorities. Marine Fisheries Regulation Acts (MFRA) of States and the National Marine Fisheries Policy. State Fisheries Departments (SFDs), Ministry of Agriculture, Cooperation & Farmers Welfare (MoA), and the Ministry of Environment, Forests and Climate Change (MoEF & CC).	https://www.ccsbt.org https://cof.gujarat.gov.in/contact-us.htm https://fisheries.maharashtra.gov.in/ http://fisheries.goa.gov.in/ http://www.karnataka.gov.in/fisheries/Pages/Home.aspx http://www.fisheries.kerala.gov.in/ http://www.fisheries.tn.gov.in/ https://www.py.gov.in/knowpuducherry/dept_fisheries.html http://apfisheries.gov.in/ http://www.odishafisheries.com/ http://www.wbfisheries.gov.in/wbfisheries/do/Forwordlink?val=32 http://agricoop.nic.in/# http://www.moef.nic.in/ DADF http://dahd.nic.in/about-us/divisions/fisheries
Products in trade	Meat (fresh & dried (mostly)) is utilised domestically for human consumption in India. Extent of international meat trade (if any) is currently unknown. Jaws, teeth, and skin enter international trade. Export of shark fin is currently prohibited. Oil is mixed with the liver oil of other shark species, but thought to be utilised domestically. Silky shark ranks among the three most important sharks in the global shark fin trade, but all international trade (import or export) of shark fins to or from India is prohibited.	Rigby *et al.*, 2017: http://dx.doi.org/10.2305/IUCN.UK.2017-3.RLTS.T39370A117721799.en Govt. of India. Notification number 110/(RE-2013) 2009-14, dt 6 Feb 2015 and 111/(RE-2013) 2009-14, dt 6 Feb 2015. Clarke, 2006b, 2008 and 2015.

Part 3. Data and data sharing		
	Description/comments	Sources of information
Reported national catch(es)	Annual catch: 2010 -197.2 t 2011 -555.4 t 2013 – 1458.4 t 2014 -1443.9 t 2015 – 1975 t 2016 – 3673.9 t 2017 – 1148.7 t	Demersal Fisheries Division (DFD). ICAR-CMFRI, unpublished data.
Are catch and/or trade data available from other States fishing this stock?	Trade data are reported to the FAO and IOTC by some Indian Ocean countries, including Sri Lanka, and other States fishing in the Indian Ocean.	
Reported catches by other States	Access to these data managed by IOTC Secretariat are available: nominal catches, catch and effort, size frequency data.	http://www.iotc.org/data/datasetshttp://www.iotc.org/documents/bycatch-datasets-available-0 (2016)
Catch trends and values	Despite the lack of sufficient data, there is some anecdotal information suggesting that silky shark abundance has declined over recent decades in the Indian Ocean, including from Indian longline research surveys. There is no quantitative stock assessment or basic fishery indicators currently available for silky shark in the Indian EEZ and therefore the stock status is uncertain.	IOTC, 2015. Varghese *et al.*, 2015.
Have RFBs and/or other States fishing this stock been consulted during or contributed data during this process?	No, but Sri Lanka's 2017 NDF has contributed some information. This NDF will be made public in order to enable other range states to make informed decisions for the management of the stock as a whole for the Indian Ocean.	https://cites.org/sites/default/files/eng/prog/shark/docs/Sri%20Lanka%20Silky%20Shark%20NDF%20-%202017%20to%202019.pdf

Section 2. Intrinsic biological and conservation concerns		
2.1 What is the level of intrinsic biological vulnerability of the species?		
Intrinsic biological factors	Level of vulnerability	Indicator/metric
a) Median age at maturity	Low	
	Medium	Age at maturity in Indian waters is 9.6 for males and 10.7 for females (Varghese *et al.*, 2015). The age of sexual maturity varies between region. In the Indian Ocean, it has been estimated to be around 13 years for males and 15 years for females (Hall *et al.*, 2012). This is significantly older than reported for silky sharks in the Pacific Ocean (Oshitani *et al.*, 2003; Joung *et al.*, 2008), Gulf of Mexico (Bonfil *et al.*, 1993) and Atlantic Ocean (Branstetter, 1987).
	High	
	Unknown	
b) Median size at maturity	Low	
	Medium	
	High	Silky shark size at maturity also varies between ocean regions, ranging globally from 180 to 225 cm TL for males, and 200–245 cm TL for females. In the Indian Ocean, size at maturity has been estimated at 217 cm TL for males and 226.5 cm TL for females (Varghese *et al.,* 2015), versus 207.6 cm TL for males and 215.6 cm TL for females (Hall *et al.*, 2012). In Aldabra atoll, a 208.4 cm male was immature while individuals of 239 cm and above were fully mature (Stevens, 1984). A 216.1 cm TL mature virgin female has been observed while individuals of 220.3 and 220.7 cm TL were fully mature and no longer virgin (Branstetter, 1987, Bonfil *et al.*, 1993, Galvan-Tirado *et al.*, 2015, Springer, 1960, Oshitani *et al.*, 2003, Joung *et al.*, 2008, Strasburg, 1958.)
	Unknown	
c) Maximum age/longevity in an unfished population	Low	
	Medium	In the Indian Ocean, while the maximum ages recorded for males and females by Hall *et al.* (2012) were 20 and 19 years, Varghese *et al.* (2015) estimated a maximum age of 27.56 years. In the Gulf of Mexico, the maximum ages were recorded as 20 years for males and 22 years for females (Bonfil *et al.*, 1993), and in the Pacific Ocean, 8 years were recorded for males and 13 years for females (Oshitani *et al.*, 2003).
	High	
	Unknown	
d) Maximum size	Low	
	Medium	L infinity is 277.3 cm TL for males (n=78) in the Indian Ocean (Hall *et al.*, 2012).
	High	309.8 cm TL, pooled for both sexes (Varghese *et al.,* 2015). L infinity is 320.4 cm TL for females (n=90) in the Indian Ocean (Hall *et al.*, 2012). In southern Gulf of Mexico, maximum length is 330 cm (Compagno, 1984).
	Unknown	

e) Natural mortality rate (M)	Low	
	Medium	Pacific: 0.179 (Smith *et al.*, 1998). Atlantic: 017-0.21 (Cortes 2002). Gulf of California: 0.26 (Furlong-Estrada *et al.*, 2014).
	High	
	Unknown	A study is in progress in the Indian Ocean. No information from India.
f) Maximum annual pup production (per mature female)	Low	
	Medium	Two to sixteen pups were recorded from specimens sampled from landings in Indian waters. No information is available on gestation period/periodicity of births. Numbers of pups per litter vary between oceans: from 1 or 2, to a maximum of 10–16 (Branstetter, 1987; Oshitani *et al.*, 2003; Joung *et al.,* 2008), or 2-14 in the eastern Indian Ocean (Hall *et al.*, 2012). Gestation period: 12–24 months, with females reported to give birth once every year, every two years, or sometime in between (Clarke *et al.*, 2015).
	High	
	Unknown	
g) Intrinsic rate of population increase (r)	Low	
	Medium	
	High	Intrinsic population increase is 0.205, based on average 9 pups with age of maturity of females being 10.7 years from Indian waters (ICAR-CMFRI, unpublished data). Rated High (FAO 2016), based on: north Atlantic: 0.078, South Atlantic: 0.042 (Cortés *et al.*, 2015).
	Unknown	
h) Geographic distribution of stock	Low	Widespread and highly migratory.
	Medium	
	High	
	Unknown	
i) Current stock size relative to historic abundance	Low	
	Medium	
	High	
	Unknown	No data available.
j) Behavioural factors	Low	
	Medium	
	High	Neonates and young juveniles up to a few years old live in coastal reef nursery grounds. They are, at this stage, demersal and semi-pelagic and vulnerable to bottom and pelagic longlines. Juveniles then move more offshore, tending to aggregate on floating objects (natural, or man-made FADs); they demonstrate strong fidelity to seamounts and are often associated with schools of tuna (Bonfil, 2008). There is segregation by size: sub-adults are found in offshore nursery areas, adults even further offshore (Compagno, 1984).
		Critical habitats are unknown.
	Unknown	

k) Trophic level	Low	
	Medium	
	High	4.5 Based on diet studies (Froese and Pauly, 2015).
	Unknown	

SUMMARY for Question 2.1			
Intrinsic biological vulnerability of species			
High	Medium	Low	Unknown

Please refer to Appendix 5 for further detail on the life history by region for *C. falciformis.*

- The silky shark is an abundant, oceanic and epipelagic carcharhinid, with a circumglobal distribution in tropical and subtropical waters.
- Its critical habitats are unknown.
- Silky shark reproduction is well understood. Several studies have reported aspects of its reproductive biology, with regional variations in birth period, gestation and size at maturity.
- They are relatively long lived (over 20 years), mature relatively late (6–12 years), and have relativity few offspring (<20 pups every one or two years). These life history characteristics make it vulnerable to overfishing. The very high proportion of juvenile *C. falciformis* with lengths <50 cm TL in current catches places stock sustainability at risk. Therefore, in the Indian Ocean Ecological Risk Assessment, it was estimated as one of the least productive shark species.
- Silky sharks are commonly taken by a range of fisheries in the Indian Ocean. In Sri Lanka, the market demand for sharks is strong and these are often caught in gillnet-longline fisheries.
- There is a concern about the magnitude of the hidden mortality of silky sharks entangled in FADs, considering the large number deployed by the tropical tuna purse seine fisheries.

This conclusion is derived primarily from:Bonfil (2008), Bonfil *et al.* (1993), Branstetter (1987), Clarke *et al.* (2015), Compagno (1984), Cortés (2002), Cortés *et al.* (2015), FAO (2016), Froese and Pauly (2015), Furlong-Estrada *et al.* (2014), Galvan-Tirado *et al.* (2015), Hall *et al.* (2012), Joung *et al.* (2008), Oshitani *et al.* (2003), Smith *et al.* (1998), Springer (1960), Stevens (1984), Strasburg (1958).

2.2 What is the severity and geographic extent of the conservation concern?

Conservation concern factors	Level of severity / scope of concern	Indicator/metric
Conservation or stock assessment status	Low	
	Medium	
	High	Indian Ocean Ecological Risk Assessment: highly vulnerable. This is the dominant species in Indian fisheries, but not exploited by purse seiners setting on FADs in the EEZ, which is considered to be the greatest risk to juveniles of this species. They are captured on longlines.
	Unknown	

Comments: The ecological risk assessment (ERA) for the Indian Ocean (Murua *et al.*, 2012) was 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. Silky shark received a high ERA vulnerability ranking (No. 4) for longline gear because it was estimated as one of the least productive shark species, and highly susceptible to longline gear. It was ranked as the second most vulnerable species to purse seine gear, due to its low productivity and high susceptibility to this gear.

IUCN Red List Status: Globally: Vulnerable (Rigby *et al.*, 2017).		
Population trend	Low	
	Medium	
	High	
	Unknown	Indian Ocean: There are no stock assessment trend data available. The IUCN Red List notes that the status of the stock is highly uncertain in the Indian Ocean.
Comments: The quality of the data reported in official landing statistics is generally poor. Filmalter *et al.* (2013) estimated that 480,000-960,000 silky shark become entangled and die annually in Indian Ocean FADs. While this does not inform a population trend, this high level of mortality is of concern. John and Varghese (2009) reported a decline in silky shark longline CPUE in the Indian EEZ. Anderson and Juaharee (2009) concluded that silky shark abundance in the Maldives was almost certainly less than 50% of what it was 20 years ago, and perhaps as little as 10%. These results are based on qualitative interviews with a limited sample size and only in a small area and therefore cannot be extrapolated to the entire Indian Ocean. Eastern Pacific: Standardised CPUE declined by 32% in the North-Eastern Pacific and 60% in the South-Eastern Pacific from 1994-2015 (Lennert-Cody *et al.* 2016). IATTC Res C-16-06 establishes conservation measures for silky sharks. Western Central Pacific: A stock assessment concluded that fishing mortality has depleted stock biomass by 70% from theoretical virgin stock biomass, and estimated spawning mass declined by 33% from 1995-2009 (Rice and Harley, 2013). The recent CPUE trend is declining (Rice *et al.* 2015). WCPFC CMM 2013-08 prohibits the retention of silky shark. Atlantic: estimates of population decline by 91% from 150-1990 (Baum and Myers 2004). In 2011, ICCAT prohibited the retention of silky sharks caught in ICCAT fisheries.		
Geographic extent/ scope of conservation concern	None	
	Low	
	Medium	
	High	Identified threats that affect the global population of this species.
	Unknown	
Comments: There are large Indian Ocean shark sanctuaries in the Maldives EEZ and around the BIOT/Chagos, which protects this species and mitigate some of the fishing pressures on this ocean's stock. Otherwise there is a high level of threat on the high seas from tuna purse seiners setting on FADs and from industrial longline fisheries targeting tunas and billfishes. Other countries bordering the Indian Ocean have gillnet and longline fisheries that take silky sharks as bycatch.		
SUMMARY for Question 2.2		
Severity and geographic extent of conservation concern		
Assess the overall severity and geographic extent of the conservation concern for this species or stock (tick appropriate box below). Explain how conclusions were reached and the main sources of information used.		
High	Medium	Low	Unknown
Explanation of conclusion and sources of information used:		
This is a low productivity species that is subject to high or very high fishing pressure. Population trends in the other major ocean basins, combined with limited trend data and information on threats from the Indian Ocean, indicate that the status of the Indian Ocean stock is also of concern.The conservation needs of and threats to this species are therefore high in the Indian Ocean.		

Given the importance of this species in various fisheries and the lack of data to evaluate the population trend in the Indian Ocean, silky shark population should be constantly monitored to assure their conservation and management.
This conclusion is derived primarily from: Anderson and Jauharee (2009), Baum and Myers (2004), John and Varghese (2009), Lennert-Cody *et al.* (2016), Murua *et al.* (2013), Rice and Harley (2013), Rice *et al.* (2015).

Section 3. Pressures on species

3.1 What is the severity of trade pressure on the stock of the species concerned?

Factor	Level of severity of trade pressure	Indicator/metric
(a) Magnitude of legal trade	Low	
	Medium	Reported shark catches and landings trends; recorded exports.
	High	
	Unknown	
	Level of confidence:	
	Low / Medium / High	
Reasoning Sharks are of commercial importance in the marine fisheries sector, being landed whole, with fins attached, and utilised fully. They are taken in large quantities for local consumption, and to a lesser extent for the extraction of liver oil (the latter is from dogfish sharks). Cartilage trade is minimal. Jaws and skin may be utilised, but fins are discarded from small sharks used for domestic consumption. There is a prohibition on exports of shark fin. Though pelagic shark catches are incidental or a by-catch of fisheries mainly targeting tuna, sharks are retained, and complete utilisation is practiced in fresh or dry forms. Silky Shark ranks among the three most important sharks in the global shark fin trade, with between half a million and one and a half million Silky Shark traded annually (http://www.iucnredlist.org). References include: BOBLME 2013.		
(b) Magnitude of illegal trade	Low	
	Medium	
	High	
	Unknown	Shark fin exports have been prohibited since 2015. Some shipments to Hong Kong have been reported as originating from India (media reports, letter from WWF India to MoEF & CC, Hong Kong customs data provided by BLOOM). Fins may be hidden in shipments of dried fish products. Sri Lanka has also seized shark fin and sea cucumbers smuggled from India for legal re-export from Sri Lanka (http://www.sundaytimes.lk/180218/news/kalpitiya-police-bust-smuggling-of-sea-cucumbers-shark-fins-282209.html).
	Level of confidence:	
	Low / Medium / High	

Reasoning:

Letter from WWF India to MoEF and CC regarding potential illegal shark fin export- from India to Hong Kong, dated 18th April 2017, reports that from 2015-16, 139,558 kg of dried shark fin with value of Hong Kong dollar 49,562,000/- was exported from India or via other countries to Hong Kong and in January to February 2017, about 1,280 kg of suspected scheduled hammerhead sharks and oceanic white tip sharks were seized in four containers, one being from India, without any relevant permits attached.

Data provided by BLOOM in Hong Kong for the following categories:

· dried shark fin without cartilage/with cartilage,

· frozen shark fin without cartilage/with cartilage or in brine solution

· excluding all canned fin products

shows that:

· in 2014: 85,834 kg was exported,

· in 2015: 80,850 kg was exported,

· and in 2016: 58,708 kg was exported.

These exports, if from India, would have been in violation to the fin export ban. However, this cannot be confirmed in the absence of valid records from India.

3.2 What is the severity of fishing pressure on the stock of the species concerned?

Factor	Level of severity of fishing pressure	Indicator/metric
(a) Fishing mortality (retained catch)	Low	
	Medium	
	High	There is virtually no discard of silky sharks from Indian fisheries; fisheries mortality is therefore ~100%.
	Unknown	
	Level of confidence:	
	Low / Medium / High	

Reasoning:

Despite the lack of data, there is some anecdotal information suggesting that silky shark abundance has declined over recent decades, including from Indian longline research surveys. However, there is no substantive information on species-specific mortality rates – more research is needed. About 1,94,490 vessels are operating in the Indian EEZ, however they do not all engage in shark fishing.

(b) Discard mortality	Low	There are virtually no discards of silky sharks from Indian fisheries.
	Medium	Longline gear: at vessel mortality varies with fisheries, from medium to high.
	High	Purse seine: A large proportion of sharks are dead at retrieval and survival rates of released individuals is low as reported from other countries.
	Unknown	Gillnets: All gillnet shark catch is retained in India and Sri Lanka. The situation in other littoral countries is unknown, but likely similar.
	Level of confidence:	
	Low / Medium / High	

Reasoning:

In India discard mortality is very low because all silky sharks caught are retained. There are concerns about discard mortality by other fleets (other than India) operating in the Indian Ocean and affecting the same stock.

Few studies have established at-vessel mortality rates in longline fisheries. Estimates in the swordfish longline fishery varied from 11% in Pacific and Atlatic (Musyl *et al.*, 2011) to 55.8 and 66.3% (Beerkircher *et al.*, 2002; Coelho *et al.*, 2012).

Three studies (published between 2014 and 2016) examined the mortality of this species associated with tropical purse seine gear. The high estimates of silky shark's at-vessel mortality (59–69%) and overall mortality rates (81–95%) reflect the harsh conditions encountered by sharks during purse seine fishing operations in the western and central Pacific Ocean (Hutchinson *et al.*, 2013; Hutchinson *et al.*, 2015) and in the Indian Ocean (Poisson *et al.*, 2014). At-vessel-mortality recorded for this species in the Eastern Pacific Ocean (Eddy *et al.*, 2016) was lower (59%).

The mortality rates estimated onboard tropical purse seiners appear to be high but it is worth noting that the contribution of the purse seine fishery to total pelagic shark mortality in the Indian Ocean is believed to be extremely small compared to gillnet fisheries (Poisson *et al.*, 2014). Nevertheless, traditional FADS entangling sharks could increase the fishing mortality of the fishery by a factor of 5 to 10 (Filmalter *et al.*, 2013). The post release mortality rates for silky shark were estimated at 15.8% by Hutchinson *et al.* (2015), 52% by Poisson *et al.* (2014) and of 28% by Eddy *et al.* (2016). Despite these differences, the total mortality rate observed in the equatorial eastern Pacific Ocean (EPO) (92%) was comparable to the value obtained in the Indian Ocean (81%) (Poisson *et al.*, 2014) and in the West and Central Pacific Ocean (84%) (Hutchinson *et al.*, 2015).

There is considerable concern within IOTC about the unknown but potentially severe impacts of gillnets on a wide range of bycatch species.

This conclusion is derived primarily from: Beerkircher *et al.* (2002), Coelho *et al.* (2012), Eddy *et al.* (2016), Filmalter *et al.* (2013), Herath (2012), Hutchinson *et al.* (2013), Hutchinson *et al.* (2015), Jayathilaka & Maldeniya (2015), Musyl *et al.* (2011), and Poisson *et al.* (2014).

Factor	Level of severity of fishing pressure	Indicator/metric
(c) Size/age/ sex selectivity	Low	
	Medium	There is no targeted or selective fishing for the species in India, however due to seasonal aggregations there may be occasional catches in high numbers of juveniles/breeding adults.
	High	In the Indian EEZ this species is not exploited by purse seine. However tropical purse seine fisheries in the Indian Ocean are highly selective for certain size-age classes, with juvenile silky shark comprising the largest component of the incidental elasmobranch catch.
	Unknown	
	Level of confidence:	
	Low	Medium / High

Reasoning: Size range for this species along the Indian coast is 55 to 255 cm TL, with a mean length of 70-100 cm TL along the east coast and 140-145.8 cm TL along the west coast (unpublished data, DFD, ICAR-CMFRI), 67 to 275 cm TL (Varghese *et al.*, 2015). Sex ratio – 1:0.3 (Chennai), 1:1.1 (Kochi), (unpublished data, DFD, ICAR-CMFRI), and 1: 0.8 for Arabian sea (Varghese *et al.*, 2015).				
Silky sharks are commonly taken by a range of fisheries at all stages of their life.				
(d) Magnitude of illegal, unreported and unregulated (IUU) fishing	Low			
	Medium			
	High			
	Unknown	Information about this factor is unavailable.		
	Level of confidence:			
	Low		Medium	High
Reasoning: Silky sharks are commonly taken by a range of fisheries. There are some concerns about the volume of sharks possibly extracted when considering the magnitude of the "Not elsewhere included" (nei) sharks provided by IOTC which are: Not elsewhere included (nei) sharks in 2015: 57,032t and average not elsewhere included (nei) sharks from 2013–2015: 49,586 t. See IOTC and FAO data uploaded to backing document folder but not yet incorporated here. NPOA- IUU , India report under preparation				

Section 4. Existing management measures

Preliminary compilation of information on existing management measures		
Existing management measures	Is the measure generic or species-specific?	Description/comments/sources of information
(Sub)-National		
Fins-attached policy	Generic	In August 2013, the Ministry of Environment and Forests (Wildlife Division) approved a policy advisory by ICAR-CMFRI on shark finning (vide F. No4-36/2013WL, 21 August 2013), prohibiting the removal of shark fins on board a vessel in the sea, and advocating landing of the whole shark.
Ban on shark fin export – Department of Commerce of Ministry of Commerce and Industry	Generic	The Union Ministry of Commerce and Industry prohibited the export of fins of all species of shark, by way of a notification on February 6 2015 (Notification No. 110 (RE-2013)/2009-2014) inserting a new entry in 'Chapter 3 of Schedule 2 of ITC (HS) Classification of Export and Import Items.' The new entry (31 A) resulted in the ban on export of all shark fins.
Seasonal ban on mechanized fishing	Generic	Closure of mechanized fishing activities for 60 days from 15th April to 15th June along east coast and 1st June to 31st July along west coast (both days inclusive), implemented through State MFRAs.
No take zones	Generic	There are 33 Marine Protected Areas where fishing activities are regulated (Singh, 2003).

Gear-specific regulations	Generic	Regulation of mesh size, restrictions on operation of certain gears like ring seines, purse seines and pair trawling, implemented through State MFRAs. http://indianfisheries.icsf.net/en/page/827-Indian%20Legal%20Instruments.html http://old.icsf.net/icsf2006/uploads/resources/legalIndia/pdf/english/state/1112187832409***Gujarat_Marine_Fisheries_Rules_2003.PDF http://old.icsf.net/icsf2006/uploads/resources/legalIndia/pdf/english/state/1112240177836***Maharashtra_Marine_Fishing_Regulation_Rules,_1982.PDF http://164.100.150.120/mpeda/pdf/state_mfras/mfra_goa.pdf http://164.100.150.120/mpeda/pdf/state_mfras/mfra_karnataka_1987.pdf http://164.100.150.120/mpeda/pdf/state_mfras/mfra_kerala.pdf http://164.100.150.120/mpeda/pdf/state_mfras/mfra_tamil_nadu.pdf http://old.icsf.net/icsf2006/uploads/resources/legalIndia/pdf/english/state/1165227972133***Andra_Pradesh_Marine_Fishing_Regulation_Rules_1995_Amendment_dated_26th_October_2004.PDF http://164.100.150.120/mpeda/pdf/state_mfras/mfra_orrissa.pdf http://old.icsf.net/icsf2006/uploads/resources/legalIndia/pdf/english/state/1112241236819***West_bengal_Marine_Fishing_Regulation_(Amendment)_Rules,_1998.PDF
Existing management measures	Is the measure generic or species- specific?	Description/comments/sources of information
Regional/International		
IOTC Resolution 15/01 on the recording of catch and effort data by fishing vessels in the IOTC area of competence	Generic	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.
IOTC Resolution 11/04 on a regional observer scheme	Generic	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.
IOTC Resolution 15/02 mandatory statistical reporting requirements for Contracting Parties and Cooperating Non-Contracting Parties (CPCs)	Species-specific	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).

IOTC Resolution 05/05 concerning the conservation of sharks caught in association with fisheries. Superceded by IOTC Res 17/05.	Species-specific and generic	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.
IOTC Resolution 17/05 on the conservation of sharks caught in association with fisheries managed by IOTC.	Generic	Para. 2. Full utilisation of shark catches, with the exception of prohibited species. Para. 3. Prohibits the removal of fins on board vessels and the landing or carrying of fins that are not naturally attached before the point of first landing. Para. 6. CPCs shall report data for catches of sharks, in accordance with IOTC data reporting procedures. Para. 11. CPCs shall undertake research to make fishing gear more selective, look into prohibiting wire leaders, improve knowledge on biological data of sharks, mating/pupping areas and improve handling practices.
IOTC resolution 17/08. FADs management plan	Generic	No measures adopted in India (no tuna purse seine FAD fisheries).
CMS	Species-specific	Listing of silky sharks on Appendix II of CMS in 2014.
CITES	Species-specific	Listing of silky sharks on Appendix II of CITES in 2016.

4.1: Are existing management measures appropriately designed and implemented to mitigate pressures affecting the stock?				
Factor	Existing management measure(s)	Relevant monitoring, control and surveillance (MCS) measure(s)	Overall assessment of compliance regime	
Trade Pressure				
(a) Magnitude of legal trade	In 2015, India introduced a ban on the export of all shark fins. All other product trade is legal.	Exports must be declared. Customs inspections of a random selection of containers is undertaken at point of export. Wildlife Crime Control Bureau is responsible for regulation/monitoring of wildlife trade.	Unknown (no information on compliance)	✓
			Poor (limited relevant compliance measures in place)	
			Moderate (some relevant compliance measures in place)	
			Good (comprehensive relevant compliance measures in place)	
	Reasoning/comments: No information from other states fishing in the Indian Ocean. The market demand for both sharks and rays is strong (MRAG, 2012).			
(b) Magnitude of illegal trade		There have been some seizures in Sri Lanka and Hong Kong of smuggled shark fins from India. Hong Kong Customs records imports by country, including from India.	Unknown (no information on compliance)	✓
			Poor (limited relevant compliance measures in place)	
			Moderate (some relevant compliance measures in place)	
			Good (comprehensive relevant compliance measures in place)	
	Reasoning/comments: Letter from WWF India to MoEF and CC regarding potential illegal shark fin export- from India to Hong Kong, dated 18th April 2017- reports that from 2015-16, 139,558 kg of dried shark fin with a value of Hong Kong dollar 49,562,000/- was exported from India or via other countries to Hong Kong, and in Jan-Feb 2017about 1,280 kg of suspected scheduled hammerhead sharks and oceanic white tip sharks were seized in four containers, one being from India without any relevant permits attached. Hong Kong Customs trade data for imports from India, 1998-2016, peaked at over 430,000 kg in 2000 and then fell to <100,000 kg in 2007, recovered slightly for a few years and declined again to below 100,000 kg in 2012. By 2015, imports from India were 80,850 kg, and fell after the export ban to 58,700 kg (HK Customs data provided by Bloom).			
Fishing Pressure				

(a) Fishing mortality (retained catch)	Closed seasons for all mechanised fisheries. Minimum legal size of capture.	Average reported catch increased from 376 t (2010-11) to 2,266t (2015-17), indicating high fishing mortality in recent years (unpublished data CMFRI). No on-board observer programme. Port monitoring takes place. Logbooks are not maintained properly. Nor are they shared with all management authorities.	Unknown (no information on compliance) Poor (limited relevant compliance measures in place) Moderate (some relevant compliance measures in place) Good (comprehensive relevant compliance measures in place)	✓
	Reasoning/comments: IOTC compliance continues to be improved.			
(b) Discard mortality	No known discards from fisheries in India	Not applicable.	Unknown (no information on compliance) Poor (limited relevant compliance measures in place) Moderate (some relevant compliance measures in place) Good (comprehensive relevant compliance measures in place)	✓
	Reasoning/comments: It is assumed that all dead sharks caught, except prohibited species, are retained on-board.			
(c) Size/age/ sex selectivity	Minimum Legal Size recommended	Monitoring in some maritime states along Indian coast.	Unknown (no information on compliance) Poor (limited relevant compliance measures in place) Moderate (some relevant compliance measures in place) Good (comprehensive relevant compliance measures in place)	✓
	Reasoning/comments: NA.			
(d) Magnitude of IUU fishing	IUU fishing POA in preparation for Indian waters.		Unknown (no information on compliance) Poor (limited relevant compliance measures in place) Moderate (some relevant compliance measures in place) Good (comprehensive relevant compliance measures in place)	✓
	Reasoning/comments: Issues of IUU fishing by IOTC's IUU provisions (IOTC-2016-CoC13-CR27 Rev1). .			

4.2: Are existing management measures effective/likely to be effective in mitigating pressures affecting the stock/population?			
Factor	Existing management measure(s)	Are relevant data collected and analysed to inform management decisions? (e.g. landings, effort, fisheries independent data)	Is management consistent with expert advice?
Trade Pressure			
(a) Magnitude of legal trade	Regulations in place and complied with. (Notification No. 110 (RE-2013)/2009-2014)	No data OR data are of poor quality OR data are not analysed (adequately) to inform management	No expert advice on management identified
		Limited relevant data are collected AND analysed to inform management	Not consistent
		Some relevant data are collected AND analysed to inform management	Expert advice partially implemented
		Comprehensive data collected AND analysed to inform management	Consistent
	Management measure(s) effective/likely to be effective? Yes Partially No Insufficient information		
	Reasoning/comments: Only generic declaration of export is done in India.		
(b) Magnitude of illegal trade	In general trade is monitored in different levels and actions taken according to national laws by Central Board of Excise and Customs and the Wildlife Crime Control Bureau.	No data OR data are of poor quality OR data are not analysed (adequately) to inform management	No expert advice on management identified
		Limited relevant data are collected AND analysed to inform management	Not consistent
		Some relevant data are collected AND analysed to inform management	Expert advice partially implemented
		Comprehensive data collected AND analysed to inform management	Consistent
	Management measure(s) effective/likely to be effective? (circle as appropriate) Yes Partially No Insufficient information		
	Reasoning/comments: Hong Kong Customs import data indicate that fin imports from India have declined but not ceased since the fin export prohibition. WWF has described seizure of shark fin exported illegally from India in 2017 without permits.		

Factor	Existing management measure(s)	Are relevant data collected and analysed to inform management decisions? (e.g. landings, effort, fisheries independent data)	Is management consistent with expert advice?
Fishing Pressure			
(a) Fishing mortality (retained catch)	Closed seasons for all mechanised fisheries. Minimum legal size of capture. IOTC resolutions.	No data OR data are of poor quality OR data are not analysed (adequately) to inform management	No expert advice on management identified
		Limited relevant data are collected AND analysed to inform management	Not consistent
		Some relevant data are collected AND analysed to inform management	Expert advice partially implemented
		Comprehensive data collected AND analysed to inform management	Consistent
	Management measure(s) effective/likely to be effective? (circle as appropriate) Yes Partially No Insufficient information		
	Reasoning/comments: Monitoring activities are described in the previous section. There is limited management expert advice provided by IOTC.		
Factor	Existing management measure(s)	Are relevant data collected and analysed to inform management decisions? (e.g. landings, effort, fisheries independent data)	Is management consistent with expert advice?
Fishing Pressure			
(b) Discard mortality	No tuna FADs used in Indian waters; no shark discards from Indian fisheries and therefore no management measures.	No data OR data are of poor quality OR data are not analysed (adequately) to inform management	No expert advice on management
		Limited relevant data are collected AND analysed to inform management	Not consistent
		Some relevant data are collected AND analysed to inform management	Expert advice partially implemented
		Comprehensive data collected AND analysed to inform management	Consistent
	Management measure(s) effective/likely to be effective? (circle as appropriate) Yes Partially No Insufficient information N/A		
	Reasoning/comments: The trawl discard composition study from India does not report this species in discard along the coast (Dineshbabu *et al.*, 2013, Lobo *et al.*, 2010). All shark bycatch in other fisheries is fully utilised. There are no management measures for discards of sharks, because this is not applicable.		

Factor	Existing management measure(s)	Are relevant data collected and analysed to inform management decisions? (e.g. landings, effort, fisheries independent data)	
Fishing Pressure			
(c) Size/age/ sex selectivity	No measures adopted in India (no size specific targeted shark fisheries). Procedures proposed in FADs management plan, IOTC resolution 17/08.	No data OR data are of poor quality OR data are not analysed (adequately) to inform management	No expert advice on management identified
		Limited relevant data are collected AND analysed to inform management	Not consistent
		Some relevant data are collected AND analysed to inform management	Expert advice partially implemented
		Comprehensive data collected AND analysed to inform management	Consistent
	Management measure(s) effective/likely to be effective? (circle as appropriate) Yes Partially No Insufficient information		
	Reasoning/comments: NA.		
		No data OR data are of poor quality OR data are not analysed (adequately) to inform management	No expert advice on management identified
(d) Magnitude of IUU fishing	NA. No target shark fishing; no specific regulation of bycatch shark fisheries; limited monitoring of IUU fishing.	Limited relevant data are collected AND analysed to inform management	Not consistent
		Some relevant data are collected AND analysed to inform management	Expert advice partially implemented
		Comprehensive data collected AND analysed to inform management	Consistent
	Management measure(s) effective/likely to be effective? (circle as appropriate) Yes Partially No Insufficient information		
	Reasoning/comments: NA.		

Section 5. Non-Detriment Finding

Step 2: Intrinsic biological vulnerability and conservation concern

Intrinsic biological vulnerability (Question 2.1)	High	Medium	Low	Unknown
Conservation concern (Question 2.2)	High	Medium	Low	Unknown

Step 3: Pressures on species			Step 4: Existing management measures
Pressure	Level of severity (Questions 3.1 and 3.2)	Level of confidence (Questions 3.1 and 3.2)	Are the management measures effective* at addressing the concerns/pressures/impacts identified? (Question 4.2) *taking into account the evaluation of management appropriateness and implementation under Question 4.1
Trade pressures			
(a) Magnitude of legal trade	High	High	Yes
	Medium	Medium	Partially
	Low	Low	No
	Unknown		Insufficient information
			Not applicable**
(b) Magnitude of illegal trade	High	High	Yes
	Medium	Medium	Partially
	Low	Low	No
	Unknown		Insufficient information
			Not applicable**
Fishing pressures			
(a) Fishing mortality (retained catch)	High	High	Yes
	Medium	Medium	Partially
	Low	Low	No
	Unknown		Insufficient information, Not applicable**
(b) Discard mortality	High	High	Yes
	Medium	Medium	Partially
	Low	Low	No
	Unknown		Insufficient information
			Not applicable**
(c) Size/age/sex selectivity of fishing	High	High	Yes
	Medium	Medium	Partially
	Low	Low	No
	Unknown		Insufficient information
			Not applicable**

(d) Magnitude of IUU fishing	High	High	Yes
	Medium	Medium	Partially
	Low	Low	No
	Unknown		Insufficient information
			Not applicable**

**Only to be used where the fishing pressure severity was assessed as "Low" for any of the Factors in Step 3 and a judgement is made that the impacts on the shark stock/population concerned are so low that mitigation is not required.

A) Can a positive NDF be made?	YES - go to B
B) Are there any mandatory conditions to the positive NDF?	YES - list under Reasoning/comments below and go to C
C) Are there any other further recommendations?	YES - go to Step 6

Reasoning/comments:

This silky shark (Carcharhinus falciformis) NDF for India is "positive with conditions" to enable (non-fin commodity) trade to continue in this newly-listed species while improvements are made to existing fisheries and trade management and monitoring frameworks, and while additional research activities and management measures are adopted as outlined in Section 6.

This NDF will be re-evaluated after 3 years, to gauge progress against the recommendations in Section 6 and update it with newly acquired data, before agreeing to a new NDF for 2023-2026.

Section 6. Further measures

6.1: Improvement in monitoring or information is required

Monitoring and data recommendations for Silky Shark in the Indian Ocean

Recommendation	Potential leads
Fishery-independent population monitoring and research Tag and release: Develop and submit a proposal to an external funding agency to assess distribution, movement and post release mortality of silky sharks using electronic tags.	ICAR-CMFRI, possibly in collaboration with other national research institutes and regional bodies IOTC, BOBP-IGO.
Distribution and Abundance: Undertake resource-specific exploratory surveys Identify spatial and seasonal silky shark breeding and nursery aggregations	ICAR-CMFRI in collaboration with the Fishery Survey of India

Fishery-dependent monitoring and research: Fishery monitoring: Improve the existing species-specific landing observation programme, through training and capacity-building of field staff. Look into establishing an informal communication group (e.g. WhatsApp/Google) of shark identification experts (both local and international), to help field staff to identify sharks and/or shark products with a camera photo at short notice. Build upon the developing programme for introducing vessel monitoring systems. Investigate options for introducing mandatory logbook reporting on species-wise landings by fishers. Use interviews with fishers to obtain enquiry-based information on shark (by)catch, particularly where access to logbooks is difficult; develop databases for records of species, catch, date and area of capture (geolocation), and gear types. Ensure that species-specific data provided to the Ministry of Agriculture and Farmers' Welfare are passed on to the FAO. Identifying area & season breeding and nursery aggregations of the species, using a participatory approach with fishers. Research: Undertake biological and stock assessment studies, utilizing data on sex ratios, size/age structure, annual reproductive output, BRPs, and fishing effort collected at landing sites by CMFRI fisheries officers	ICAR-CMFRI, NGOs ICAR-CMFRI State Fisheries Depts ICAR-CMFRI, State Fisheries Departments ICAR-CMFRI DADF ICAR-CMFRI ICAR-CMFRI, Universities, IOTC Sci Comm & Working Parties
Monitoring of domestic and international trade: Improve the level of trade data reporting – data declaration by traders (species, source of obtaining the product, size of fish (length & weight), quantity, product form). Provide international trade data, as relevant, to CITES, FAO, IOTC. Undertake market survey, interviews with fishermen & traders, collate information from Customs & other databases, and from trade channels Report on the study on the value chain for shark products and the socio-economic status of fishers and other stakeholders. Recommend to the Marine Products Export Development Authority (Ministry of Commerce and Industry) that species-specific codes be added to the current generic product-specific codes for trade records; offer to collaborate with them to develop codes. Promoting the use of genetic analysis by CMFRI for ambiguous products in trade and raise awareness with relevant government departments that this service exists.	ICAR-CMFRI in collaboration with State Fisheries Departments and stakeholders (fishers and traders) ICAR-CMFRI ICAR-CMFRI ICAR-CMFRI and MPEDA ICAR-CMFRI

6.2: Improvement in management is required

Management recommendations for Silky Shark in the Indian Ocean	
Recommendation	Potential leads
Strict implementation of each state's Marine Fishery Regulation Act (MFRA) regarding gear, mesh size, operation in no-take zones and closed seasons	State Fishery Department, Coastguard, Marine Enforcement Police
Strengthen Monitoring, Control and Surveillance (MCS)	State Fisheries Departments Coastguard and Marine Enforcement Police

Improve participatory management and inter-departmental coordination through fishery management councils, as developed under the FAO CCRF	National and State Fishery Management Councils
Create awareness through visual, print and electronic media and mass campaigns	ICAR-CMFRI, NETFISH-MPEDA, NGOs
Seasonal closure of fishing in identified breeding/nursery grounds	States, through MFRAs
Improved surveillance to check for IUU fishing by foreign vessels, and develop protocol for identifying species on board	Indian Navy and Coastguard
Continue to monitor and where necessary improve compliance with existing fisheries management regulations (national, regional and international), including: ● IOTC Resolution 17/05 on the Conservation of sharks caught in association with fisheries managed by IOTC, including reporting requirements ● IOTC Resolution 17-08 on Fish Aggregating Devices, including the adoption of non-entangling Fish Aggregating Devices (FADs) (to reduce silky shark bycatch)	Department of Animal Husbandry, Dairying and Fisheries (DADF)
Develop and implement the NPOA-Sharks for India, based on the guidance document, with a special focus on plans for shark species listed in CITES and CMS, encourage and take part in regional initiatives to develop a regional shark plan.	ICAR-CMFRI
Support shark conservation efforts and proposals through IOTC, including: ● Resolution 17/05 On the Conservation of sharks caught in association with fisheries managed by IOTC; ● Resolution 17/07 On the Prohibition to use large-scale driftnets in the IOTC Area; ● Resolution 17/08 Procedures on a fish aggregating devices (FADs) management plan, including a limitation on the number of FADs, more detailed specifications of catch reporting from FAD sets, and the development of improved FAD designs to reduce the incidence of entanglement of non-target species ● Resolution 13/06 On a scientific and management framework on the conservation of shark species caught in association with IOTC managed fisheries	Ministry of Fisheries, Animal Husbandry and Dairying ICAR-CMFRI
Urge Ministry of Commerce and Industry to introduce HS codes for all shark products to collect improved data on imports and exports.	MPEDA
Develop a fisher awareness program aimed to: ● improve identification of juvenile and pregnant sharks and techniques to maximize live release ● improve logbook data recording. ● provide an overview and increase awareness of shark biology, global status, and management measures in place both locally and internationally.	ICAR-CMFRI
Increase awareness for shark processors, traders, and exporters regarding the fin export ban, and CITES requirements for the export of other products derived from CITES listed shark species (this includes export permits accompanied by the Legal Acquisition Finding and Non-Detriment Findings).	ICAR-CMFRI & NGOs
Sign the CMS Sharks MoU to access additional support for the management of shark bycatch.	MoEF & CC (Ministry of Environment, Forest and Climate Change)

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Appendix 1. Reported catches of silky shark in the Indian Ocean

Reported catches of Silky Shark in Western Indian Ocean (WIO) and Eastern Indian Ocean (EIO) by fleet in a) 2015 and b) 2016 (source: IOTC Nominal Catch data base)

2015

Fleet	Area IOTC	Type of Fishery	Gear	Catch/ Capture (t)
TAIWAN, CHINA	WIO	Industrial Fishing	Fresh Longline	176
NEI.FRESH	WIO	Industrial Fishing	Fresh Longline	9
IRAN ISLAMIC REP.	WIO	Artisanal Fishing	Gillnet	1567
TAIWAN, CHINA	WIO	Industrial Fishing	Longline	229
NEI. FROZEN	WIO	Industrial Fishing	Longline	17
COMOROS	WIO	Artisanal Fishing	Troll Line	0
MADAGASCAR	WIO	Artisanal Fishing	Troll Line	112
TAIWAN, CHINA	EIO	Industrial Fishing	Fresh Longline	40
INDONESIA	EIO	Industrial Fishing	Fresh Longline	292
NEI.FRESH	EIO	Industrial Fishing	Fresh Longline	2
SRI LANKA	EIO	Industrial Fishing	Fresh Longline	2
SRI LANKA	EIO	Artisanal Fishing	Longline	306
SRI LANKA	EIO	Artisanal Fishing	Gill net	124
SRI LANKA	EIO	Artisanal Fishing	Ring net	46
SRI LANKA	EIO	Artisanal Fishing	Troll	2
TAIWAN, CHINA	EIO	Industrial Fishing	Longline	2
INDONESIA	EIO	Industrial Fishing	Longline	6

2016

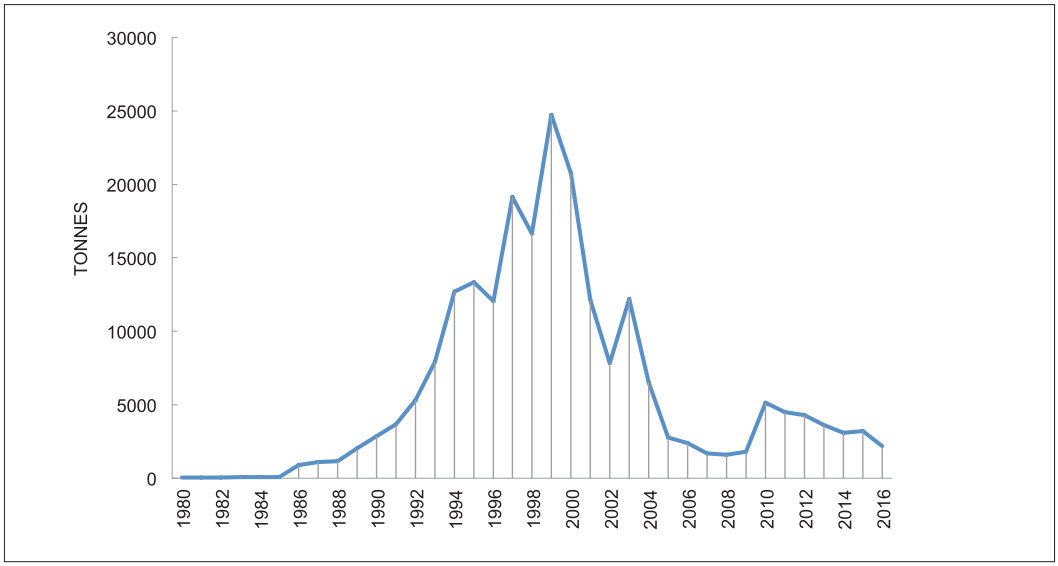
Fleet	Area IOTC	Type of Fishery	Gear	Catch/ Capture (t)
TAIWAN, CHINA	WIO	Industrial Fishing	Fresh Longline	202
NEI.FRESH	WIO	Industrial Fishing	Fresh Longline	9
IRAN ISLAMIC REP.	WIO	Artisanal Fishing	Gillnet	523
TAIWAN, CHINA	WIO	Industrial Fishing	Longline	305

NEI. FROZEN	WIO	Industrial Fishing	Longline	28
COMOROS	WIO	Artisanal Fishing	Troll Line	1
MADAGASCAR	WIO	Artisanal Fishing	Troll Line	112
TAIWAN, CHINA	EIO	Industrial Fishing	Fresh Longline	56
INDONESIA	EIO	Industrial Fishing	Fresh Longline	292
NEI.FRESH	EIO	Industrial Fishing	Fresh Longline	2
SRI LANKA	EIO	Industrial Fishing	Fresh Longline	8
SRI LANKA	EIO	Artisanal Fishing	Longline	116
SRI LANKA	EIO	Artisanal Fishing	Gill net	198
SRI LANKA	EIO	Artisanal Fishing	Ring net	18
SRI LANKA	EIO	Artisanal Fishing	Troll	67
TAIWAN, CHINA	EIO	Industrial Fishing	Longline	5
INDONESIA	EIO	Industrial Fishing	Longline	6

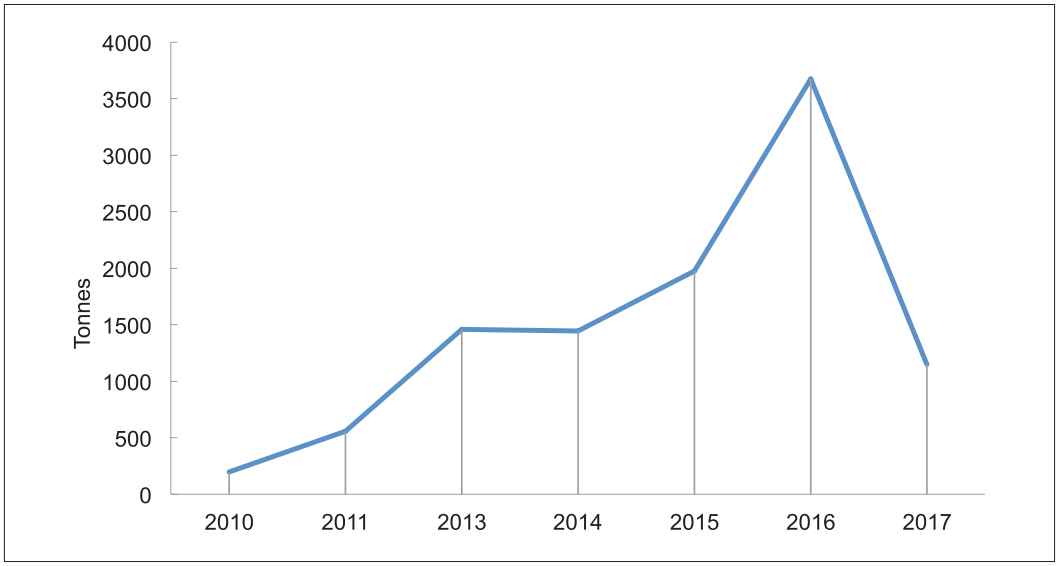
Average of reported catches of Silky shark by fleet 2011-2016(source: IOTC Nominal Catch data base)

Fleet	2011	2012	2013	2014	2015	2016	Average
EU.UK	1	1	0	0	0	0	1
EU.PORTUGAL	5	7	0	0	0	0	6
INDONESIA	42	73	79	206	298	298	166
IRAN ISLAMIC REP.	0	2560	1865	1293	1567	523	1561.6
SRI LANKA	4025	1138	1247	1122	753	647	1488.7
MADAGASCAR	112	112	112	112	112	112	112
MOZAMBIQUE	5	5	0	0	0	0	5
NEI.FRESH	0	0	0	7	11	11	9.7
NEI.FROZEN	37	50	32	16	18	28	30.17
TAIWAN, CHINA	262	336	291	321	447	568	370.83
TANZANIA	6	6	1	1	0	0	3.5
COMOROS				1	1	0	1

Catch (t) of Silky shark in the Indian Ocean, 1980-2016. (IOTC bycatch data 2017)



Appendix 2. Landings of Silky sharks in India from 2010 to 2017(Source: DFD, CMFRI, unpublished)



Appendix 3. Life history characteristic noted by region for *C. falciformis*

Ocean	Area	Median age at maturity (Years)	Maturity TL (cm)	Maximum age (years)	Maximum TL (cm)	Litter size	Gestation period (months)	References
Indian Ocean	Eastern IO	M:13 F:15	M:207.6 F:215.6	M:20 F:19	M:277.3 F:320.4	2-14		(Hall *et al.*, 2012)
	Southeastern Africa		M:240 F:248-260					(Bass *et al.*, 1973)
	Aldabra Atoll		M:239 F:216					(Stevens, 1984b)
	Eastern Arabian sea (India)	M:9.6 F:10.7	M:217 F:226.5	27.56	309.8	3-13		Varghese *et al.*, 2015
	Indian water		M: 187-217 F213-230		330	2-16		CMFRI unpublished
Atlantic	Gulf of Mexico		M:225 F:232-245	M:20 F:22	314			(Bonfilet *et al.*, 1993)
	Unspecified		M: 220 F: 250					(Cadenat and Blache, 1981)
	Northwest Gulf of Mexico	M: 6–7 F: 7–9	M: 210–220 F:>225			2-12	12	(Branstetter, 1987)
	Equatorial		M: 210- 230 F: 230			4-15		(Hazin *et al.*, 2007)
	Equatorial		M: 180-200 F: 205-210			7-25		(Lana, 2012)
	Florida coast		M: 218 F: 234		307			(Springer, 1960)
	Gulf of Guinea		F: 238		300			(Bane, 1966)
Pacific	Western central		M: 210-214 F: 202-218					(Bonfil, 2008)
	Baja California		M: 182 F: 180			2-9	11-12	(Hoyos-Padilla *et al.*, 2011)
	Baja California	7-8 (both)						(Sanchez-de Ita *et al.*, 2011)
	Northeastern Taiwan	M: 9.3 F: 9.2-10.2	M:212.5 F: 210-220			8-10		(Joung *et al.*, 2008)

	Unspecified	M: 5-6 F:6-7	M: 180-187 F: 193-200	M:8 F:13	245	1-16		(Oshitani *et al.*, 2003)
	Eastern Australia		M: 214 F: 202-208					(Stevens, 1984a)
	Northern Australia		M: 210 F: 215		243			(Stevens and McLoughlin, 1991)
	Central Pacific		F: 202-208					(Strasburg, 1958)

Appendix4. Status of the Indian Ocean Silky shark (IOTC)(FAL:*Carcharhinus falciformis*). IOTC 2017.

Executive Summary: Silky Shark

Status of the Indian Ocean silky shark (FAL: *Carcharhinus falciformis*)

Indian Ocean Tuna Commission
Commission des Thons de l'Oce'an Indien

iotc ctoi

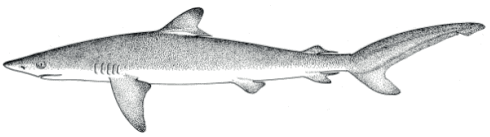


TABLE 1.Silky shark: Status of silky shark (*Carcharhinus falciformis*) in the Indian Ocean.

Area1	Indicators		2017stock status determination
Indian Ocean	Reported catch 2016: Not elsewhere included (nei) sharks2 2016: Average reported catch 2012-16: Av. not elsewhere included (nei) sharks22012-16:	2,189t 54,495t 3,278t 49,152 t	
	MSY (1,000 t) (80% CI): FMSY (80% CI): SBMSY (1,000 t) (80% CI): F2014/FMSY (80% CI): SB2014/SBMSY (80% CI): SB2014/SB0 (80% CI):	unknown	

1Boundaries for the Indian Ocean = IOTC area of competence

2Includes all other shark catches reported to the IOTC Secretariat, which may contain this species (i.e., SHK: sharks various nei; RSK: requiem sharks nei).

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.Silky shark: IUCN threat status of silky shark (*Carcharhinus falciformis*) in the Indian Ocean.

Common name	Scientific name	IUCN threat status[3]		
		Global status	WIO	EIO
Silky shark	*Carcharhinus falciformis*	Near Threatened	Near Threatened	Near Threatened

IUCN = International Union for Conservation of Nature; WIO = Western Indian Ocean; EIO = Eastern Indian Ocean

3The process of the threat assessment from IUCN is independent from the IOTC and is presented for information purpose only

Sources: IUCN 2007, 2012

Appendix 5. Indian Ocean stock – Management Advice (IOTC)

Stock status. There remains considerable uncertainty about the relationship between abundance and the nominal CPUE series from the main longline fleets, and about the total catches over the past decade (Table 1). 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. Silky shark received a high vulnerability ranking (No. 4) in the ERA rank for longline gear because it was estimated to be one of the least productive shark species, and with a high susceptibility to longline gear. Silky shark was estimated to be the second most vulnerable shark species in the ERA ranking for purse seine gear, due to its low productivity and high susceptibility to purse seine gear. The current IUCN threat status of 'Near Threatened' applies to silky shark in the western and eastern Indian Ocean and globally (Table 2). There is a paucity of information available on this species but several studies have been carried out for this species in the recent years. Silky sharks are commonly taken by a range of fisheries in the Indian Ocean. Because of their life history characteristics – they are relatively long lived (over 20 years), mature relatively late (at 6–12 years), and have relativity few offspring (<20 pups every two years), the silky shark can be vulnerable to overfishing. Despite the lack of data, there is some anecdotal information suggesting that silky shark abundance has declined over recent decades, including from Indian longline research surveys, which are described in the IOTC Supporting Information for silky shark sharks. There is no quantitative stock assessment or basic fishery indicators currently available for silky shark in the Indian Ocean therefore the stock status is uncertain.

Outlook. Maintaining or increasing effort can probably result in declines in biomass, productivity and CPUE. 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 silky shark will decline in these areas in the near future and may result in localised depletion.

Management advice. A precautionary approach to the management of silky 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 also be noted:
Maximum Sustainable Yield (MSY): Unknown.
Reference points: Not applicable.
Main fishing gear (2012-16): Gillnet; gillnet-longline; longline (fresh); longline-gillnet.
Main fleets (2012-16): Sri Lanka; I.R. Iran; Taiwan, China.

Appendix 6. Silky Shark Supporting Information (IOTC)

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

CONSERVATION AND MANAGEMENT MEASURES

Silky 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 sharks silky sharks must be recorded by longline and purse seine fleets (retained and discarded).

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.

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 utilization of sharks and includes a ratio of fin-to-body weight for shark fins retained onboard a vessel.

National Measures

Silky shark in India are currently subject to a number of Conservation and Management Measures:

In August 2013, the Ministry of Environment and Forests (Wildlife Division) approved a policy advisory by ICAR-CMFRI on Shark Finning (vide F. No4-36/2013WL, 21 August 2013), prohibiting the removal of shark fins on board a vessel in the sea, and advocating landing of the whole shark.

The Union Ministry of Commerce and Industry prohibited the export of fins of all species of shark, by way of a notification on February 6 2015 (Notification No. 110 (RE-2013)/2009-2014) inserting a new entry in 'Chapter 3 of Schedule 2 of ITC (HS) Classification of Export and Import Items.' The new entry (31 A) resulted in the ban on export of all shark fins.

Closure of mechanized fishing activities for 60 days from 15th April to 15th June along east coast and 1st June to 31st July along west coast (both days inclusive), implemented through State MFRAs.

Regulation of mesh size, restrictions on operation of certain gears like ring seines, purse seines and pair trawling, implemented through State MFRAs.

FISHERIES INDICATORS

Silky sharks: *Carcharhinus falciformis* are one of the most abundant large sharks inhabiting warm tropical and subtropical waters throughout the world (Fig. 1). TABLE 1 outlines some of the key life history traits of silky shark in the Indian Ocean.

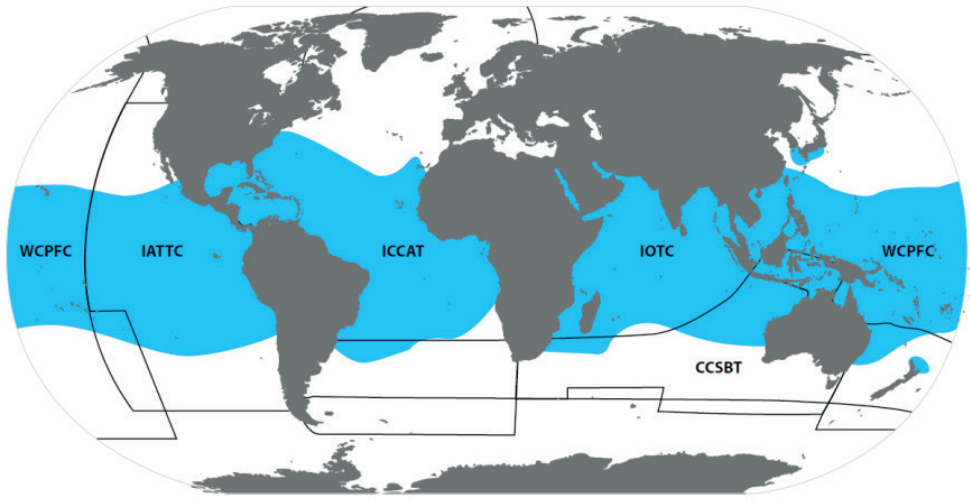


Fig. 1. The worldwide distribution of the silky shark (source: CITES listing proposal, 2016).

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, bycatches 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 utilize their entire catches of sharks. Full utilization 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

TABLE 1. Silky shark: Biology of Indian Ocean silky sharks (*Carcharhinus falciformis*)

Parameter	Description
Range and stock structure	Essentially pelagic, the silky shark is distributed from slopes to the open ocean. It is found throughout the coastal waters of India. It also ranges to inshore areas and near the edges of continental shelves and over deepwaterreefs. It is reported to exhibit strong fidelity to seamounts and natural or manmade objects (like FADs) floating at the sea surface. Silky sharks live down to 500 m. Typically, smaller individuals are found in coastal waters. Small silky sharks are also commonly associated with schools of tuna, particularly under floating objects. Large silky sharks associate with free-swimming tuna schools. Silky sharks often form mixed-sex schools containing similar sized individuals. Area of overlap with IOTC management area = high. No information is available on stock structure.

Longevity	20+ years for males; 22+ years for females in the southern Gulf of Mexico and maximum size can reach 350 cm long. In the Pacific area it was estimated to be around 25 years. Generation time was estimated to be between 11 and 16 years in the Gulf of Mexico years. From Eastern Arabian sea (Indian EEZ), it was 27.56 years.
Maturity (50%)	The age of sexual maturity is variable. In the Indian Ocean it has been estimated to be around 15 years for females and 13 years for males. In the Atlantic Ocean, off Mexico, silky sharks mature at 10–12+ years. By contrast in the Pacific Ocean, males mature at around 5-6 years and females mature at around 6–7 years. Size: 215 cm TL for females; 207 cm TL for males in the Eastern Indian Ocean. 239 cm TL for males; 216 cm TL for females in Aldabra atoll. In South Africa: 240cm TL for males and 248-260cm TL for females. In the Indian EEZ, males attain maturity at the length of 187-217 cm whereas females attain at 213-230cm TL. The age at maturity for males and females are 9.66 and 10.73 years respectively.
Reproduction	The silky shark is a placental viviparous species with a gestation period of around 12 months. Females give birth possibly every two years. The number of pups per litter ranges from 9-14 in the Eastern Indian Ocean, and 2–11 in the Pacific Ocean. Fecundity: medium (<20 pups) Generation time: 11–16 years Gestation period: 12 months Reproductive cycle is biennial The number of pups per litter ranges from 2-16 in the Indian EEZ.
Size (length and weight)	Maximum size is around 350 cm long FL. New-born pups are around 75–80 cm TL or less at birth. Reported as 56–63 cm TL in the Maldives. 78–87 cm TL in South Africa. Length–weight relationship for both sexes combined in the Indian Ocean is TW=0.160*10-4 * FL2.91497. The maximum reported size from Indian EEZ is 330 cm TL and recorded size at birth is 65.1 to 87 cm TL.

Sources: Strasburg 1958, Bass *et al.* 1973, Stevens, 1984, Anderson & Ahmed, 1993, Compagno & Niem 1998, Smith *et al.,* 1998, Mejuto *et al.,* 2005, Hall *et al.,* 2012, Varghese *et al.,* 2015, DFD,CMFRI unpublished data.

Silky sharks: Fisheries

Silky sharks are often targeted by some semi-industrial, artisanal and recreational fisheries and are a bycatch of industrial fisheries (pelagic longline tuna and swordfish fisheries and purse seine fishery) (TABLE 2). In India, the majority of silky sharks are caught as secondary catch in longline and drift gillnet fisheries for large pelagic, with a small bycatch by trawlers. Size range in fisheries for the species 67 to 275 cm TL is recorded from the south west coast of India (Varghese *et al.,* 2015). Discard of silky shark in Indian waters is negligible as whatever caught is retained.

There is little information on the fisheries prior to the early 1970s, and some countries do not collect shark data while others 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 elasmobranches, but the statistics are limited by the lack of species-specific data and data from the major fleets.

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

TABLE 2. Silky shark: Estimated frequency of occurrence and bycatch mortality in the Indian Ocean pelagic fisheries.

Gears	PS	LL		BB/TROL/HAND	GILL	UNCL
		SWO	TUNA			
Frequency	Common	Abundant		Common	Abundant	Abundant
Fishing mortality	Study in progress	Study in progress	Study in progress	Unknown	Unknown	Unknown
Post release mortality	81%(85%brailed individuals,18% meshed individuals).	Unknown	Unknown	Unknown	Unknown	Unknown

Sources: Romanov 2002, 2008, Ariz et al., 2006, Peterson et al., 2008, Romanov et al., 2008, Poisson 2014

Silky sharks catch trends: The nominal catches for silky shark reported to the IOTC Secretariat are highly uncertain as is their utility in terms of minimum catch estimates (TABLE 3). For CPCs reporting longline data by species, between 0 and 2% of the catch of sharks were silky sharks. For CPCs reporting gillnet data by species, I.R. Iran and Sri Lanka, 23% and 11% of the catches of shark were silky sharks respectively.

TABLE 3. Silky shark: Catch estimates for silky shark in the Indian Ocean for 2014 to 2016

Catch		2014	2015	2016
Most recent catch (reported)	Silky shark	3080 t	3207 t	2189 t
	nei-sharks	41095 t	54357 t	53502 t

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 2016, seven countries reported catches of silky sharks in the IOTC region.

A recent project estimated possible silky shark catches for fleets/countries based on the ratio of shark catch over target species by metier (Murua *et al.,* 2013). This estimation was based on nominal catches of target species from the IOTC database under the assumption that target catches are declared correctly. The study highlighted that the catch data on oceanic whitetip sharks in the IOTC database may be a considerable underestimate (i.e. total estimated catches were approximately 10 times higher than that declared in the IOTC database). Another study estimated that the number of silky sharks entangled in the nets beneath FADs is much higher than previously thought, ranging between 480,000 and 960,000 individuals per year, assuming a presence of between 3,750 and 7,500 active FADs (Filmater *et al.,* 2013). The authors also acknowledged that solutions

exist to mitigate the problem through the exclusion of meshed materials in the subsurface structure of the FAD, as is currently being implemented by the European purse seine. FAD management plans must be submitted to the IOTC and guidelines are set out in IOTC Resolution 15/08 Procedures on a fish aggregating devices (FADs) management plan, including a limitation on the number of FADs, more detailed specifications of catch reporting from FAD sets, and the development of improved FAD designs to reduce the incidence of entanglement of non-target species.

Silky shark contributed 0.14-6.66% of the annual shark landings in India during 2010-2017 (average 2.6%). It forms 16-30% of the total shark landing along southern coast of India (Chennai and Kochi) (DFD, CMFRI, unpublished data).

Silky sharks: Nominal and standardised CPUE trends

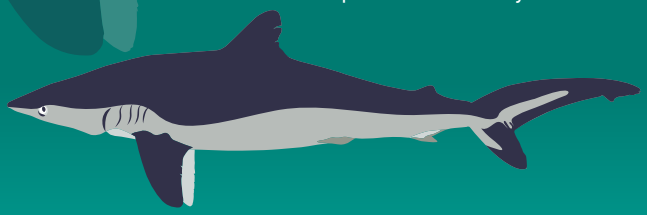
Data not available at the IOTC Secretariat. However, Maldivian shark fishermen have reported significant declines in silky shark abundance (Anderson, 2009). In addition, Indian longline research surveys, in which silky sharks contributed 7% of catch, demonstrate declining nominal catch rates over the period 1984–2006 (John & Varghese, 2009). No long-term data for purse-seine CPUE are available; however, there is anecdotal evidence of a five-fold decrease in silky shark catches per set between 1980s and 2005.

STOCK ASSESSMENT

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

India Non-Detriment Finding for
Silky Shark
Carcharhinus falciformis
in the Indian Ocean | 2019 to 2022

The silky shark *Carcharhinus falciformis* is an oceanic and coastal-pelagic shark with a circumglobal distribution in tropical waters. It contributes significantly to India's shark landings particularly along the southern coast. It was included in Appendix II of the Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES) at the 17th Meeting of the Conference of the Parties (CoP17, Johannesburg) in 2016. The findings and suggestions presented in this Non-Detriment Finding (NDF) document will be a foundation to evolve and implement measures to manage the fishery of silky shark in Indian waters while allowing for international trade from/to the country, within the permits of existing national legislations on trade in shark commodities. This NDF, for the period 2019-2022, is "positive with conditions" and will be re-evaluated and updated after three years.



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ISSN 2394-8019