Proposal of the Kingdom of the Netherlands for listing of two shark species on the Annexes of the SPAW Protocol

Executive Summary

The Kingdom of the Netherlands is proposing to list the largetooth sawfish on Annex II and the silky shark on Annex III of the SPAW Protocol.

We feel the listing of these two species is justified for the following reasons:

Largetooth sawfish (*Pristris pristis*)

The shark specialist group of the IUCN has classed the sawfish family as the most endangered elasmobranch group. Their long lifespan and slow reproduction coupled with a high change of capture in coastal fisheries makes them extremely vulnerable and at risk of extinction. In 2017 the small tooth sawfish was listed under the SPAW protocol Annex II, we now propose to add the other Caribbean species, the large tooth, as well. The justification is similar to the small tooth with the added reasoning that it is still found in several Caribbean countries but critically endangered in all of them.

Silky shark (*Carcharhinus falciformis*)

In 2017 the silky shark was added to CITES appendix II as a species for which international trade needs to be regulated and better fisheries management is warranted. The species occurs regularly in Caribbean water, recently a population of sub-adult silky sharks was discovered on the Saba Bank, and is (by)caught in pelagic and off shore fisheries. There is active international trade in the species as it is of great value to the fin market (it is one of 3 most common species in the fin trade) but there is only limited knowledge of stock structure and migration pattern. A listing on Annex 3 of the SPAW protocol would help in aligning national management of the species with international obligations under CITES and ICCAT.

Proposal for listing of Largetooth sawfish on Annex II of the SPAW Protocol

Largetooth Sawfish (Pristis pristis)

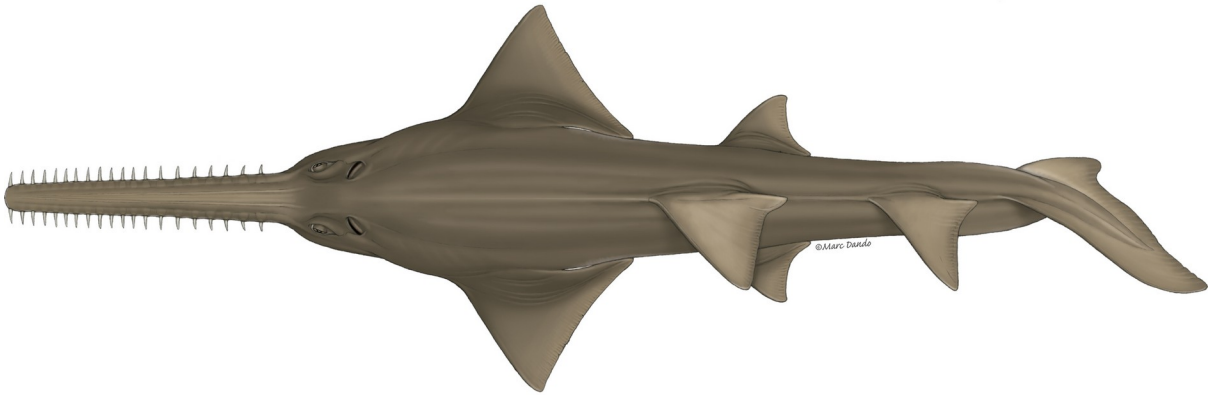

Illustration: Marc Dando

Summary

As one of the worlds most threatened fish species with a historic distribution in the Caribbean the Largetooth Sawfish qualifies for listing on the SPAW Protocol Annex 2 on the basis of the following criteria:

- criterion 1; the species shows a dramatic decline, both the globally and in the Western Atlantic, the species range has been dramatically restricted and populations have fragmented. The life history of the species marked by slow growth and late maturation makes it vulnerable to overexploitation and difficult for the species to recover. Essential habitat for the species is scarce
- criterion 3; sawfish rostra (the saw) are still highly prized in the curio trade and there is a market for its fins, meat and liver (for oil). Existing protective measures have not been sufficient in preventing the further depletion of the species.
- criterion 4; the species has been assessed as critically endangered by the IUCN
- criterion 5; it is listed on CITES on Appendix I and
- criterion 6; it is listed on CMS annex I and II as well as subject to other conservation and management protocols and legislation relevant to the region.

The Largetooth Sawfish (*Pristis pristis*) is a large ray species (6.5+ m total length) associated with shallow coastal areas, mangroves and estuaries. Juveniles occur in freshwater systems and adults in marine and estuarine environments (although in Lake Nicaragua, individuals spend much, if not all, of their lives in freshwater). All subpopulations of the species have undergone significant population declines and the species is now apparently extirpated

from large areas of its former range in the Western Atlantic due to unsustainable fishing pressure and habitat destruction.

Sawfish are highly sought after for the curio trade in their distinctive rostrum, their large fins are valuable for shark fin soup in Asia and in the past their meat has been actively traded. Their slow growth rate and the late maturation makes all sawfish vulnerable to over exploitation. In the case largetooth sawfish the overlap of their habitat with heavily fished areas makes them exceptionally vulnerable to extinction.

The IUCN Shark Specialist Group has placed all sawfishes at the top of the list of most threatened elasmobranch families and the large tooth sawfish has bene assessed as critically endangered in the latest red list assessment. Worldwide measures are being taken to prevent further depletion and help the species to recover. The species has been listed on CITES appendix I since 2007, on annex I & II of CMS since 2014, it has national protection status in the US, Belize, Brazil, Nicaragua (freshwater only) and the European Union. A SPAW listing would add to the overall protection of the species as it would provide cross border protection in an area that has formerly been of key importance to the species and encompasses some of the last know populations.

Species information

Scientific and common names of the species

1.1 Class: Chondrichthyes, subclass Elasmobranchii

1.2 Order: Rajiformes

1.3 Family: Pristidae

1.4 Species: *Pristis pristis* (Linnaeus, 1758)

A recent taxonomic review has shown that *P. perotteti* (Atlantic) and *P. microdon* (Indo-West Pacific) are synonymous with *P. pristis* (Faria *et al*. (2013)

1.5 Scientific synonyms: *Pristis microdon* (Latham, 1794); *Pristis perotteti* (Valenciennes in Müller & Henle, 1841); *Pristis zephyreus* (Jordan & Starks, 1895); *Squalus pristis* (Linnaeus, 1758)

1.6 Common names:

English: Largetooth sawfish
Synonyms: Common Sawfish, Wide Sawfish, Freshwater sawfish, River sawfish
Spanish: Pez sierra común, Pez Sierra, Pejepeine, Pejesierra
French: Poisson-scie commune, Scie commune

Justification

Criterion 1:

Is the listing of the species warranted by (a) the size of the population, evidence of decline, restrictions on its range of distribution, degree of population fragmentation, (b) biology and behavior of the species, as well as other aspects of population dynamics, or (c) other conditions clearly increasing the vulnerability of the species?

a. Estimated population of species and its geographic ranges

The Largetooth Sawfish (*Pristis pristis*) has historically had a widespread distribution throughout the tropical and subtropical marine and estuarine waters. It is one of the ew elasmobranch species that has adapted to living in fresh water for at least part of its life cycle. Historically the species consisted of four subpopulations (Eastern Atlantic, Western Atlantic, Eastern Pacific and Indo-West Pacific). Until recently the Indo pacific and Atlantic populations were thought to be separate species, but a recent taxonomic review has shown that these al belong to one species (*P. pristis*). The species has in the past been recorded from several countries in the Wider Caribbean region from Uruguay through the Caribbean and Central America, the Gulf of Mexico, and seasonally to the United States. Actively commercial fisheries on some populations, bycatch in other Estimates are that it has since suffered a population reduction of ≥80% over a period of three generations (i.e., 1960s to present) and that it is now extirpated for most of its range. Recent records from the Caribbean are extremely rare. A status review from 2010 by NOAA found that the Amazon estuary appears to have the highest remaining abundance of *P. pristis* in the Atlantic, followed by the Colorado–San Juan River system in Nicaragua and Costa Rica other areas which potentially still have Largetooth sawfish are the coastal systems of Guyana, Surinam and French Guyana. A recent study found indirect evidence of Largetooth sawfish in Mexican waters (Bonfils et al, 2017).

b. biology

A productivity-susceptibility analysis by Dulvy *et al*. (2014) shows the five species of the family Pristidae are the most threatened elasmobranchs in the world, as a result of their high exposure to coastal shallow-water fisheries and their sow life history and large body size.

The life history of Largetooth Sawfish, like many elasmobranchs, is characterized by slow growth, late maturity, and low fecundity, which generally contributes to a low intrinsic rate of increase. The maximum reported size of Largetooth Sawfish is 656 cm TL, although it has been estimated up to 700 cm TL (Compagno and Last 1999). Very large individuals are now rarely seen anywhere.

The reproductive method of sawfishes is most likely lecithotrophic viviparity (eggs are hatched inside the mother's ovaries and nourished from the yolk only). The only known reproductive study of Largetooth Sawfish was from Lake Nicaragua in the 1970s (Thorson 1976) with other observations from northern Australia. Thorson (1976) found female fish had two functional ovaries and litter sizes in Lake Nicaragua were 1–13 (mean 7.3) following a gestation period of about five months. While the reproductive cycle is possibly biennial in the Western Atlantic (Thorson 1976), it appears to be annual in northern Australia (Peverell 2008). Peverell (2008) using a preliminary vertebral growth ring analysis estimated a maximum age of 35 years and age at maturity at 8-10 years in northern Australia.

c. other

Pristis pristis is thought to migrate regularly between marine and freshwater habitats. Individuals have been recorded over 1,300 km upstream from the mouth of the Amazon River and in Lake Nicaragua. The duration and extend of migrations patterns are unknown but may be associated with breeding activity and hence seasonal in nature. All sawfish species are extremely susceptible to capture in gillnets and demersal trawl nets due to their large size and the pontetial for the rostrum to get entangled in netting. In addition, the shallow coastal, brackish and freshwater habitats of sawfishes are often associated with high levels of human activity, which may result in degradation or loss of habitat through pollution, prey depletion, and coastal or riverine developments, including mangrove clearance, canal development and construction of seawalls.

Habitat degradation and loss threaten Sawfishes throughout their range (CITES, 2007). The largetooth sawfish relies on a variety of specific habitat types including estuaries and mangroves; these are all affected by human development (CITES, 2007). Agricultural and urban development, commercial activities, dredge-and-fill operations, boating, erosion, and diversions of freshwater runoff as a result of continued coastal and catchment development has caused substantial loss or modification of these habitats (CITES, 2007).

Criterion 3. what are the levels and patterns of use and how successful are national management programs?

The principal threat to the Sawfishes is from target and utilized bycatch fisheries. Their long tooth-studded rostrum (the saw) is prized in the curio trade and the large fins with high number of filaments fetch a high prize in the shark fin market. The meat is utilized for human consumption and the large liver produce liver oil. There have been some targeted Sawfish fisheries: in Lake Nicaragua and possibly in Brazil from 1960s to 1980s (NOAA, 2010). Commercial targeting Sawfish stocks is however no longer economically viable as populations have been severely depleted throughout its range. Sawfish fins occur but are now extremely rare in the Asian dried shark fin trade and may have once had their own trade name given their value (Clarke et.al. 2006b).

The dependence of sawfish of coastal, shallow areas for a mayor part of their life history makes them highly susceptible to interactions with fisheries and the shape of the rostrum makes them extraordinarily vulnerable to entanglement in any sort of net gear. The Nicaraguan government imposed a temporary moratorium on targeted fishing for Sawfishes in Lake Nicaragua in the early 1980s (Thorson, 1982), after the population collapsed following intensive fishing in the 1970s. The aim was to allow the population to recover, but no such recovery has occurred (McDavitt, 2002). It appears that even bycatch mortality is sufficient to prevent population growth.

Sawfish are regularly used for their meat; however, most of the consumption is local and so they appear to be only occasionally traded beyond local markets (NMFS, 2009). The meat is white and tender, particularly in juveniles, and is one of the most valuable and preferred of all elasmobranchs (sharks and rays) sold in the city of Belém, Pará State, Brazil (Charvet-Almeida, 2002) and caught by Guinéan fishers (Doumbouya, 2004). A large individual can yield several hundred kg of valuable meat (Last and Stevens 1994). The rostral saws can be very valuable as curios (particularly those from the largest specimens). In North Brazil (Pará State) Charvet-Almeida (2002) reports that large saws (>1.5 m) were ordered by buyers before fishing starts and may be worth up to US$ 300 to the fisherman, depending upon size. There is a significant market in Chinese Taipei for Sawfish saws that are part of the ceremonial equipment/weapons of spirit mediums (there are an estimated 23,000 of these mediums in Taiwan). The small saws, from newborn and juvenile Sawfish, are sold as curios, or ground up as a local treatment for asthma (in Brazil) or exported for use in traditional Chinese medicine.

As the species is migratory for at least part of its adult life, any national conservation initiative intended to prevent these Critically Endangered species from being driven further towards extinction is unlikely to be successful if Sawfishes are not protected during their seasonal migrations through other range States' waters. This is a particular problem when the population is distributed along a coastline that is divided into a large number of small countries, as is the case in the Central Caribbean.

Criterion 4. Does the evaluation according to IUCN criteria, applied in a Caribbean context, i.e., the status of the population at the regional level, warrant listing of the species?

The Western Atlantic sub-population of largetooth sawfish has been assessed as critically endangered by the IUCN, justification:

"Western Atlantic Largetooth Sawfish (Pristis pristis) were once found from Uruguay to the United States and commonly found from Brazil to Mexico. They have been nearly extirpated primarily by fishing (trawl and inshore netting) throughout their range inferring a population reduction based on a reduction in extent of occurrence (EOO) of ≥80% over a period of three generations (i.e., 1961 to present). Despite protections in Brazil, Nicaragua, Mexico and the United States (it is possibly extinct in the latter two range states), the species is still

subject to threats region-wide from gillnets used in rivers, river mouths, estuaries and nearshore waters, and trawling. Coastal development and the loss of mangroves also contributed to the decline and will slow any potential recovery of the species. Current records indicate that Largetooth Sawfish can only be regularly encountered today in the Amazon River basin, the Rio Colorado-Rio San Juan area in Nicaragua, and possibly some remote areas of French Guiana, Suriname, and Guyana. Declines and continuing threats result in a Critically Endangered assessment for this subpopulation" (Carlson & Smith, 2013)

Criterion 5. Is the species subject to local or international trade, and is the international trade of the species regulated under CITES or other instruments?

CITES listings

All species of sawfish (family Pristidae) have been listed on Appendix I since 2007.

The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) provides a legal framework to monitor and control the international trade in species that are overexploited by such trade; it is one of the most effective agreements in regulating natural resource use (Fowler and Cavanagh 2005).

Animals and plants threatened with extinction may be listed in Appendix I, essentially banning international trade in these species or their parts. Appendix II is reserved for species that could become threatened if trade is not controlled; trade in these species is closely monitored and allowed only after exporting countries provide evidence that such trade is not detrimental to populations of the species in the wild. Currently 183 countries are Party to CITES, including all Caribbean, North American, and Central American countries except for Haiti (CITES 2017a).

See also**:** **www.cites.org**

Criterion 6. How important and useful are regional cooperative efforts for the protection and recovery of the species? [Include strengthening of existing cooperative efforts through global MEAs such as CMS]

Several global, regional and national conservation measures and protective legislation aimed and the protection of largetooth sawfish (and other shark and ray species)

Relevant global management and protection

IPOA Sharks

Widespread concern over the lack of management of shark fisheries and the impact that expanding catches may had on shark populations led to the adoption and endorsement of the Food and Agriculture Organization of the United Nations (FAO) International Plan of Action for the Conservation and Management of Sharks (IPOA–SHARKS) in 1999.

The IPOA-Sharks is a voluntary international instrument, developed within the framework of the 1995 FAO Code of Conduct for Responsible Fisheries, that guides nations in taking positive action on the conservation and management of sharks and their long-term sustainable use. Its aim is to ensure the conservation and management of sharks and their long-term sustainable use, with emphasis on improving species-specific catch and landings data collection, and the monitoring and management of shark fisheries. The code sets out principles and international standards of behavior for responsible fishing practices to enable effective conservation and management of living aquatic organisms while considering impacts on the ecosystem and biodiversity. The IPOA-Sharks recommends that FAO member states 'should adopt a national plan of action for the conservation and management of shark stocks (NPOA-Sharks), if their vessels conduct directed fisheries for sharks or if their vessels regularly catch sharks in non-directed fisheries'. Additionally, the IPOA-Sharks directs that states that implement a NPOA-Sharks should regularly, at least every four years, assess its implementation for the purpose of identifying cost-effective strategies for increasing its effectiveness.'

To assist countries in implementing the IPOA-Sharks the FAO developed a dedicated set of technical guidelines for the conservation and management of sharks. The guidelines provide general advice and a framework for development and implementation of national level shark assessment and management consistent with the IPOA-Sharks, including the preparation of shark assessment reports.

CMS

The Convention on Migratory Species (the full name is the Convention on the Conservation of Migratory Species of Wild Animals) is an environmental treaty under the aegis of the United Nations Environment Programme (UNEP). The CMS provides a global platform for the conservation and sustainable use of migratory animals and their habitats. CMS brings together the States through which migratory animals pass, the Range States, and lays the legal foundation for internationally coordinated conservation measures throughout a migratory range. Caribbean members are: Cuba, Costa Rica, Domincan Republic, Brazil, Panama Honduras and the European Union.

All sawfish species were listed on both appendix I and II of the treaty in 2014, listing on the appendices has the following implications:

CMS Appendix I - include migratory species threatened with extinction. Signatory states are asked to protect these animals, conserve or restore the habitats in which they live, remove obstacles to migration and control other factors that might endanger them. It is prohibited for any Range State to catch these species.

CMS Appendix II - includes migratory species with an unfavorable conservation status or those that would significantly benefit from international co-operation. Range States have to enter into auxiliary agreements with each other to protect these species.

CMS MOU SHARKS

The Memorandum of Understanding (MOU) on the Conservation of Migratory Sharks is the first global instrument for the conservation of migratory species of sharks negotiated under the auspice of CMS. It was first adopted in 2010 and now has 39 signatories supporting is objectives. The MOU is a non-binding international instrument. It aims to achieve and maintain a favorable conservation status for migratory sharks based on the best available scientific information and taking into account the socio-economic value of these species for the people in various countries. Brazil, Colombia, Costa Rica, The Netherlands and the United States are signatories to the MoU.

The objectives of the Conservation Plan are listed in Annex III of the MoU and include:

- Improving the understanding of migratory shark populations through research, monitoring and information exchange
- Ensuring that directed and non-directed fisheries for sharks are sustainable
- Ensuring to the extent practicable the protection of critical habitats and migratory corridors and critical life stages of sharks
- Increasing public awareness of threats to sharks and their habitats, and enhance public participation in conservation activities
- Enhancing national, regional and international cooperation

In pursuing activities described under these objectives, Signatories should endeavor to cooperate through regional fisheries management organizations (RFMOs), the FAO, Regional Seas Conventions (RSCs) and biodiversity-related Multilateral Environmental Agreements (MEAs).

In 2016 the Sharks MoU set up an Advisory committee and a Conservation Working group to assist signatories in the implementation of the MoU. In this role the shark MoU is a facilitating body to assist signatories in implementing measures associated with the CMS listings.

Regional Protection

SICA

The Dominican Republic has, together with Belize and six other Central American countries, united under the name SICA (Central American Integration System), signed an agreement to prohibit shark finning. This ban is also applicable to fishing vessels in international waters under the flag of SICA member states. This arrangement OSP-05-11 entered into force in 1 January 2012.

OSPESCA

The Organization of the Fisheries and Aquaculture Sector of the Central American Isthmus (Organización del Sector Pesquero y Acuícola del Istmo Centroamericano, OSPESCA)

OSPESCA aims at promoting coordinated and sustainable development of fishing and aquaculture, in the framework of the Central American integration process (SICA), defining, approving and implementing policies, strategies, programmes and regional projects on fisheries and aquaculture. This is a legally binding framework and its members are Belize, Costa Rica, Dominican Republic, El Salvador, Guatemala, Honduras, Nicaragua, and Panama.

In 2011 it adopted measures on shark finning and for the management of whale sharks.

- Regional Regulation OSP-05-11 which prohibits the practice of shark finning and establishes regional management measures for the sustainable use of sharks, which contributes to finning eradication.

- Regional Regulation OSP-07-2014 which strengthens the sustainability of the Whale Shark species (Rhincodon typus) by adopting management measures by the SICA Member States.

National Protection

The United States listed *Pristis pristis* on the US Endangered Species Act in 2007, following earlier protection in the State waters of Florida and Louisiana and protection under the USA Atlantic & Gulf Coasts Fishery Management Plan since 1997.

Outside United States waters, Nicaragua imposed a permanent ban on targeted Sawfish fishing in Lake Nicaragua. In Brazil, the largetooth sawfish is protected by the Ministry of Environment and in Mexico, the take of all Sawfishes is banned. The European Union has paced all sawfish species on the prohibited species list of the TAC & Quota regulation of the EU's Common Fisheries Policy. This bans all targeting, retention, transshipping and landing of sawfishes in EU waters and by EU vessels and operators.

Other national measures

Honduras

In June 2011 Honduras created the first shark sanctuary in Central America and declared all its marine waters in both the Pacific and Caribbean as a permanent shark sanctuary. This had been preceded in 2010 by a shark fishing moratorium and created the first shark sanctuary of the Americas amounting to about 240,000 km2 of national waters, most of which lie along the 700 km-long Caribbean coast of the nation.

Bahamas

In July 2011 the Bahamas banned all shark fishing in its EEZ. That law firmly turns all 630,000 sq km of Bahamian waters into a shark sanctuary17. The fines for shark fishing were raised from 3000 to 5000 USD per incident.

Venezuela

Towards implementing its Plan de Acción Nacional (PAN) de conservación for sharks, in June 2012 Venezuela joined the rest of the Americas in outlawing the finning of sharks in its

waters and established a 3,730 km2 shark sanctuary surrounding the touristic archipelago of Los Roques. Recent research (e.g. Tavares 2005, 2008 2009) had demonstrated the importance of the shallow waters of Los Roques as a shark nursery area.

St. Maarten
On the 12th of October 2011 the government of St. Maarten issued a temporary moratorium on shark fishing. The shark fishing moratorium prohibits the take and landing of sharks and requires immediate release of incidentally caught sharks, under penalty of a maximum of 500,000 Antillean Guilders or 3 months in prison.

Bonaire, St. Eustatius and Saba and (Caribbean Netherlands)
In 2015, the Dutch government declared the *Yarari* sanctuary for sharks and marine mammals in the Economic Exclusive Zones of Saba and Bonaire, and that provisions will be considered and implemented as necessary to regulate activities that may have a negative impact on sharks.

Management and recovery plans for the species

In 2014 the IUCN Shark Specialist Group together with its partners published a Global Strategy for the conservation of sawfish (Harrison & Dulvy, 2014). This strategy sets out priority regions for research, fisheries management, and outreach and education programs as well as creates network with an aim to develop a network to develop regional capacity and more focused and tailored regional conservation action. In 2018 the strategy was updated and the Caribbean was described as a particular area of interest for the largetooth sawfish with the SPAW protocol listed as the most relevant regional protective legislation.

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Proposal for listing of silky shark on Annex III of the SPAW Protocol

Silky shark (*Carcharhinus falciformis*)

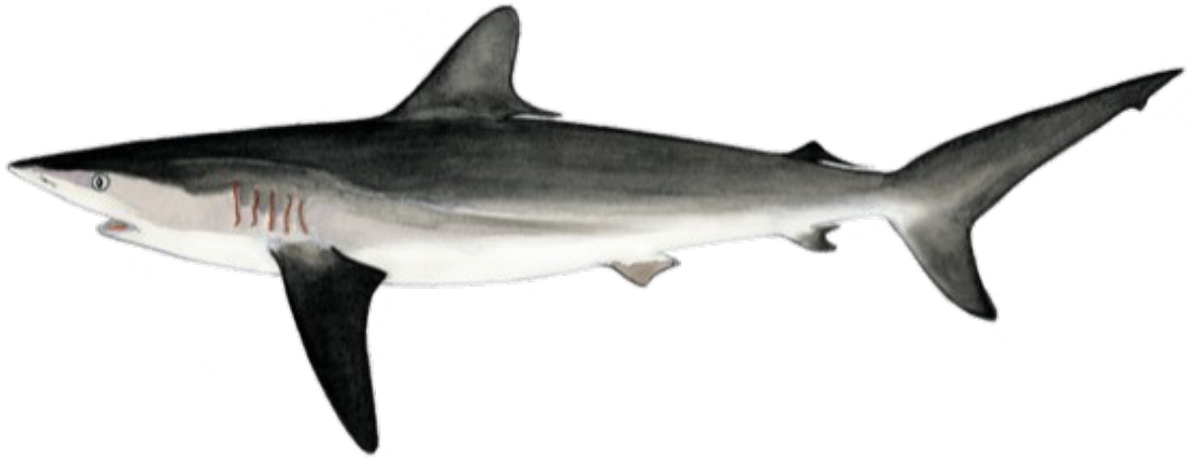

Illustration © FAO

Summary

The silky shark qualifies for listing under Annex 3 of the SPAW protocol based on the following criteria:

- Criterion 1: With estimated declines of 46-98% in the Atlantic, including the Gulf of Mexico and the Caribbean, it has been estimated that fishing mortality in the northwest Atlantic would need to be reduced by ~60%, as a minimum baseline, to ensure the survival of silky sharks. The life history of the species is marked by slow growth and late maturation, which makes it vulnerable to overexploitation.
- Criterion 2: A precautionary approach should be taken due to a limited knowledge of stock structure and migration patterns.
- Criterion 3: The silky shark is a pelagic migratory species that is both targeted and caught as bycatch in the Atlantic in most in offshore pelagic longline fisheries. Also, the species is greatly threatened by international trade, as it is one of the three most traded shark species in the global shark fin trade. Management of silky shark should focus on preventing capture and include small-scale measures such as temporal and spatial fisheries closures as well as large-scale regulations. No such national regulations have are put in place specifically for silky sharks.
- Criterion 4: The species is listed as Vulnerable globally by the IUCN.
- Criterion 5: The silky shark is one of the three most traded shark species in the global shark fin trade, and is listed in Appendix II of CITES since 2017.
- Criterion 6: As the silky shark is a highly migratory pelagic species, there is a need for international cooperation in management of this species. The silky shark is listed on Appendix II of CMS since 2014.

- Criterion 7: The silky shark is a circumglobal species with panmictic populations along the western Atlantic Ocean. However, recent studies suggest there may be a distinctive population structure between the Northwest and Southwest Atlantic.
- Criterion 8: The silky shark *Carcharhinus falciformis* is a species in the *Carcharhinid* family.
- Criterion 9: Declines of silky sharks are found throughout the Atlantic, including the Gulf of Mexico and the Caribbean.

The silky shark is an oceanic and coastal shark found near the edge of continental shelves and out in the open ocean, outside the EEZs of coastal States. Estimated declines of silky shark in the Atlantic, including the Gulf of Mexico and the Caribbean, range from 46-90%. The species is greatly threatened by international trade, as it is one of the three most traded shark species in the global shark fin trade. The need for international cooperation and management of this migratory species is recognized by CMS and CITES, both of which list the silky shark on their appendices.

Whereas most conservation measures in the Caribbean are coastal-oriented, the silky shark is a pelagic migratory species that, in the Atlantic, is targeted and bycaught most in offshore pelagic longline fisheries. A SPAW listing would help ensure cross-border management, which should focus on preventing capture and include small-scale measures such as temporal and spatial closures, as well as regulations on a regional scale.

Species information

a. Scientific and common names of the species;

Taxonomy

1.1 Class: Chondrichthyes, subclass Elasmobranchii

1.2 Order: Carcharhiniformes

1.3 Family: Carcharhinidae

1.4 Species: *Carcharhinus falciformis* (Müller & Henle, 1839)

1.5 Scientific synonyms: *Carcharias falcipinnis* (Lowe, 1839), *Aprionodon sitankaiensis* (Herre, 1931), *Carcharinus floridanus* (Bigelow, Schroeder & Springer, 1943), *Eulamania malpeloensis* (Fowler, 1944), *Carcharhinus atrodorsus* (Deng, Xiong & Zhan, 1981)

1.6 Common names:

English: Silky shark, blackspot shark, grey whaler shark, olive shark, reef shark, ridgeback shark

Spanish: Requin, soyeux

French: Tiburon jaqueton, tollo mantequero

b. Estimated population of species and its geographic ranges;

There is almost no information about the stock structure of silky sharks. Nevertheless, on the basis of variations in life-history parameters in different parts of the world, it appears that there are several distinct populations in the Northwest Atlantic Ocean, in the Pacific Ocean, and in the Indian Ocean (Bonfil, 2009). Clarke *et al*. (2015) examined silky shark phylogeography and population genetics on a global scale, finding strong phylogeographic partitioning with two highly divergent, matrilineal evolutionary lineages corresponding to the western Atlantic and Indo-Pacific Oceans, but panmitic populations along the western Atlantic Ocean. Having included more samples from both the Northwest and Southwest Atlantic, Domingues *et al.* (2017) found silky shark exhibited high mitochondrial control region genetic diversity, and statically significant population structure between the Northwest and Southwest Atlantic that was not detected in previous studies.

Silky sharks are oceanic and coastal sharks found near the edge of continental shelves and out in the open ocean, outside the EEZs of coastal States. They can be found from shallow waters to depths of 500 meters. Silky sharks are circumglobal in tropical waters. They are found in FAO Areas 21, 31, 34, 37, 41, 47, 51, 57, 61, 71, 77, 81, and 87. In the western Atlantic Ocean, the range of the silky shark extends from Massachusetts to southern Brazil and includes the Gulf of Mexico (GOM) and Caribbean Sea (Compagno, 1984). A recent study by Arocha *et al.* (2017) of the pelagic longline observer programs in the Caribbean Sea between 1994-2015 indicated the overall spatial distribution of the total relative abundance of silky shark to be highly concentrated (>3 sharks/1000 hooks) off the central coast of Venezuela and around the off-shore islands (figure 1), while important catches (1-3 sharks/ 1000 hooks) were common in the area off the northern shelf of South America. Catch rates were low in the central areas of the Caribbean Sea. In the Northwest Atlantic, silky sharks were found to have left the exclusive economic zone of the United States, moved into and out of the Gulf of Mexico, and moved into the Caribbean Sea, with a maximum distance of 723 miles traveled (Kohler *et al*., 1998).

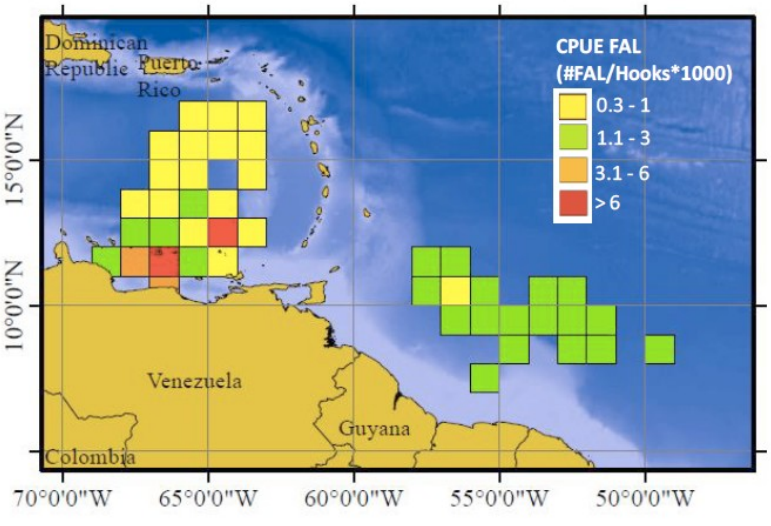

Figure 1: Overall spatial distribution of silky shark (*Carcharhinus falciformis*) nominal catch rates during 1994- 2015, from observed sets (Arocha *et al*., 2017).

There is no stock assessment of the silky shark in the Atlantic Ocean. In the Gulf of

Mexico, silky sharks were historically one of the most commonly caught shark species, but subsequently experienced drastic population declines: in the 1950s, silky sharks were found on 35% of sets and accounted for 24% of all sharks caught in the longline fishery. Catch rates then declined from 1.71 (±3.49 SD) per 1000 hooks in the 1950s to 0.10 (±0.42 SD) per 1000 hooks in the 1990s (Baum and Myers, 2004). The authors estimate this decline in catch rate equates to a 10-fold decline, or 91.2%, in silky shark abundance in 40 years in the Gulf of Mexico. The mean size is also notably smaller than during the 1950s, with silky sharks averaging 97 cm in the 1990s, which is well below the size of maturity of 180 cm for the region (Baum and Myers, 2004).

United States pelagic longline observer and logbook data (1992-2005) that encompasses both the northwest and western central Atlantic regions was used to estimate a decrease of 46 and 50% respectively in silky shark standardized CPUE (Cortés *et al*., 2007). Population reductions of 95% and 98% respectively were estimated over three generations. However, Cortés *et al*. (2007) also reported that relative abundance of silky shark appeared to be increasing in the area since 2000 and advised caution in interpreting the catch trends due to shortcomings in the data and the highly migratory nature of the silky shark that requires a more comprehensive analysis of trends throughout their range. Another analyses of the observer data from this same fishery over 1992-2005 combined catches of dusky shark (*Carcharhinus obscurus*), silky shark, and night shark (*Carcharhinus signatus*), grouped because of identification problems, and reported that the standardized catch rates of this species complex were suspected to have declined by 76% (Baum and Blanchard, 2010). The International Union for the Conservation of Nature (IUCN) categorizes the silky shark as Vulnerable, meaning it is considered to be facing a high risk of extinction in the wild.

c. Status of legal protection, with reference to relevant national legislation or regulation;

The silky Shark is a member of the family *Carcharhinidae*, which is listed on Annex I, Highly Migratory Species, of the UN Convention on the Law of the Sea. They were listed on the Convention on Migratory Species (CMS) under Appendix II in 2014. A Memorandum of Understanding (MOU) was signed by 38 countries in 2010 for migratory sharks, and silky shark was added to the MOU in February 2016. The silky shark was listed in Appendix II of CITES in 2017, due to the threat posed by international trade, as it is one of the three most traded shark species in the global shark fin trade.

IPOA Sharks:
There are since the 1990s several shark protection plans, both internationally at intergovernmental and non- governmental level, as well as at national level by several nations in the Wider Caribbean region. Within the framework of the Code of Conduct for Responsible Fisheries the FAO (Food and Agriculture Organization) developed the

International Plan of Action for the Conservation and Management of Sharks (IPOA Sharks) in 1999. The objective of IPOA Sharks is to ensure the conservation and management of sharks and their long-term sustainable use. IPOA Sharks is voluntary and intends to give states guidelines on how to establish a National Plan of Action (NPOA) through guiding principles and procedures for implementation.

Sharks MoU:
The Memorandum of Understanding on the conservation of migratory sharks (Sharks MoU) of the Convention on the Conservation of Migratory Species of Wild Animals (CMS) is a legally non-binding instrument of the CMS and the first global instrument for the conservation of migratory shark species. The Sharks MoU entered into force on 1 March 2010 with the aim to sustainably manage and protect migratory shark species, in particular the species included in appendices I en II of the CMS. As of November 2013 the Sharks MoU has 27 members, 26 national governments and the European Union.
National legislations in the Caribbean region applying to sharks (as reviewed by Van Beek *et al*., 2014) are as follows:

US Caribbean Region:
NOAA fisheries service presented the amendment 4 to the 2006 Consolidated Atlantic Highly Migratory Species (HMS) Fishery Management Plan (FMP). The PowerPoint states that “in 2010, Puerto Rico reported approximately 11.8 mt of commercial shark landings and less than one megaton was reported by St. Thomas and St. John combined. These landings were not species specific and it is unknown if they were harvested from Federal or Territorial waters”. Proposed management measures for small-scale HMS commercial fisheries include specific authorized gears and retention limits for sharks.

US Gulf of Mexico and (Caribbean) Florida:
Following years of declines in catches, and concern about the protection status of many shark species, in 1993 the USA established a Federal Management Plan for Shark Fisheries in the Atlantic Ocean, particularly directed at the coastal bottom long-line fishery. Since 1993 several amendments of the original plan have been implemented and local state governments have tied in by implementing complementary legislation. Measures included successively restrictive catch quotas, finning limitations, area closures, seasonal closures, adjustments of size limits, limits to retention in recreational fisheries, establishment of protected species lists, establish a shark research fishery and the use of regional and species specific quotas.

Honduras:
In June 2011 Honduras created the first shark sanctuary in America and declared all its marine waters in both the Pacific and Caribbean as a permanent shark sanctuary. This had been preceded in 2010 by a shark fishing moratorium and created the first shark sanctuary

of the Americas amounting to about 240,000 km2 of national waters, most of which lie along the 700 km-long Caribbean coast of the nation.

Bahamas:
The Bahamas have had a longline fishing ban since 1993 and consequently there has been no commercial shark fishing activity. This longline ban has effectively made the whole archipelago of the Bahamas a shark “no-take” zone. The last export of shark from the Bahamas was a lot of 2 metric tons in 2004. In July 2011 the Bahamas went a step further and legally banned all shark fishing. That law firmly turns all 630,000 sq km of Bahamian waters into a shark sanctuary17. The fines for shark fishing were raised from 3000 to 5000 USD per incident.

Venezuela:
Towards implementing its Plan de Acción Nacional (PAN) de conservación for sharks, in June 2012 Venezuela joined the rest of the Americas in outlawing the finning of sharks in its waters and established a 3,730 km2 shark sanctuary surrounding the touristic archipelago of Los Roques. Recent research (e.g. Tavares 2005, 2008 2009) had demonstrated the importance of the shallow waters of Los Roques as a shark nursery area.

The Dominican Republic has, together with Belize and six other Central American countries, united under the name SICA (Central American Integration System), signed an agreement to prohibit shark finning. This ban is also applicable to fishing vessels in international waters under the flag of SICA member states. This arrangement OSP-05-11 entered into force in 1 January 2012.

St. Maarten:
On the 12th of October 2011 the government of St. Maarten issued a temporary moratorium on shark fishing. The shark fishing moratorium prohibits the take and landing of sharks and requires immediate release of incidentally caught sharks, under penalty of a maximum of 500,000 Antillean Guilders or 3 months in prison. This temporary ban was changed to an infinite ban in 2016.

Cayman Islands:
The Cayman Islands declared their intention to establish a Shark Sanctuary in 2016 with a provision under the National Conservation Law.

British Virgin Islands
A designation of a Shark Sanctuary on the British Virgin Islands was done by the cabinet of the British overseas territory prohibiting the commercial fishing of all shark and ray species throughout the full exclusive economic zone. As of May, 2014 the following actions are prohibited within the British Virgin Islands and its waters:

• Intentional fishing for sharks;
• The sale, export, import, or possession of sharks, rays, or shark and ray products, including meat and fins;
• Intentional removal of the fins or tail of a shark;
• Intentional injury of a shark or a ray;
• Intentional feeding of sharks or rays or use of food to attract them.

Bonaire, St. Eustatius and Saba:
In 2015, the Dutch government designated the waters of Saba and Bonaire including the EEZ as the '*Yarari'* sanctuary for sharks and marine mammals, declaring that provisions will be considered and implemented as necessary to regulate activities that may have a negative impact on sharks. In Sep. 2018 St. Eustatius joined this declaration, so the *Yarari* Sanctuary now encompasses all the waters of the Caribbean Netherlands.

d. Ecological interactions with other species and specific habitat requirements

Silky sharks are found in the oceanic and coastal-pelagic habitats of tropical waters, often associated with seamounts, and juveniles with floating objects. Silky sharks often inhabit continental shelves and slopes from the surface to 500 m of depth. Older silky sharks are typically in oceanic waters, but often found more offshore near land than in the open ocean (Baum and Myers, 2004). Silky sharks can be found on reefs that are adjacent to deep water, for example in the Red Sea (Clarke *et al*., 2011). Their foraging occurs more inshore and they will return to the shelf to reproduce. Nurseries are along the outer continental shelf edge, and neonates stay near the reefs until they are large enough to move to the pelagic habitat, possibly the first winter after pupping in the early summer (Beerkircher *et al*., 2002). Around 130 cm in length, silky sharks move to an oceanic habitat where they join schools of pelagic fish, such as tuna. Juveniles are often caught in very large numbers by fishing gear set on floating fish aggregating devices (FADs; as reviewed by Rigby *et al*., 2017).

While silky sharks can be found in warmer tropical waters above 23˚C, they have been found to migrate according to temperature. Silky sharks were found to remain within the uniform temperature surface layer, but those north of 10°N remained significantly deeper and in cooler temperatures than those south of 10°N. It has also been noted that silky sharks have shown sexual segregation. A diel vertical movement pattern was observed with silky sharks spending greater time at depth during the day than at night. Plasticity of vertical habitat utilization was noted with occasional forays to depths in excess of 550 m during both day and night (Rigby *et al*., 2017; Hueter *et al*., 2018).

Silky sharks are a high trophic level predator in ocean ecosystems feeding mainly on teleosts and cephalopods (Compagno, 1984). Cortés (1999) determined the trophic level based on diet for silky shark was 4.2 (maximum = 5.0).

e. Management and recovery plans for the species;

Silky shark retention bans are in place for all vessels operating under ICCAT and WCPFC management. Additionally, any silky shark that is brought on board must be released in the best condition possible and as quickly as possible. All interactions are recorded and the status upon release is recorded (alive or dead). ICCAT has exemptions for developing countries that report the catch of silky shark, that have no increase in catch of silky shark and ensure that it will not enter international trade. IATTC has prohibited retention of silky shark on purse seine vessels, limited longline vessel silky shark bycatch to a maximum of 20% by weight of total catch per fishing trip, and in multi-species fisheries that use surface longlines limited the catch of silky sharks that are less than 100 cm total length to 20% of the total number of silky sharks caught per trip (Rigby *et al*., 2017).

Management of silky shark should focus on preventing capture and include small scale measures such as temporal and spatial closures as well as large scale regulations, however, this management is made difficult by the limited knowledge of stock structure and migration patterns (Rigby *et al*., 2017).

f. Research programs and available scientific and technical publications relevant to the species;

A shark conservation program in Belize called Earthwatch researches whether protected reef areas are effective in helping populations recover. A goal of the project is to better describe the niche of the dominant shark species on the Belize Barrier Reef, including Caribbean reef shark, nurse shark, Caribbean sharpnose, great hammerhead, blacktip shark, lemon shark, silky shark, night shark and tiger sharks. A tag and release program is implemented using hook-and-line shark fishing gear. Tissue samples are collected from tagged sharks and from local fishermen's catches. Associated environmental data like water quality, salinity and pH are collected. Habitats are recorded by means of snorkel surveys and video is used to record abundance and diversity of coral and fish species.

After a first official observation of silky sharks on the Saba Bank in early 2018, scientists associated with the Saba Conservation Foundation have an expedition planned in the Summer of 2018 to tag silky sharks.

American and Cuban Collaboration Tracking Silky Sharks in Cuban Waters
To prepare Cuba's National Plan of Action for Sharks, Cuban scientists have been working together with many international institutions including the U.S.-based Environmental Defense Fund (EDF) and Mote Marine Laboratory. After a 2015 expedition, in which the scientific team tagged three silky sharks in the Jardines de la Reina (Gardens of the Queen) National Marine Park off Cuba's south coast. The shark research conservation work is still ongoing, but did result in a first revealing publication (Hueter *et al*., 2018).

g. Threats to the species, its habitats and associated ecosystems, especially threats which originate outside the jurisdiction of the Party.

The Silky shark is the second most caught species of shark globally, after the Blue Shark (*Prionace glauca*). It is both targeted or caught as incidental (bycatch) by longline fisheries and purse seine fisheries (especially those using drifting fish aggregating devices [FADs]) as well as by artisanal fisheries. FADs are made of a floating object and nets that lie vertical in the water column to attract schools of fish. The silky shark, as well as other species, is also easily entangled in the nets; and there have been large increases in the use of FADs since 1996. In the Atlantic pelagic longline fishery, silky sharks are ranked first in vulnerability to the Atlantic pelagic longline fishery. They are an important part of the Cuban longline fishery, where they are targeted for meat, and are actually one of the five most captured shark species caught (Aguilar *et al*., 2014; Espinosa, 2004). In the shark bottom longline fishery in Gulf of Mexico and Southern Atlantic, silky sharks represent a major by-product species (Enzenauer *et al*., 2015). Whether they are targeted or an incidental catch, the silky shark is often either retained for its meat and fins where regulations allow, or released with high mortality rates apparent in the tropical purse seine fisheries (as reviewed by Rigby *et al*., 2017).

The Silky Shark was found to represent at least 3-4% of the fins auctioned in Hong Kong, the world's largest shark fin trading center—the third highest after blue shark and hammerhead shark (general)—and Hong Kong is thought to make up more than half of the global shark fin trade. Silky shark fins are valuable to the trade, although they are not one of the highest value fin types (S. Clarke, unpubl. data; as reviewed by Rigby *et al*., 2017).

The offshore pelagic and oceanic habitats of most silky shark populations are not currently directly affected by habitat loss and destruction, although climate change and rising sea temperatures may affect this species and their prey. Aggregations of female silky sharks have been found on reefs in the Red Sea; coral reef habitats are at a particularly high risk of degradation from climate change and human activities. The increasing use of FADs is of concern because this leads to the mortality of the very large numbers of juvenile silky sharks associated with floating object habitats.

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