

**CONVENTION ON MIGRATORY
SPECIES**

**MEMORANDUM OF UNDERSTANDING
ON THE CONSERVATION OF
MIGRATORY SHARKS**

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MEMORANDUM OF UNDERSTANDING ON THE
CONSERVATION OF MIGRATORY SHARKS
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**BACKGROUND PAPER ON THE CONSERVATION
STATUS OF MIGRATORY SHARKS¹**

¹ “Shark” means any of the migratory species, subspecies or populations in the Class *Chondrichthyes* (which includes sharks, rays, skates and chimaeras)

Abbreviations

CCAMLR	Commission on the Conservation of Antarctic Marine Living Resources
CCSBT	Commission for the Conservation of Southern Bluefin Tuna
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
CMS	Convention on Migratory Species
COFI	Committee on Fisheries of the FAO
CR	Critically Endangered (in the IUCN Red List of Threatened Species)
DEFRA	Department for Environment, Food and Rural Affairs (UK)
DD	Data Deficient (in the IUCN Red List of Threatened Species)
EEZ	Exclusive Economic Zone (usually extends 200 nautical miles from the coast)
EN	Endangered (in the IUCN Red List of Threatened Species)
FAO	United Nations Food and Agriculture Organization
GFCM	General Fisheries Commission for the Mediterranean
GROMS	Global Register of Migratory Species
HELCOM	Helsinki Commission (governing body for the Helsinki Convention on the Protection of the Marine Environment of the Baltic Sea Area)
IATTC	Inter-American Tropical Tuna Commission
ICCAT	International Commission for the Conservation of Atlantic Tunas (Atlantic)
IOTC	Indian Ocean Tuna Commission
IPOA	International Plan of Action
IUCN	World Conservation Union
LC	Least Concern (in the IUCN Red List of Threatened Species)
MEA	Multi-lateral Environmental Agreement
MoU	Memorandum of Understanding
NAFO	Northwest Atlantic Fisheries Organization
NEAFC	North East Atlantic Fisheries Commission
NPOA	National Plan of Action
NT	Near Threatened (in the IUCN Red List of Threatened Species)
OSPAR	Convention for the protection of the marine environment of the North-East Atlantic
RAC/SPA	Regional Activity Centre for Specially Protected Areas (UNEP, Mediterranean)
RFMO	Regional Fisheries Management Organization
SEAFO	South-east Atlantic Fisheries Organization
SSC	Species Survival Commission (of IUCN—the World Conservation Union)
SSG	Shark Specialist Group
TAC	Total Allowable Catch
UNCLOS	United Nations Convention on the Law of the Sea
UNEP	United Nations Environment Program
UNFSA	United Nations Fish Stock Agreement
VU	Vulnerable (in the IUCN Red List of Threatened Species)
WCPFC	Western and Central Pacific Fisheries Commission

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The contribution of the Shark Specialist Group volunteer network to this study was invaluable. SSG volunteers assisted with the identification of migratory shark species for inclusion in the migratory shark and batoid databases prepared for CMS in 2007. Furthermore, over 300 national, regional and international SSG and many other experts from 64 countries participated in the Global Shark Red List Assessment (GSRLA). The GSRLA evaluated the global Red List status of all species of chondrichthyan fishes (the sharks, batoid fishes and chimaeras) and is a contribution to the IUCN's Global Marine Red List Assessment.

The original SSG migratory sharks project, including the preparation of the databases and presentations to the Scientific Council Meeting in Bonn (March 2007) and the first Migratory Sharks Meeting in the Seychelles (December 2007), was funded by the Department for Environment, Food and Rural Affairs (Defra UK). The CMS Secretariat also supported the publication of the joint IUCN/CMS *Review of Migratory Chondrichthyan Fishes* (Fowler and Valenti 2007). Numerous organisations have funded the Shark Specialist Group's GSRLA, including Defra, Conservation International, the Packard Foundation, the Save our Seas Foundation, Pew Lenfest Program, Marine Conservation Biology Institute, and many other generous donors.

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Summary

The review analyses the migratory and threatened status of the 1,093 species of chondrichthyan fishes (about 60 families of sharks, skates and chimaeras) included in the IUCN Red List online database in June 2012. Seventeen per cent of all species are assessed as threatened (182 species are Vulnerable, Endangered or Critically Endangered), 12% (133 species) as Near Threatened, and only 25% (274 species) as Least Concern – the lowest proportion of ‘not at risk’ species of all vertebrate groups that have been assessed. Forty-six per cent of species are assessed as Data Deficient – 504 species without insufficient information to enable them to be placed in one of the other categories. Considering only data-sufficient species, the actual level of threat across all shark taxa is likely to be over 24%. This is higher than current estimates of threat to all other marine and vertebrate taxa, with the exception of reef-building corals and amphibians.

Ninety-five migratory species are identified, and found to be at an even higher risk; 46% (44 species) are threatened, 21% (20 species) Near Threatened, and only 9% (9 species) are least concern. The risk to the 58 possibly migratory species is slightly lower, with a much higher proportion of Data Deficient species. Of the 940 non-migratory species, only 14% (127 species) are threatened and 28% (259 species) are Least Concern. If only data-sufficient species are considered, then 50% of migratory and potentially migratory species (55 species) are threatened, compared with just 27% (127) of non-migratory species. All species listed as threatened are of unfavourable conservation status because of the impacts of fisheries, target and bycatch, which have reduced their abundance greatly below historic levels.

The eight species listed in the CMS Appendices represent fewer than 15% of the 55 threatened species of migratory and possibly migratory sharks identified by this study, or 15% of the sharks listed in Annex I, Highly Migratory Species, of the UN Convention on the Law of the Sea (UNCLOS). Only ‘Vulnerable’ species have been protected through CMS. There are no Endangered or Critically Endangered migratory species listed in the Appendices and no species from the seven shark families that have been identified as being at greatest risk (including sawfishes and thresher sharks) have been listed.

The highest levels of threatened species are in tropical coastal shelf seas, particularly along the Atlantic and West Pacific shelves and in the Indo-Pacific biodiversity triangle; these areas also contain a large number of migratory species. Furthermore, over 50% of migratory oceanic pelagic sharks, taken in high seas fisheries, are threatened. Management for these species, whether target or bycatch, cannot be undertaken solely by coastal States, even in partnership; it also relies upon action by Regional Fisheries Management Organizations. The study reviews actions by RFMOs and coastal States for the conservation and management of migratory sharks, including implementation of the FAO IPOA–Sharks. The earliest species listed by CMS appear to benefit from a greater number of national conservation initiatives than do other species, including those listed in Annex I to UNCLOS. Very few are protected or managed effectively in any significant part of their total global range. No species-specific conservation or fisheries management measures were identified for almost half of all threatened migratory species.

1 Background

The Appendices of the Convention on the Conservation of Migratory Species currently include eight species of “sharks” (species, subspecies or populations in the Class Chondrichthyes, including sharks, rays, skates and chimaeras). Seven of these are true sharks, and are also listed in Annex I of the Memorandum of Understanding (MOU) on the Conservation of Migratory Sharks². The most recently listed species, the giant manta ray, is a batoid fish and has not yet been proposed for inclusion in Annex I to the MOU (Table 1).

Table 1. Shark species listed in the CMS Appendices and MOU Annex 1

Family	Species	Common name	Appendix I	Appendix II	MOU Annex I
Rhincodontidae	<i>Rhincodon typus</i>	Whale shark	-	1999	✓
Lamnidae	<i>Carcharodon carcharias</i>	White shark	2002	2002	✓
Cetorhinidae	<i>Cetorhinus maximus</i>	Basking shark	2005	2005	✓
Lamnidae	<i>Isurus oxyrinchus</i>	Shortfin mako	-	2008	✓
“	<i>Isurus paucus</i>	Longfin mako	-	2008	✓
“	<i>Lamna nasus</i>	Porbeagle	-	2008	✓
Squalidae	<i>Squalus acanthias</i>	Spiny dogfish *	-	2008	✓
Mobulidae	<i>Manta birostris</i>	Giant manta	2011	2011	×

(* Northern Hemisphere populations only.)

The eight species listed in the CMS Appendices, however, represent only about 5% of the 153 threatened species of migratory and possibly migratory sharks identified by the IUCN Red List Assessment, or 15% of the sharks listed in Annex I, Highly Migratory Species, of the UN Convention on the Law of the Sea. (Not all UNCLOS Annex I shark species are assessed as threatened (Vulnerable, Endangered or Critically Endangered) in the IUCN Red List.) UNCLOS Annex I migratory shark species are listed in the Appendix to this report.

This paper draws upon the latest results of the Global Shark Red List Assessment in order to update the review of migratory sharks undertaken five years ago (Fowler and Valenti 2007). It summarises current knowledge on the number and status of migratory shark species, the extent to which these species are protected or managed under a variety of international and regional biodiversity conservation and fisheries management instruments, and identifies some of the higher priorities for conservation of threatened migratory shark taxa.

² “Shark” means any of the migratory species, subspecies or populations in the Class *Chondrichthyes* (which includes sharks, rays, skates and chimaeras)

2 The status of migratory sharks

2.1 Taxonomic diversity

Class Chondrichthyes, the chondrichthyan or cartilaginous fishes, is comprised of Subclass Elasmobranchii – the sharks and batoid fishes (including skates, stingrays, guitarfishes and sawfishes), and Subclass Holocephalii – the chimaeroid fishes. It is common practice to refer to these species collectively as ‘sharks’. They occur in almost every marine habitat and a few species of elasmobranchs (not chimaeras) are found in some rivers and lakes. The smaller bottom-living species tend not to be strong swimmers and to have a limited range – many are endemic, but some of the larger pelagic species undertake regular, even continuous migrations that may cross ocean basins.

At the present time, Class Chondrichthyes includes about 60 families and 190 genera, but even at this high taxonomic level, these figures are being revised upwards. The number of valid species is rising far more rapidly, with ‘old’ species being resurrected and completely new species being discovered and described at a rapid rate. Scientists have described a new species, on average, almost every two weeks since the 1970s. A third of all species have been described in the past 30 years, and 81 new species were described in 2008 alone, mostly from Australia and adjacent areas of the Indo-Pacific (Last 2007; White and Last 2012). It is probable that well over 1,200 species of chondrichthyan fish exist (Naylor *et al.* 2012a), but the review described here has focused upon the 1,093 species that were included in the IUCN Red List online database in June 2012. Of these, 1,041 species had been considered to be taxonomically valid up to August 2011, and were therefore covered by the recent IUCN SSC Shark Specialist Group’s Global Shark Red List Assessment (GSRLA; Dulvy *et al.* submitted). A further 52 newly described or newly resurrected species have since been added to the IUCN Red List, and 27 earlier assessments have been updated.

The majority of the 52 newly described species are endemics and/or from deepwater; they are unlikely to be migratory or listed as threatened (see below). A few of the new additions are ‘old’ species that were unrecognised until recently. For example, the giant manta ray *Manta birostris* has recently been split into two species, *M. birostris* (Donndorff, 1798) and the resurrected species *M. alfredi* (Krefft, 1868), while a third as yet undescribed species, *Manta cf. birostris*, is reported from the Caribbean (Marshall *et al.* 2009). Two species of Southeast Asian river stingrays (the giant freshwater stingray *Himantura polylepis* (Bleeker, 1852), and the Mekong freshwater stingray *Dasyatis laosensis* Karnasuta, 1987) have also been resurrected recently. These species are mentioned here because they are all now assessed as threatened (Vulnerable to Endangered) in the IUCN Red List and are migratory or possibly migratory, but last three were not, of course, included in the migratory shark and batoid databases prepared for CMS in 2007.

Despite these updates, the migratory species lists presented here are still not definitive – other species have been split and old species resurrected, and this process is likely to continue as new tools, particularly genetic analyses, are more widely applied (e.g. Naylor *et al.* 2012a,b). For example, the Northeast Atlantic possibly migratory common skate, *Dipturus batis* (Linnaeus, 1758), currently assessed as Critically Endangered, is now considered to be a species complex comprised of *D. flossada* (Risso, 1826) and *D. intermedia* Parnell (1837) (Iglésias *et al.* 2009). Furthermore, a cryptic hammerhead lineage (*Sphyrna* sp.) has been identified in the western Atlantic (Pinhal *et al.* 2012), but not yet described.

2.2 Migratory status

The definition of “migratory” species given in the box below is based upon the CMS definition, slightly amended so as clearly to include marine species that migrate between national waters and the high seas. While it is easy to identify many shark species that are migratory using this definition, current knowledge is inadequate to identify conclusively all migratory sharks. Species are therefore considered by this study to be ‘possibly migratory’ where there is some evidence to suggest that migrations occur but their nature remains uncertain. Poorly known species are also included as ‘possibly migratory’ when they are in a genus that contains very similar highly mobile species that are known to be migratory, occur in similar habitats and geographic ranges, and probably have similar behavioural and life history characteristics. For example, the majority of the non-endemic eagle rays and bat rays with a relatively broad geographic range are included as possibly migratory species, because other members of these genera (*Aetobatus*, *Aetomylaeus*, *Myliobatis* and *Pteromylaeus*) are known to be migratory.

Definition of migratory species

Species included in this analysis are those that fall under the definition given in Article I of CMS: “the entire population or any geographically separate part of the population of any species or lower taxon of wild animals, a significant proportion of whose members *cyclically and predictably* cross one or more national jurisdictional boundaries”.

Under this definition:

- i) The word "cyclically" in the phrase "cyclically and predictably" relates to a cycle of any nature, such as astronomical (circadian, annual etc.), life or climatic, and of any frequency.
- ii) The word "predictably" in the phrase "cyclically and predictably" implies that a phenomenon can be anticipated to recur in a given set of circumstances, though not necessarily regularly in time.
- iii) For the purposes of this study, national jurisdictional boundaries include national land and sea borders and, where appropriate, the outer 200 mile boundary between the Exclusive Economic Zone (EEZ) of each nation and the High Seas.

The number of migratory and possibly migratory shark species has increased since the last CMS review in 2007, which included 140 species, drawing upon Red List assessments for about 50% of all chondrichthyan fishes, including some 90% of known migratory species. Resurrected migratory species have been added to the global list and some additional species that are very closely related to known migratory species are now included as possibly migratory. We therefore list 95 migratory and 58 possibly migratory species here, a total of 153 species.

A note of caution: the GROMS database does not include all of the shark species identified by this study. Furthermore, it lists some sharks that are apparently not migratory including some species that are likely restricted to very small home ranges. CMS signatories are therefore encouraged to consult the migratory sharks database prepared for CMS (particularly if this can be updated regularly) for more information on this taxonomic group.

2.3 Red List status

The GSRLA reviewed 1,041 species considered to be taxonomically valid up to August 2011 (Dulvy *et al.* submitted). The review presented here includes an additional 52 newly described or newly resurrected species since added to the IUCN Red List. Twenty-seven of the Red List assessments online in 2011 have been updated, in some cases resulting in an uplisting or a downlisting of the global assessment of threat. Because the total number of shark species is large, the overall result (expressed as percent of species in each Red List category) has not changed significantly. There is now a slightly larger proportion of Least Concern species, following the addition of a many Australian endemics and deepwater sharks, mostly not threatened with extinction. Only five newly added species are threatened.

Table 2 summarises the status of all 1,093 species assessed and published in the IUCN Red List of Threatened Species in June 2012, comparing the threatened status of the 95 migratory species, 58 possibly migratory species and 940 non-migratory species. Seventeen per cent of all species have been assessed as threatened (Vulnerable, Endangered or Critically Endangered), 12% as Near Threatened and only 25% as Least Concern – the latter is the lowest proportion of ‘not at risk’ species of all vertebrate groups that have been assessed (Dulvy *et al.* submitted). The remaining 46% of species are assessed as Data Deficient – without insufficient information to enable them to be placed in one of the other categories. Unsurprisingly, a large number of Data Deficient species occur in deepwater (mostly on continental slopes), but 18% of are found on continental shelves. The GSRLA has taken into account the varying levels of threat found in different habitats for data sufficient species to estimate that the actual level of threat across all taxa is likely to be over 24%. This is higher than current estimates of threat to all other marine and vertebrate taxa, with the exception of reef-building corals and amphibians (Dulvy *et al.* submitted).

When migratory and non-migratory species are compared (Figure 1), it is immediately apparent that non-migratory species are at a lesser overall risk and migratory species at a much higher relative risk than all shark species combined. Only 14% of non-migratory species are assessed as threatened (Vulnerable, Endangered or Critically Endangered), 10% as Near Threatened and 28% as Least Concern. In contrast, migratory species are at a much higher risk of extinction. Forty-six per cent are threatened, 21% Near Threatened, and only 9% are least concern. There is a greater uncertainty about the status of possibly migratory species, because data are often lacking to enable both their migratory status and their threatened status to be determined. This is reflected in the greater proportion of Data Deficient species in this category – 34% are Data Deficient. Taking Data Deficient species out of the equation, then the proportion of data-sufficient Threatened migratory and possibly migratory species remains very high, with 50% threatened, compared with 31% of all species, and 27% of non-migratory species. (The latter is an overestimate, because a large proportion of Data Deficient, non-migratory, deepwater species are likely to prove to be Least Concern, hence the estimate given above of 24% of all sharks being threatened.)

The Appendix to this report lists (in taxonomic order): 1) all species of migratory sharks and 2) possibly migratory species, as identified by the IUCN Shark Specialist Group, with their IUCN Red List of Threatened Species status. Table 3 extracts from these lists only those migratory and possibly migratory species that are listed as Threatened (Critically Endangered, Endangered or Vulnerable), highlighting the migratory species that are listed in the CMS Appendices.

Table 2. Comparison of the global Red List status of migratory and non-migratory chondrichthyan fishes

IUCN Red List Category	All species (2012)		Non-migratory		Migratory		Possibly migratory		Migratory & possibly migratory	
	Number	Percentage*	Number	Percentage*	Number	Percentage*	Number	Percentage*	Number	Percentage*
Critically Endangered	25	2%	16	2%	8	8%	1	2%	9	6%
Endangered	41	4%	30	3%	6	6%	5	9%	11	7%
Vulnerable	116	11%	81	9%	30	31%	5	9%	35	23%
Subtotal Threatened	182	17%	127	14%	44	46%	11	19%	55	36%
Near Threatened	133	12%	92	10%	20	21%	21	37%	41	27%
Subtotal Threatened & Near Threatened	315	29%	219	23%	64	67%	32	55%	96	63%
Least Concern	274	25%	259	28%	9	9%	6	10%	15	10%
Data Deficient	504	46%	462	49%	22	23%	20	34%	42	27%
Total	1093		940		95		58		153	
Excluding Data Deficient species:										
Critically Endangered	25	4%	16	3%	8	11%	1	3%	9	8%
Endangered	41	7%	30	6%	6	8%	5	13%	11	10%
Vulnerable	116	20%	81	17%	30	41%	5	13%	35	32%
Subtotal Threatened	182	31%	127	27%	44	60%	11	29%	55	50%
Near Threatened	133	23%	92	19%	20	27%	21	55%	41	37%
Least Concern	274	47%	259	54%	9	12%	6	16%	15	14%
Total	589		478		73		38		111	

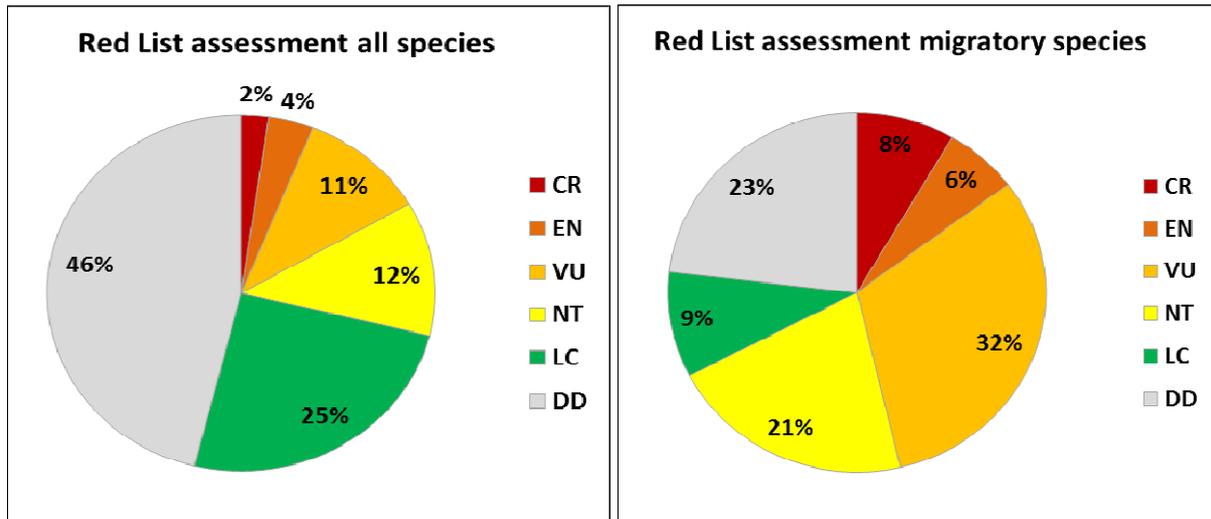
* The percentage of the total number of species assessed and published online (www.iucnredlist.org) in June 2012.

Table 3. Threatened migratory and potentially migratory chondrichthyan species (listed in alphabetic order)

a) Critically Endangered Species		
Species	Common name	Red List criteria
<i>Anoxypristis cuspidata</i>	Knifetooth or Narrow Sawfish	A2bcd+3cd+4bcd
<i>Dipturus batis</i>	Blue Skate, Flapper Skate, Grey Skate	A2bcd+4bcd
<i>Isogomphodon oxyrinchus</i>	Daggernose Shark	A2ad+3d+4ad
<i>Pristis microdon</i>	Freshwater or Largetooth Sawfish,	A2abcd+3cd+4bcd
<i>Pristis pectinata</i>	Smalltooth or Wide Sawfish	A2bcd+3cd+4bcd
<i>Pristis perotteti</i>	Largetooth Sawfish	A2abcd
<i>Pristis pristis</i>	Common Sawfish	A2abc+3cd
<i>Rhinobatos horkelii</i>	Brazilian Guitarfish	A2bd
<i>Squatina squatina</i>	Angel Shark	A2bcd+3d+4bcd
b) Endangered Species		
<i>Aetobatus flagellum</i>	Longheaded Eagle Ray	A2d+3d+4d
<i>Aetomylaeus maculatus</i>	Mottled Eagle Ray	A2d+3d+4d
<i>Aetomylaeus vespertilio</i>	Ornate or Reticulate Eagle Ray	A2bd+3d+4d
<i>Dasyatis laosensis</i>	Mekong Freshwater Stingray	A2acde
<i>Himantura polylepis</i>		A2bcd
<i>Lamiopsis temmincki</i>	Broadfin Shark	A2d+3d
<i>Malacoraja senta</i>	Smooth Skate	A2bcd
<i>Mobula mobular</i>	Giant Devil Ray	A4d
<i>Rhinoptera brasiliensis</i>	Brazilian Cownose Ray	A2abcd+3bcd+4abcd; B1ab(i,iii,v)
<i>Sphyrna lewini</i>	Scalloped Hammerhead	A2bd+4bd
<i>Sphyrna mokarran</i>	Great Hammerhead	A2bd+4bd
c) Vulnerable Species		
<i>Aetomylaeus nichofii</i>	Banded Eagle Ray	A2d+3d+4d
<i>Amblyraja radiata</i>	Starry Ray, Thorny Skate	A2b
<i>Alopias pelagicus</i>	Pelagic Thresher Shark	A2d+4d
<i>Alopias superciliosus</i>	Bigeye Thresher Shark	A2bd
<i>Alopias vulpinus</i>	Common Thresher Shark	A2bd+3bd+4bd
<i>Carcharias taurus</i>	Grey Nurse, Sand Tiger, Ragged-tooth Shark	A2ab+3d

c) Vulnerable Species (continued – species listed in the CMS Appendices are highlighted)		
<i>Carcharodon carcharias</i>	Great White Shark	A2cd+3cd
<i>Carcharhinus longimanus</i>	Oceanic Whitetip Shark	A2ad+3d+4ad
<i>Carcharhinus obscurus</i>	Dusky Shark	A2bd
<i>Carcharhinus plumbeus</i>	Sandbar Shark	A2bd+4bd
<i>Carcharhinus signatus</i>	Night Shark	A2abd+3bd+4abd
<i>Cetorhinus maximus</i>	Basking Shark	A2ad+3d
<i>Dasyatis colarensis</i>	Colares Stingray	A3d
<i>Dasyatis fluviorum</i>	Brown or Estuary Stingaree/Stingray	A2bcd+3cd+4bcd
<i>Galeorhinus galeus</i>	School, Soupfin, or Tope Shark	A2bd+3d+4bd
<i>Hemipristis elongata</i>	Fossil or Snaggletooth Shark	A2bd+3bd+4bd
<i>Himantura uarnacoides</i>	Bleeker's Whipray	A2bcd+3bcd+4bcd
<i>Himantura uarnak</i>	Honeycomb, Leopard, Marbled, or Reticulate Stingray/Whipray	A2bd+3bd+4bd
<i>Isurus oxyrinchus</i>	Shortfin Mako	A2abd+3bd+4abd
<i>Isurus paucus</i>	Longfin Mako	A2bd+3d+4bd
<i>Lamna nasus</i>	Porbeagle	A2bd+3d+4bd
<i>Manta alfredi</i>	Coastal or Reef Manta Ray	A2abd+3bd+4abd
<i>Manta birostris</i>	Giant or Oceanic Manta Ray	A2abd+3bd+4abd
<i>Mobula rochebrunei</i>	Lesser Guinean Devil Ray	A4d
<i>Mustelus mustelus</i>	Common Smoothhound	A2bd+3bd+4bd
<i>Nebrius ferrugineus</i>	Tawny Nurse Shark	A2abcd+3cd+4abcd
<i>Negaprion acutidens</i>	Sharptooth Lemon Shark	A2abcd+3bcd+4abcd
<i>Odontaspis ferox</i>	Herbst's Nurse Shark, Small-tooth Sand Tiger	A2bd+4bd
<i>Raja pulchra</i>	Mottled Skate	A2bcd+3cd+4cd
<i>Rhincodon typus</i>	Whale Shark	A2bd+3d
<i>Rhinoptera javanica</i>	Flapnose or Javanese Cownose Ray	A2d+3cd+4cd
<i>Rhynchobatus djiddensis</i>	Giant Guitarfish, Whitespotted Wedgefish	A2d+3d+4d
<i>Sphyrna tudes</i>	Golden or Smalleye Hammerhead Shark	A2ad+3d+4ad
<i>Sphyrna zygaena</i>	Smooth Hammerhead	A2bd+3bd+4bd
<i>Squalus acanthias</i>	Piked Dogfish, Spurdog	A2bd+3bd+4bd

Figure 1. Threatened status of all sharks (left) and migratory sharks (right)



2.4 CMS Conservation status of migratory chondrichthyans

Those migratory sharks whose conservation status is not favourable, which are listed in one of the IUCN Red List categories of threat, fail to meet the abundance criterion of the CMS Article 1(c) 4 definition of favourable status: “*the distribution and abundance of the migratory species approach historic coverage and levels to the extent that potentially suitable ecosystems exist and to the extent that is consistent with wise wildlife management*”.

Table 3 illustrates the way in that Red List Criterion A (population decline) has been applied to every threatened species of migratory shark; they have been listed because their abundance is greatly reduced below historic levels. In every case, this has been caused by depletion in unsustainable target fisheries and/or in bycatch. Some of the most seriously threatened depleted species (for example the common skate *Dipturus batis* species complex) were originally taken in target fisheries. Once they were no longer sufficiently abundant to support directed fisheries, they continued to be taken as a utilised bycatch of fisheries targeting other, more plentiful and resilient species. Only one migratory species (*Rhinoptera brasiliensis*, Brazilian cownose ray) also qualifies for listing (as Endangered) using Criterion B (restricted geographic range) because, unsurprisingly, very few migratory shark species have a restricted range.

Table 3 highlights those species that have so far been listed in the Appendices of CMS. It is striking to note that these are all assessed as Vulnerable in the IUCN Red List of Threatened Species. None of the migratory species that are listed as Endangered or Critically Endangered have yet been proposed for listing.

Dulvy *et al.* (submitted), in their analysis of the GSRLA, do not compare migratory versus non-migratory species (this information is not presented in the IUCN Red List database). However, they identify seven families that are at greatest threat because such a large proportion of the family is at risk. These are the sawfishes, wedgefishes, numbfishes, stingrays, guitarfishes, angel sharks (all six occur in coastal and continental shelf habitats), and the highly migratory pelagic thresher sharks. Some of these families include few or no migratory species, but of those that are migratory, every member of family Pristidae, the

sawfishes, is listed as Critically Endangered, and every member of the family Alopiidae, the thresher sharks, is listed as Vulnerable. This high level of risk across the entire family makes these taxa of particularly high conservation concern.

This same global analysis also identifies hotspots of threat and conservation priority that are also relevant for threatened migratory species. It concludes that tropical coastal shelf seas support the highest levels of threatened species, particularly along the Atlantic and West Pacific shelves, and the Indo-Pacific biodiversity triangle – regions that also contain a high number of migratory species.

It has not yet been possible to update the assessments of regional status and distribution of migratory sharks that were prepared for CMS in 2007. However, the list of States and other entities in whose waters the largest numbers of migratory shark species are reported to occur, and where aggregations or significant records of CMS-listed species have been reported is unlikely to have changed significantly; this is presented in Table 4. These data are dependent at least partly upon the distribution of survey effort and may not be an accurate reflection of migratory shark biodiversity or relative abundance of listed species.

Table 4. States and entities in whose waters most migratory shark species are reported

Australia	Egypt	Mozambique
Bahamas	India	Nicaragua
Brazil	Indonesia	South Africa
China	Japan	Spain
Colombia	Madagascar	Taiwan Province of China
Costa Rica	Mexico	USA
Cuba	Morocco	Viet Nam

(Source: 2007 IUCN SSG review for CMS)

Moving to the high seas: Dulvy *et al.* (2008) examined the status of the 21 oceanic pelagic sharks that are usually caught in high seas fisheries. All of these species are identified in this review as migratory or possibly migratory. The authors concluded that over 50% are globally threatened and a further 25% Near Threatened. Without exception, fishing is the main activity resulting in these threatened and Near Threatened assessments. Only two species are Least Concern – the pelagic stingray *Pteroplatytrygon violacea* and the salmon shark *Lamna ditropis*, the former (a discarded bycatch species) because it is very productive, producing two litters of 1–13 pups per year in captivity, and the latter because much of its population is recovering following the cessation of North Pacific open ocean gillnet fisheries, and the small North eastern Pacific recreational target fishery is very closely managed.

This paper highlights the high level of threat to migratory species that are found on the high seas, beyond the jurisdiction of coastal States. Management for these species, whether target or bycatch, cannot be undertaken solely by coastal States; it also relies upon action by Regional Fisheries Management Organizations (see next section).

3 Legal and management status of migratory sharks

Some threatened migratory species (particularly those already listed in the CMS Appendices) have legal protection or benefit from other management measures such as catch limits or prohibitions, but only in some range States and in part of their range (Table 5). Very few are protected or managed effectively in any significant part of their total global range. No species-specific conservation or fisheries management measures were identified for almost half of all threatened migratory species, but further consultation may identify other measures.

Table 5. Domestic management measures for threatened migratory & possibly migratory species

<i>Alopias pelagicus</i>	Pelagic thresher shark	Spain
<i>Alopias superciliosus</i>	Bigeye thresher shark	Spain
<i>Alopias vulpinus</i>	Common thresher shark	Spain
<i>Anoxypristis cuspidata</i>	Sawfish	India
<i>Carcharhinus altimus</i>	Bignose shark	USA
<i>Carcharhinus galapagensis</i>	Galapagos shark	USA
<i>Carcharhinus leucas</i>	Bull shark	India
<i>Carcharhinus obscurus</i>	Dusky shark	USA
<i>Carcharhinus signatus</i>	Night shark	USA
<i>Carcharias taurus</i>	Sand tiger/grey nurse shark	Australia, Croatia, Italy, Malta, Mauritania, South Africa, Spain, USA
<i>Carcharodon carcharias</i>	White shark	Bermuda, British Virgin Islands, Cayman Islands, Christmas Island, Cocos/Keeling, Croatia, EU, Ecuador, Falkland/Malvinas Is, Guadeloupe, Guyana, Italy, Maldives, Malta, Mauritania, Martinique, Mexico, Namibia, New Zealand, Réunion, South Africa, Turks & Caicos, USA
<i>Cetorhinus maximus</i>	Basking shark	Albania, Bermuda, British Virgin Islands, Cayman Islands, Croatia, Hong Kong, EU, Ecuador, Falkland/Malvinas, Guadeloupe, Guyana, Italy, Malta, Martinique, Mauritania, Mexico, New Zealand, South Africa, Turkey, Turks & Caicos, USA
<i>Dipturus batis</i>	Common skate	EU
<i>Galeorhinus galeus</i>	Tope or school shark	Mauritania, UK
<i>Isogomphodon oxyrinchus</i>	Daggernose Shark	Brazil
<i>Isurus oxyrinchus</i>	Shortfin mako shark	Catch limits in several States
<i>Isurus paucus</i>	Longfin mako shark	USA
<i>Lamna ditropis</i>	Salmon shark	USA
<i>Lamna nasus</i>	Porbeagle shark	Canada, EU, Ecuador, USA
<i>Manta birostris</i>	Manta ray	Ecuador, Honduras, Maldives, Mexico, New Zealand, Philippines, Yap
<i>Mobula japonica</i>	Japanese or Spinetail Devilray	Ecuador, Honduras, Maldives, Mexico, New Zealand
<i>Mobula mobular</i>	Giant Devil Ray	Some Mediterranean States
<i>Mobula munkiana</i>	Pygmy Devil Ray	Mexico
<i>Mobula tarapacana</i>	Chilean or Guinean Devil Ray	Honduras, Maldives, Mexico
<i>Mobula thurstoni</i>	Bentfin or Smoothtail Devil Ray	Mexico
<i>Odontaspis ferox</i>	Deepwater nurse shark	Australia, New Zealand, USA
<i>Pristis</i> species	Sawfishes	Australia, India, Mexico, South Africa, USA
<i>Rhincodon typus</i>	Whale shark	Belize, Burma, Cambodia, Hong Kong SAR, Christmas Island, Cocos/Keeling, Ecuador, Guadeloupe, Guyana, Honduras, India, Malaysia, Maldives, Mexico, New Zealand, Philippines, Réunion, South Africa, Taiwan Province of China (quota), United Arab Emirates, USA
<i>Sphyrna lewini</i>	Scalloped hammerhead shark	Spain
<i>Sphyrna mokarran</i>	Great hammerhead shark	Spain
<i>Sphyrna zygaena</i>	Smooth hammerhead shark	Spain
<i>Squalus acanthias</i>	Spiny dogfish	Canada, EU, Ecuador
<i>Squatina squatina</i>	Angel shark	EU
This table does not list national measures prohibiting shark fisheries within EEZs, or regional measures adopted by RFMOs and binding upon Contracting Parties (see Table 6). EU Member States and overseas territories are not listed separately for EU-wide measures.		

3.1 Fisheries management

Fisheries management measures, in territorial waters, EEZs and on the high seas, represent the most important and widespread conservation and management tools for improving the status of migratory shark populations. Unfortunately, while the need to address the poor conservation status of shark populations has received increased attention from FAO and Regional Fisheries Management Organizations (RFMOs) over the past ten to 15 years, the management of shark fisheries has remained a relatively low priority for most fisheries managers. This is because catch volumes and value (fins are the exception) are generally low. When resources are limited, species with a high economic value or species of high priority for food security will naturally receive management attention before sharks. This is particularly the case in developing countries, where catch limits and other fisheries management tools are scarce, even in those countries that have adopted National Shark Plans under the framework of the FAO's International Plan of Action for the Conservation and Management of Sharks (IPOA–Sharks).

The FAO International Plan of Action for the Conservation and Management of Sharks (IPOA-Sharks)

The IPOA-Sharks, adopted in 1999, highlights the action required for sharks within the context of the Code of Conduct for Responsible Fisheries. Its overall objective is to ensure the conservation and management of sharks and their long-term sustainable use. It embraces the precautionary approach and encompasses all chondrichthyan fisheries, whether target or bycatch, industrial, artisanal or recreational, as well as species conservation and habitat protection. The IPOA-Sharks called upon States to produce a Shark Assessment Report (SAR) and, if they have shark fisheries, to develop and implement National Plans of Action (NPOA) by 2001. Despite some improvements since the last CMS review in 2007, progress with implementation of the IPOA–Sharks remains disappointing.

Only 47 countries (33% of the 143 countries reporting catches to FAO) have adopted an NPOA. Thirty of these have reported less 1% of the world's shark catches to FAO since 2000. They are not, therefore, among the world's top 26 shark fishing countries and entities, listed in Table 6, each of which are responsible for at least 1% of global shark catches reported to FAO, and a total of 84% of catches in aggregate (Fischer *et al.* 2012).

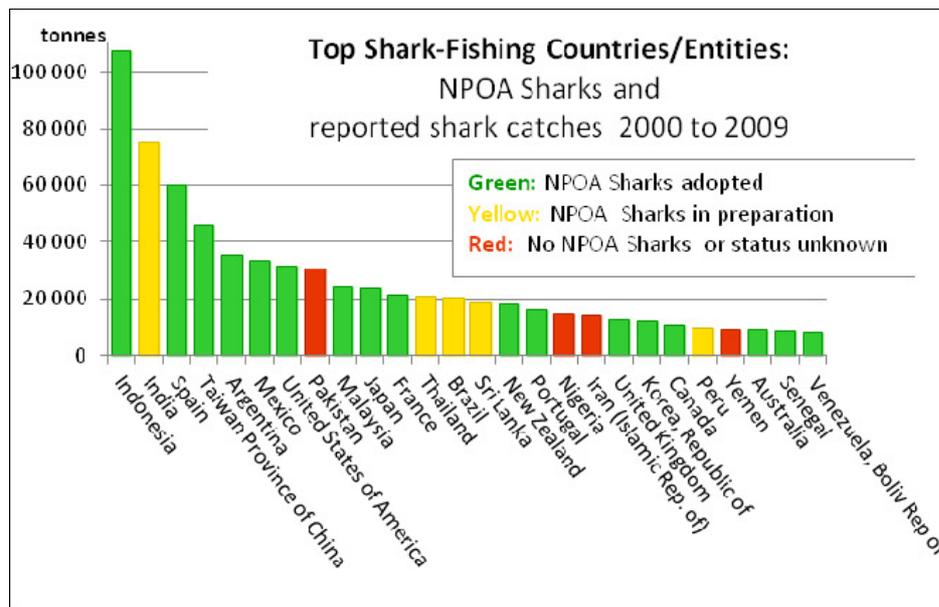
Table 6. Top twenty-six shark catching countries and entities 2000–2009 (Fischer *et al.* 2012)

1. Indonesia	10. Japan	19. United Kingdom
2. India	11. France	20. Korea (Republic of/South)
3. Spain	12. Thailand	21. Canada
4. Taiwan Province of China	13. Brazil	22. Peru
5. Argentina	14. Sri Lanka	23. Australia
6. Mexico	15. New Zealand	24. Yemen
7. United States of America	16. Portugal	25. Senegal
8. Pakistan	17. Nigeria	26. Venezuela
9. Malaysia	18. Iran	

Figure 2 (from Fischer *et al.* 2012) illustrates the annual shark catch that has been taken by these 26 since 2000 (during a period when world shark catches have fallen from 900,000 t to

750,000 t, only partly due to the introduction of catch limits), and the status of their National Shark Plans. Of the 26, 35% (nine countries) have not yet adopted an NPOA. Some have Shark Plans in preparation or awaiting adoption, but four (15%) of the world's major shark fishing nations have not yet addressed implementation of the IPOA–Sharks. Progress is also incomplete for other FAO IPOAs, including the IPOAs for IUU fishing, fishing capacity, and seabirds.

Figure 2. Reported shark catches and status of National Shark Plans for the 'top 26' shark fishing countries and entities (Fischer *et al.* 2012)



Regional Fisheries Management Organisations

Regional Fisheries Bodies (RFBs) are usually (but not invariably) established under the mandate of FAO (www.fao.org/fi/body/rfb/index.htm). They include management, advisory and scientific fisheries bodies. There are currently some 16 Regional Fisheries Management Organizations (RFMOs) with a mandate to establish binding management measures for fisheries resources. They serve as fora through which States meet and cooperate to manage fisheries for the conservation and sustainable use of marine living resources, and address most fisheries targeting straddling stocks (Maguire *et al.* 2006).

Despite their large geographic range and the large number of States with far seas fisheries within RFMO areas, even the largest RFMOs tend to have only some 15 to 30 members (contracting and cooperating parties – CPPs). There is considerable geographical overlap between many RFBs, but overlap in species responsibilities doesn't generally occur and not all fisheries resources (particularly not high seas species) fall within the mandate of existing RFBs. The extent to which RFMOs with jurisdiction over fisheries that take a large bycatch of oceanic and highly migratory sharks (whether utilised or discarded), particularly the tuna RFMOs, regulate the bycatch of migratory sharks is patchy (Maguire *et al.* 2006). The majority are undertaking data collection programmes (albeit sometimes hampered by poor reporting by contracting and cooperating Parties) and have introduced shark finning bans, but they largely fail to regulate shark bycatch other than for a few key species. It is apparent that only a small proportion of the species listed in UNCLOS Annex I (see the Appendix to this report) and/or identified as migratory in this review are the subject of RFMO

management measures. Those that are, include the thresher sharks, oceanic whitetip, the hammerheads, silky shark, basking shark, spiny dogfish, porbeagle shark and some deep-sea migratory sharks. With the exception of the oceanic whitetip shark and bigeye thresher shark, none of these species is protected by more than one RFMO (Table 7).

Table 7. RFMO conservation and management measures for migratory sharks

	Prohibit finning	Collect & report data	Species prohibitions	Other measures
Commission for the Conservation of Southern Bluefin Tuna (CCSBT)		X		
Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR)				Target shark fishing prohibited; live release of bycatch required.
General Fisheries Commission for the Mediterranean (GFCM)	X	X	Basking shark, white shark, giant devil ray, tope, shortfin mako, porbeagle, hammerhead sharks and other SPA/BD protocol species	Same measures as ICCAT, plus prohibited species listed in Annex II of the SPA/BD protocol of the Barcelona Convention.
Indian Ocean Tuna Commission (IOTC)	X	X	All thresher sharks <i>Alopias</i> spp.	encourage live release of bycatch; research into gear selectivity, nursery habitat, stock assessments
Inter-American Tropical Tuna Commission (IATTC)	X	X	Oceanic whitetip <i>Carcharhinus longimanus</i>	encourage live release of bycatch; research into gear selectivity, nursery habitat, stock assessments
International Commission for the Conservation of Atlantic Tunas (ICCAT)	X	X	Bigeye thresher shark <i>Alopias superciliosus</i> , oceanic whitetip shark <i>Carcharhinus longimanus</i> , hammerhead sharks Sphyrnidae (except for <i>Sphyrna tiburo</i>), silky shark <i>Carcharhinus falciformis</i>	Encourage live release of bycatch; research gear selectivity and nursery habitat; stock assessment for mako shark; reduce porbeagle mortality.
North East Atlantic Fisheries Commission (NEAFC)			Basking shark, porbeagle, spiny dogfish and deepwater sharks including bluntnose six-gilled shark <i>Hexanchus griseus</i> and Greenland shark <i>Somniosus microcephalus</i>	
Northwest Atlantic Fisheries Organization (NAFO)	X	X		Encourage live release of bycatch; research gear selectivity & nursery areas
South East Atlantic Fisheries Organization (SEAFO)	X	X	Deepwater shark fisheries prohibited until information available on sustainable levels	Encourage live release of bycatch; research gear selectivity & nursery areas
Western and Central Pacific Fisheries Commission (WCPFC)	X	X	Oceanic whitetip <i>Carcharhinus longimanus</i>	Encourage live release of bycatch; research gear selectivity, bycatch avoidance and nursery habitat; undertake stock assessments; implement National Shark Plans

Table 8 combines the list of 20 major shark fishing nations from Table 7, and the States with highest migratory shark biodiversity (Table 5). Those range States appearing on both lists and which are presumed therefore potentially to have a particularly important contribution to make to migratory shark conservation and management are Indonesia, Taiwan Province of China, India, Spain, USA, Mexico, Japan and Brazil. Also shown in this table are their membership of RFMOs and CMS (for the latter, the Convention or the MOU), and whether they have a Shark Plan or shark fisheries management activity underway.

Table 8. Priority Range States and Fishing States for migratory shark management

State	Major fisher ³	Centre of biodiversity ⁴	CMS Party/ MOU Signatory	Tuna RFMO Contracting/ Cooperating Party	Shark Plan
Argentina	X		X	CCAMLR	X
Australia	X	X	X	CCAMLR, CCSBT, IOTC, WCPFC	X
Bahamas		X			
Brazil	X	X		CCAMLR, ICCAT	
Canada	X			IATTC, ICCAT, NAFO, WCPFC	X
China		X		CCAMLR, IATTC, IOTC, ICCAT, WCPFC	
Colombia		X		IATTC,	
Costa Rica		X	X	IATTC,	
Cuba		X			
Egypt		X	X	GFCM, ICCAT	
EU	X		X	CCAMLR, GFCM, IATTC, ICCAT, IOTC, NAFO, WCPFC	X
France	X		X	CCAMLR, GFCM, IATTC, IOTC, ICCAT, NAFO, NEAFC, WCPFC	X
India	X	X	X	CCAMLR, IOTC	
Indonesia	X	X		CCSBT, IOTC	X
Iran	X				
Japan	X	X		CCAMLR, CCSBT, IATTC, IOTC, ICCAT, NAFO, WCPFC	X
Korea	X			CCAMLR, CCSBT, IOTC, ICCAT, NAFO, WCPFC	X
Madagascar		X		IOTC	
Malaysia	X			IOTC	X
Mexico	X	X		IATTC, ICCAT	X
Morocco		X	X	GFCM, ICCAT	
Mozambique		X			
New Zealand	X		X	CCAMLR, CCSBT, WCPFC	X
Nicaragua		X		IATTC, ICCAT	
Nigeria	X		X		
Pakistan	X		X	IOTC	
Peru	X			IATTC,	
Portugal	X		X		X
Senegal	X		X	ICCAT	X
South Africa		X	X	CCAMLR, ICCAT	X
Spain	X	X	X	CCAMLR, GFCM, IATTC	X
Sri Lanka	X		X	IOTC	
Taiwan, Prov. China	X	X		CCSBT, IATTC, WCPFC	X
Thailand	X			IOTC	
United Kingdom	X		X	CCAMLR, ICCAT, IOTC	X
USA	X	X	X	CCAMLR, IATTC, ICCAT, NAFO, WCPFC	X
Venezuela				IATTC, ICCAT	X
Viet Nam		X			
Yemen					

³ As defined in Table 6

⁴ As defined in Table 4

3.2 Biodiversity conservation

In addition to the major multilateral environmental agreements for biodiversity conservation (CMS, CITES and CBD, which are not discussed here), some UNEP Regional Seas Conventions are beginning to play a role in the conservation and management of sharks, migratory or not.

The Regional Seas Conventions that are presently the most active are centred in the Northeast Atlantic and adjacent areas. A small number of migratory sharks are listed in the OSPAR Convention's priority list of threatened and/or declining species in the Northeast Atlantic: basking shark, common skate, porbeagle, spurdog and angel shark. OSPAR follows up these listings by developing recommendations for the management of listed species for adoption by the Biodiversity Committee and OSPAR Members. The sister convention, HELCOM, also lists common skate, porbeagle and spurdog in its list of threatened and/or declining Baltic Sea species.

The Barcelona Convention is the main tool for implementing in the Mediterranean the provisions for sustainable management of coastal and marine biodiversity under the 1992 Convention on Biological Diversity. Annex II of the Barcelona Convention Protocol for Specially Protected Areas and Biodiversity (SPA/BD protocol) lists species requiring strict protection, including a fairly large number of shark species. Although the General Fisheries Council for the Mediterranean (GFCM) normally adopts the measures agreed in the International Commission for the Conservation of Atlantic Tuna (ICCAT), exceptionally, in 2012, GFCM adopted special protection measures for all shark species listed in Annex II of the Barcelona Convention. This is presently the only example of an RFMO adopting species conservation measures proposed in a Regional Seas agreement, and potentially sets an interesting precedent for future cross over between regional biodiversity conservation and fisheries management arrangements.

4 Conclusions

Migratory sharks are assessed in the IUCN Red List of Threatened Species at a much higher relative level of extinction risk than are non-migratory species. Forty-six per cent of the 95 migratory species identified in this review are threatened (44 species are Vulnerable, Endangered or Critically Endangered), 21% (20 species) are Near Threatened, and only 9% (9 species) are Least Concern. The risk to the 58 possibly migratory species is slightly lower, with a much higher proportion of Data Deficient species. If only data-sufficient species are considered, then 50% of migratory and potentially migratory species (55 species) are threatened, compared with just 27% (127) of non-migratory species. Of the 940 non-migratory species, only 14% (127 species) are assessed as threatened, while 28% (259 species) are Least Concern.

The assessments for the 1,093 species of chondrichthyan fishes (about 60 families of sharks, skates and chimaeras) included in the IUCN Red List online database in June 2012 lies between these extremes. Seventeen per cent of all species (182 species) are assessed as threatened 12% (133 species) as Near Threatened and only 25% (274 species) as Least Concern – the lowest proportion of ‘not at risk’ species of all vertebrate groups that have been completely assessed. The level of threat for all shark taxa combined is only exceeded by reef-building corals and amphibians. The threat to migratory sharks is very much greater.

All migratory species listed in the IUCN Red List as threatened are of unfavourable conservation status because of the impacts of fisheries, target and bycatch, which have reduced their abundance greatly below historic levels. The eight species listed in the CMS Appendices represent fewer than 15% of the 55 threatened species of migratory and possibly migratory sharks identified by this study, or 15% of the sharks listed in Annex I, Highly Migratory Species, of the UN Convention on the Law of the Sea (UNCLOS). It is clear from the review that species which have been listed for many years in the CMS Appendices are benefiting from a much greater number of conservation actions by range States and RFMOs.

Only ‘Vulnerable’ species have been protected through listing in the CMS Appendices. There are no Endangered or Critically Endangered migratory species listed in the Appendices and no species from the seven shark families that have been identified as being at greatest risk (including sawfishes and thresher sharks) have been listed. No species-specific conservation or fisheries management measures were identified for almost half of all threatened migratory species. The analysis also identifies regions and countries with highest levels of biodiversity, threatened species and fisheries landings. This information can be used to set future priorities for listing sharks in the Appendices or for other actions under the Migratory Shark MOU.

Very few of the shark species identified by this review are listed in GROMS, but the databases prepared in 2007 for migratory sharks and migratory batoid fishes are out of date and not available online. These could be a very useful source of conservation and management information and advice, if merged and maintained regularly by the IUCN Shark Specialist Group. There are staffing and other resource implications for updating and maintaining this source of information.

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Appendix: Species lists

1. Migratory shark species (in taxonomic order – species listed in CMS Appendices are highlighted)

Order	Family	Species and authority	Common names	Red List status
Hexanchiformes	Hexanchidae	<i>Hexanchus griseus</i> (Bonnaterre, 1788)	Bluntnose Sixgill Shark	NT
Hexanchiformes	Hexanchidae	<i>Notorynchus cepedianus</i> (Peron, 1807)	Broadnose Sevengill Shark	DD
Squaliformes	Squalidae	<i>Squalus acanthias</i> Linnaeus, 1758	Piked Dogfish, Spurdog	VU
Squaliformes	Squalidae	<i>Squalus megalops</i> (Macleay, 1881)	Cosmopolitan or Shortnose Spurdog	DD
Squaliformes	Squalidae	<i>Squalus mitsukurii</i> Jordan & Snyder, 1903	Green-eye or Shortspine Spurdog	DD
Squaliformes	Somniosidae	<i>Somniosus antarcticus</i> Whitley, 1939	Southern Sleeper Shark	DD
Squaliformes	Somniosidae	<i>Somniosus microcephalus</i> (Bloch & Schneider, 1801)	Greenland or Large Sleeper Shark	NT
Squaliformes	Somniosidae	<i>Somniosus pacificus</i> Bigelow & Schroeder, 1944	Pacific Sleeper Shark	DD
Squatiformes	Squatinae	<i>Squatina squatina</i> (Linnaeus, 1758)	Angel Shark	CR
Orectolobiformes	Ginglymostomatidae	<i>Nebrius ferrugineus</i> (Lesson, 1830)	Tawny Nurse Shark	VU
Orectolobiformes	Rhincodontidae	<i>Rhincodon typus</i> Smith, 1828	Whale Shark	VU
Lamniformes	Odontaspidae	<i>Carcharias taurus</i> Rafinesque, 1810	Grey Nurse, Sand Tiger, Ragged-tooth Shark	VU
Lamniformes	Megachasmidae	<i>Megachasma pelagios</i> Taylor, Compagno & Struhsaker, 1983	Megamouth Shark	DD
Lamniformes	Alopiidae	<i>Alopias pelagicus</i> Nakamura, 1935	Pelagic Thresher Shark	VU
Lamniformes	Alopiidae	<i>Alopias superciliosus</i> Lowe, 1840	Bigeye Thresher Shark	VU
Lamniformes	Alopiidae	<i>Alopias vulpinus</i> (Bonnaterre, 1788)	Common Thresher Shark	VU
Lamniformes	Cetorhinidae	<i>Cetorhinus maximus</i> (Gunnerus, 1765)	Basking Shark	VU
Lamniformes	Lamnidae	<i>Carcharodon carcharias</i> (Linnaeus, 1758)	Great White Shark	VU
Lamniformes	Lamnidae	<i>Isurus oxyrinchus</i> Rafinesque, 1810	Shortfin Mako	VU
Lamniformes	Lamnidae	<i>Isurus paucus</i> Guitart Manday, 1966	Longfin Mako	VU
Lamniformes	Lamnidae	<i>Lamna ditropis</i> Hubbs & Follett, 1947	Salmon Shark	LC
Lamniformes	Lamnidae	<i>Lamna nasus</i> (Bonnaterre, 1788)	Porbeagle	VU
Carcharhiniformes	Triakidae	<i>Galeorhinus galeus</i> (Linnaeus, 1758)	Tope, School or Soupfin Shark	VU
Carcharhiniformes	Triakidae	<i>Mustelus asterias</i> Cloquet, 1819	Starry Smoothhound	LC
Carcharhiniformes	Triakidae	<i>Mustelus mustelus</i> (Linnaeus, 1758)	Common Smoothhound	VU
Carcharhiniformes	Carcharhinidae	<i>Carcharhinus acronotus</i> (Poey, 1860)	Blacknose Shark	NT
Carcharhiniformes	Carcharhinidae	<i>Carcharhinus amblyrhynchoides</i> (Whitley, 1934)	Graceful Shark	NT
Carcharhiniformes	Carcharhinidae	<i>Carcharhinus brachyurus</i> (Günther, 1870)	Bronze Whaler or Copper Shark	NT
Carcharhiniformes	Carcharhinidae	<i>Carcharhinus brevipinna</i> (Müller & Henle, 1839)	Spinner Shark	NT
Carcharhiniformes	Carcharhinidae	<i>Carcharhinus falciformis</i> (Müller & Henle, 1839)	Silky Shark	NT
Carcharhiniformes	Carcharhinidae	<i>Carcharhinus isodon</i> (Müller & Henle, 1839)	Smoothtooth Shark	LC
Carcharhiniformes	Carcharhinidae	<i>Carcharhinus leucas</i> (Müller & Henle, 1839)	Bull Shark	NT
Carcharhiniformes	Carcharhinidae	<i>Carcharhinus limbatus</i> (Valenciennes, 1839)	Blacktip Shark	NT
Carcharhiniformes	Carcharhinidae	<i>Carcharhinus longimanus</i> (Poey, 1861)	Oceanic Whitetip Shark	VU
Carcharhiniformes	Carcharhinidae	<i>Carcharhinus macloti</i> (Müller & Henle, 1839)	Hardnose Shark	NT
Carcharhiniformes	Carcharhinidae	<i>Carcharhinus obscurus</i> (Lesueur, 1818)	Dusky Shark	VU
Carcharhiniformes	Carcharhinidae	<i>Carcharhinus plumbeus</i> (Nardo, 1827)	Sandbar Shark	VU
Carcharhiniformes	Carcharhinidae	<i>Galeocerdo cuvier</i> (Peron & Lesueur, 1822)	Tiger Shark	NT
Carcharhiniformes	Carcharhinidae	<i>Isogomphodon oxyrinchus</i> (Müller & Henle, 1839)	Daggernose Shark	CR

Order	Family	Species and authority	Common names	Red List status
Carcharhiniformes	Carcharhinidae	<i>Negaprion acutidens</i> (Rüppell, 1837)	Sharptooth Lemon Shark	VU
Carcharhiniformes	Carcharhinidae	<i>Negaprion brevirostris</i> (Poey, 1868)	Lemon Shark	NT
Carcharhiniformes	Carcharhinidae	<i>Prionace glauca</i> (Linnaeus, 1758)	Blue Shark	NT
Carcharhiniformes	Sphyrnidae	<i>Sphyrna lewini</i> (Griffith & Smith, 1834)	Scalloped Hammerhead	EN
Carcharhiniformes	Sphyrnidae	<i>Sphyrna mokarran</i> (Rüppell, 1837)	Great Hammerhead Shark,	EN
Carcharhiniformes	Sphyrnidae	<i>Sphyrna tiburo</i> (Linnaeus, 1758)	Bonnethead Shark	LC
Carcharhiniformes	Sphyrnidae	<i>Sphyrna tudes</i> (Valenciennes, 1822)	Golden or Smalleye Hammerhead	VU
Carcharhiniformes	Sphyrnidae	<i>Sphyrna zygaena</i> (Linnaeus, 1785)	Smooth Hammerhead	VU
Rajiformes	Pristidae	<i>Anoxypristis cuspidata</i> (Latham, 1794)	Knifetooth or Narrow Sawfish	CR
Rajiformes	Pristidae	<i>Pristis microdon</i> Latham, 1794	Freshwater or Largetooth Sawfish,	CR
Rajiformes	Pristidae	<i>Pristis pectinata</i> Latham, 1794	Smalltooth or Wide Sawfish	CR
Rajiformes	Pristidae	<i>Pristis perotteti</i> Valenciennes, in Müller & Henle, 1841	Largetooth Sawfish	CR
Rajiformes	Pristidae	<i>Pristis pristis</i> (Linnaeus, 1758)	Common Sawfish	CR
Rajiformes	Rhynchobatidae	<i>Rhynchobatus djiddensis</i> (Forsskål, 1775)	Giant Guitarfish, Whitespotted Wedgefish	VU
Rajiformes	Rhinobatidae	<i>Rhinobatos annandalei</i> Norman, 1926	Annandale's Guitarfish	DD
Rajiformes	Rhinobatidae	<i>Rhinobatos annulatus</i> Smith, in Müller & Henle, 1841	Lesser Guitarfish, Lesser Sandshark	LC
Rajiformes	Rhinobatidae	<i>Rhinobatos horkelii</i> Müller & Henle, 1841	Brazilian Guitarfish	CR
Rajiformes	Rhinobatidae	<i>Rhinobatos lionotus</i> Norman, 1926	Smoothback Guitarfish	DD
Rajiformes	Torpedinidae	<i>Torpedo nobiliana</i> Bonaparte, 1835	Atlantic, Black or Great Electric Ray	DD
Rajiformes	Rajidae	<i>Amblyraja radiata</i> (Donovan, 1808)	Starry Ray, Thorny Skate	VU
Rajiformes	Rajidae	<i>Malacoraja senta</i> (Garman, 1885)	Smooth Skate	EN
Rajiformes	Rajidae	<i>Raja binoculata</i> Girard, 1854	Big Skate	NT
Rajiformes	Rajidae	<i>Raja pulchra</i> Liu, 1932	Mottled Skate	VU
Rajiformes	Rajidae	<i>Raja straeleri</i> Poll, 1951	Biscuit Skate	DD
Rajiformes	Potamotrygonidae	<i>Potamotrygon constellata</i> (Vaillant, 1880)	Thorny River Stingray	DD
Rajiformes	Potamotrygonidae	<i>Potamotrygon hystrix</i> (Müller & Henle, in Orbigny, 1834)	Porcupine River Stingray,	DD
Rajiformes	Potamotrygonidae	<i>Potamotrygon motoro</i> (Natterer, 1841)	Ocellate River Stingray	DD
Rajiformes	Potamotrygonidae	<i>Potamotrygon scobina</i> Garman, 1913	Raspy River Stingray	DD
Rajiformes	Dasyatidae	<i>Himantura fai</i> Jordan & Seale, 1906	Pink Whipray	LC
Rajiformes	Dasyatidae	<i>Himantura imbricata</i> (Bloch & Schneider, 1801)	Scaly Whipray	DD
Rajiformes	Dasyatidae	<i>Himantura marginata</i> (Blyth, 1860)	Blackedge Whipray	DD
Rajiformes	Dasyatidae	<i>Himantura polylepsis</i> (Bleeker, 1852)		EN
Rajiformes	Dasyatidae	<i>Himantura uarnacoides</i> (Bleeker, 1852)	Bleeker's Whipray	VU
Rajiformes	Dasyatidae	<i>Himantura uarnak</i> (Forsskål, 1775)	Honeycomb, Leopard, Marbled, or Reticulate Whipray	VU
Rajiformes	Dasyatidae	<i>Dasyatis centroura</i> (Mitchill, 1815)	Roughtail Stingray	LC
Rajiformes	Dasyatidae	<i>Dasyatis colarensis</i> Santos, Gomes & Charvet-Almeida, 2004	Colares Stingray	VU
Rajiformes	Dasyatidae	<i>Dasyatis geijskesi</i> Boeseman, 1948	Sharpsnout or Wingfin Stingray	NT
Rajiformes	Dasyatidae	<i>Dasyatis sabina</i> (Lesueur, 1824)	Atlantic Stingray	LC
Rajiformes	Dasyatidae	<i>Pastinachus sephen</i> (Forsskael, 1775)	Cowtail Stingray	DD
Rajiformes	Dasyatidae	<i>Pteroplatytrygon violacea</i> (Bonaparte, 1832)	Blue or Pelagic Stingray	LC
Rajiformes	Myliobatidae	<i>Aetobatus flagellum</i> (Bloch & Schneider, 1801)	Longheaded Eagle Ray	EN
Rajiformes	Myliobatidae	<i>Aetobatus narinari</i> (Euphrasen, 1790)	Bonnetray, Spotted Eagle Ray	NT
Rajiformes	Myliobatidae	<i>Aetomylaeus nichoffi</i> (Bloch & Schneider, 1801)	Banded Eagle Ray	VU

Order	Family	Species and authority	Common names	Red List status
Rajiformes	Myliobatidae	<i>Myliobatis freminvillii</i> Lesueur, 1824	Bullnose Ray	DD
Rajiformes	Myliobatidae	<i>Myliobatis goodei</i> Garman, 1885	Southern Eagle Ray	DD
Rajiformes	Rhinopteridae	<i>Rhinoptera bonasus</i> (Mitchill, 1815)	Cowfish, Cownose Ray, Skeete	NT
Rajiformes	Rhinopteridae	<i>Rhinoptera javanica</i> Müller & Henle, 1841	Flapnose Ray, Javanese Cownose Ray	VU
Rajiformes	Rhinopteridae	<i>Rhinoptera steindachneri</i> Evermann & Jenkins, 1891	Golden or Pacific Cownose Ray, Hawkray	NT
Rajiformes	Mobulidae	<i>Manta alfredi</i> (Krefft, 1868)	Coastal or Reef Manta Ray	VU
Rajiformes	Mobulidae	<i>Manta birostris</i> (Donndorff, 1798)	Giant Manta Ray	VU
Rajiformes	Mobulidae	<i>Mobula hypostoma</i> (Bancroft, 1831)	Atlantic or Lesser Devil Ray	DD
Rajiformes	Mobulidae	<i>Mobula japanica</i> (Müller & Henle, 1841)	Japanese or Spinetail Devilray	NT
Rajiformes	Mobulidae	<i>Mobula kuhlii</i> (Müller & Henle, 1841)	Lesser or Shortfin Devil Ray	DD
Rajiformes	Mobulidae	<i>Mobula mobular</i> (Bonnaterre 1788)	Giant Devil Ray	EN
Rajiformes	Mobulidae	<i>Mobula munkiana</i> Notarbartolo-di-Sciara, 1987	Pygmy Devil Ray	NT
Rajiformes	Mobulidae	<i>Mobula tarapacana</i> (Philippi, 1892)	Chilean, Guinean or Sicklefin Devil Ray	DD

2. Possibly migratory shark species (listed in taxonomic order)

Order	Family	Species and authority	Common names	Red List status
Lamniformes	Odontaspidae	<i>Odontaspis noronhai</i> (Maul, 1955)	Bigeye Sand Tiger	DD
Lamniformes	Odontaspidae	<i>Odontaspis ferox</i> (Risso, 1810)	Herbst's Nurse Shark, Smalltooth Sand Tiger	VU
Lamniformes	Pseudocarchariidae	<i>Pseudocarcharias kamoharai</i> (Matsubara, 1936)	Crocodile Shark	NT
Carcharhiniformes	Triakidae	<i>Mustelus canis</i> (Mitchell, 1815)	Dusky Smoothhound	NT
Carcharhiniformes	Hemigaleidae	<i>Hemipristis elongata</i> Klunzinger, 1871	Fossil or Snaggletooth Shark	VU
Carcharhiniformes	Carcharhinidae	<i>Carcharhinus altimus</i> (Springer, 1950)	Bignose Shark	DD
Carcharhiniformes	Carcharhinidae	<i>Carcharhinus amboinensis</i> (Müller & Henle, 1839)	Java Shark, Pigeye Shark	DD
Carcharhiniformes	Carcharhinidae	<i>Carcharhinus porosus</i> (Ranzani, 1839)	Smalltail Shark	DD
Carcharhiniformes	Carcharhinidae	<i>Carcharhinus albimarginatus</i> (Rüppell, 1837)	Silvertip Shark	NT
Carcharhiniformes	Carcharhinidae	<i>Carcharhinus amblyrhynchos</i> (Bleeker, 1856)	Grey Reef Shark	NT
Carcharhiniformes	Carcharhinidae	<i>Carcharhinus dussumieri</i> (Valenciennes, in Müller & Henle, 1839)	Whitecheek or Widemouth Blackspot Shark	NT
Carcharhiniformes	Carcharhinidae	<i>Carcharhinus galapagensis</i> (Snodgrass & Heller, 1905)	Galapagos Shark	NT
Carcharhiniformes	Carcharhinidae	<i>Carcharhinus melanopterus</i> (Quoy & Gaimard, 1824)	Blacktip Reef Shark	NT
Carcharhiniformes	Carcharhinidae	<i>Carcharhinus perezii</i> (Poey, 1876)	Caribbean Reef Shark	NT
Carcharhiniformes	Carcharhinidae	<i>Carcharhinus sealei</i> (Pietschmann, 1916)	Blackspot Shark	NT
Carcharhiniformes	Carcharhinidae	<i>Carcharhinus sorrah</i> (Müller & Henle, 1839)	Spottail Shark	NT
Carcharhiniformes	Carcharhinidae	<i>Carcharhinus signatus</i> (Poey, 1868)	Night Shark	VU
Carcharhiniformes	Carcharhinidae	<i>Lamiopsis temmincki</i> (Müller & Henle, 1839)	Broadfin Shark	EN
Carcharhiniformes	Carcharhinidae	<i>Nasolamia velox</i> (Gilbert, 1898)	Whitenose Shark	DD
Carcharhiniformes	Carcharhinidae	<i>Rhizoprionodon acutus</i> (Rüppell, 1837)	Milk Shark	LC
Carcharhiniformes	Carcharhinidae	<i>Rhizoprionodon terraenovae</i> (Richardson, 1836)	Atlantic Sharpnose Shark	LC
Carcharhiniformes	Sphyrnidae	<i>Eusphyrus blochii</i> (Cuvier, 1817)	Winghead Shark	NT
Carcharhiniformes	Sphyrnidae	<i>Sphyrna media</i> Springer, 1940	Scoophead Shark	DD
Carcharhiniformes	Sphyrnidae	<i>Sphyrna corona</i> Springer, 1940	Mallethead or Scalloped Bonnethead	NT

Order	Family	Species and authority	Common names	Red List status
Rajiformes	Rhinobatidae	<i>Rhinobatos percellens</i> (Walbaum, 1792)	Chola or Southern Guitarfish	NT
Rajiformes	Narcinidae	<i>Discopyge tschudii</i> Heckel in Tschudi, 1844	Apron Ray	NT
Rajiformes	Narcinidae	<i>Narcine brasiliensis</i> (Olfers, 1831)		DD
Rajiformes	Torpedinidae	<i>Torpedo fuscomaculata</i> Peters, 1855	Blackspotted Torpedo	DD
Rajiformes	Rajidae	<i>Leucoraja erinacea</i> (Mitchill 1825)	Little Skate	NT
Rajiformes	Rajidae	<i>Dipturus batis</i> Linnaeus, 1758	Blue, Flapper, or Grey Skate	CR
Rajiformes	Rajidae	<i>Raja eglanteria</i> Bosc, 1800	Clearnose Skate	LC
Rajiformes	Rajidae	<i>Raja clavata</i> Linnaeus, 1758	Thornback Skate	NT
Rajiformes	Dasyatidae	<i>Dasyatis americana</i> Hildebrand & Schroeder, 1928	Southern Stingray	DD
Rajiformes	Dasyatidae	<i>Dasyatis dipterura</i> Jordan & Gilbert, 1880	Diamond Stingray	DD
Rajiformes	Dasyatidae	<i>Dasyatis guttata</i> (Bloch & Schneider, 1801)	Longnose Stingray	DD
Rajiformes	Dasyatidae	<i>Dasyatis laosensis</i> Roberts & Karnasuta, 1987	Mekong Freshwater Stingray	EN
Rajiformes	Dasyatidae	<i>Dasyatis chrysonota</i> (Smith, 1828)	Blue Stingray	LC
Rajiformes	Dasyatidae	<i>Dasyatis say</i> (Lesueur, 1817)	Bluntnose Stingray	LC
Rajiformes	Dasyatidae	<i>Dasyatis fluviatorum</i> Ogilby, 1908	Brown or Estuary Stingray or Stingaree	VU
Rajiformes	Dasyatidae	<i>Himantura schmardae</i> (Werner, 1904)	Chupare Stingray	DD
Rajiformes	Dasyatidae	<i>Himantura walga</i> (Muller & Henle, 1841)	Dwarf Whipray	NT
Rajiformes	Gymnuridae	<i>Gymnura micrura</i> (Bloch & Schneider, 1801)	Smooth Butterfly Ray	DD
Rajiformes	Gymnuridae	<i>Gymnura natalensis</i> (Gilchrist & Thompson, 1911)	Butterfly, Diamond or Short-tailed Ray	DD
Rajiformes	Myliobatidae	<i>Aetobatus guttatus</i> (Shaw, 1804)	Sharpwing Eagle Ray	DD
Rajiformes	Myliobatidae	<i>Aetomylaeus maculatus</i> (Gray, 1832)	Mottled Eagle Ray	EN
Rajiformes	Myliobatidae	<i>Aetomylaeus vespertilio</i> (Bleeker, 1852)	Ornate or Reticulate Eagle Ray	EN
Rajiformes	Myliobatidae	<i>Pteromylaeus bovinus</i> (Geoffroy St. Hilaire, 1817)	Bullray, Duckbill	DD
Rajiformes	Rhinopteridae	<i>Rhinoptera brasiliensis</i> Müller & Henle, 1841	Brazilian Cownose Ray	EN
Rajiformes	Rhinopteridae	<i>Rhinoptera marginata</i> (Geoffroy St. Hilaire, 1817)	Lusitanian Cownose Ray	NT
Rajiformes	Myliobatidae	<i>Myliobatis aquila</i> (Linnaeus, 1758)	Common Eagle Ray	DD
Rajiformes	Myliobatidae	<i>Myliobatis chilensis</i> Philippi, 1892	Chilean Eagle Ray	DD
Rajiformes	Myliobatidae	<i>Myliobatis peruvianus</i> Garman, 1913	Peruvian Eagle Ray	DD
Rajiformes	Myliobatidae	<i>Myliobatis tobijei</i> Bleeker, 1854	Japanese Eagle Ray, Kite Ray	DD
Rajiformes	Myliobatidae	<i>Myliobatis californicus</i> Gill, 1865	Bat Ray	LC
Rajiformes	Myliobatidae	<i>Myliobatis longirostris</i> Applegate & Fitch, 1964	Longnose or Snouted Eagle Ray	NT
Rajiformes	Mobulidae	<i>Mobula eregoodootenkee</i> (Bleeker, 1859)	Pygmy Devilray	NT
Rajiformes	Mobulidae	<i>Mobula thurstoni</i> (Lloyd, 1908)	Bentfin or Lesser Devil Ray,	NT
Rajiformes	Mobulidae	<i>Mobula rochebrunei</i> (Vaillant, 1879)	Lesser Guinean Devil Ray	VU

3. Shark species listed in UNCLOS Annex 1, Highly Migratory Species

Migratory/possibly migratory sharks listed in UNCLOS Annex 1, Highly Migratory Species

<i>Hexanchus griseus</i>	<i>Carcharhinus isodon</i>	<i>Prionace glauca</i>
<i>Cetorhinus maximus</i>	<i>Carcharhinus leucas</i>	<i>Rhizoprionodon acutus</i>
Family Alopiidae	<i>Carcharhinus limbatus</i>	<i>Rhizoprionodon terraenovae</i>
<i>Alopias pelagicus</i>	<i>Carcharhinus longimanus</i>	Family Isurida
<i>Alopias superciliosus</i>	<i>Carcharhinus macloti</i>	(now Family Lamnidae)
<i>Alopias vulpinus</i>	<i>Carcharhinus melanopterus</i>	<i>Carcharodon carcharias</i>
<i>Rhincodon typus</i>	<i>Carcharhinus obscurus</i>	<i>Lamna ditropis</i>
Family Carcharhinidae ⁵	<i>Carcharhinus perezii</i>	<i>Lamna nasus</i>
<i>Carcharhinus acronotus</i>	<i>Carcharhinus plumbeus</i>	<i>Isurus oxyrinchus</i>
<i>Carcharhinus albimarginatus</i>	<i>Carcharhinus porosus</i>	<i>Isurus paucus</i>
<i>Carcharhinus altimus</i>	<i>Carcharhinus sealei</i>	Family Sphyrnidae
<i>Carcharhinus amblyrhynchoides</i>	<i>Carcharhinus signatus</i>	<i>Eusphyrna blochii</i>
<i>Carcharhinus amblyrhynchos</i>	<i>Carcharhinus sorrah</i>	<i>Sphyrna corona</i>
<i>Carcharhinus amboinensis</i>	<i>Galeocerdo cuvier</i>	<i>Sphyrna lewini</i>
<i>Carcharhinus brachyurus</i>	<i>Isogomphodon oxyrinchus</i>	<i>Sphyrna media</i>
<i>Carcharhinus brevipinna</i>	<i>Lamiopsis temmincki</i>	<i>Sphyrna mokarran</i>
<i>Carcharhinus dussumieri</i>	<i>Nasolamia velox</i>	<i>Sphyrna tiburo</i>
<i>Carcharhinus falciformis</i>	<i>Negaprion acutidens</i>	<i>Sphyrna tudes</i>
<i>Carcharhinus galapagensis</i>	<i>Negaprion brevirostris</i>	<i>Sphyrna zygaena</i>

⁵ Annex I simply lists 'Family Carcharhinidae, which includes many species that are not known to be migratory. This table specifies the species that are, according to this review, relevant here.