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SPECIES**

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AN OPTION FOR INTERNATIONAL COOPERATION
ON MIGRATORY SHARKS UNDER
THE CONVENTION ON MIGRATORY SPECIES
Mahe, Seychelles, 11-13 December 2007
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**BACKGROUND PAPER ON THE CONSERVATION STATUS OF MIGRATORY
SHARKS AND POSSIBLE OPTIONS FOR INTERNATIONAL COOPERATION
UNDER THE CONVENTION ON MIGRATORY SPECIES**

*(Prepared by the Shark Specialist Group of the IUCN Species Survival Commission
on behalf of the CMS Secretariat)*

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Abbreviations

ACAP	Agreement on the Conservation of Albatrosses and Petrels
ACCOBAMS	Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area
ASEAN	Association of Southeast Asian Nations
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
HMFS MP	Highly Migratory Fish Species Management Plan
IATTC	Inter-American Tropical Tuna Commission
ICCAT	International Commission for the Conservation of Atlantic Tunas (Atlantic)
ICES	International Council for the Exploration of the Seas (Northeast Atlantic)
IOSEA MoU	Memorandum of Understanding on the Conservation and Management of Marine Turtles and their Habitats of the Indian Ocean and South-East Asia
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
MSY	Maximum Sustainable Yield
NAFO	Northwest Atlantic Fisheries Organization
NE	Not Evaluated (in the IUCN Red List of Threatened Species)
NEAFC	North East Atlantic Fisheries Commission
NPOA	National Plan of Action
NT	Near Threatened (in the IUCN Red List of Threatened Species)
RAC/SPA	Regional Activity Centre for Specially Protected Areas (UNEP, Mediterranean)
RFO	Regional Fisheries Organization
RFMO	Regional Fisheries Management Organization
SAR	Shark Assessment Report
SEAFO	South-east Atlantic Fisheries Organization
SPA	Specially Protected Area
SSC	Species Survival Commission (of IUCN—the World Conservation Union)
SSG	Shark Specialist Group
SWOT	Strengths, Weaknesses, Opportunities, Threats
TAC	Total Allowable Catch
TRAFFIC	The trade monitoring partnership of IUCN and WWF
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
WSSD	World Summit on Sustainable Development

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Important source documents included papers by Jules Colomer on “The Convention on Migratory Species’ role in the conservation and management of Migratory Sharks” and “Frequently asked questions”, and a study on the merits of a CMS instrument for migratory raptors by Paul Goriup and Graham Tucker (2005). Extracts from these documents have been used in this review.

The Department for Environment, Food and Rural Affairs (Defra UK) funded the preparation of the initial shark database and an extension to cover batoid fishes (skates and rays), the preparation of this report, and Sarah Fowler’s travel to the CMS shark meeting in the Seychelles (December 2007) and the Scientific Council Meeting in Bonn (March 2007). The CMS Secretariat is funding an associated review of the cartilaginous fishes for the latter meeting. Sarah Fowler’s attendance at the Seychelles and Bonn meetings is made possible by the Pew Marine Fellows Program.

1 Introduction

1.1 Background

A wide range of human activities directly and indirectly affect shark populations around the world (Stevens *et al.* 2005), chief among these being fisheries. The K-selected life history strategies of sharks, which include slow growth, late maturity, the production of small numbers of large well-developed young, longevity, and low natural mortality, are characteristic of species with few natural predators and are highly successful under natural conditions. Unfortunately, they also make sharks particularly vulnerable to population depletion if mortality rates increase, and slow to recover even if conservation and management measures are introduced. Many stocks are now depleted and some species are now considered to have a heightened risk of extinction, mostly as a result of the rapid and largely unregulated growth of target and bycatch fisheries in State waters and on the high seas. Other threats to shark stocks include depletion of their prey species and habitat loss or degradation through coastal development and pollution (Camhi *et al.* 1998).

Despite early warnings that shark stocks required special management attention and that fisheries might not be sustainable (e.g. Holden 1973), and the listing of oceanic shark species on Annex 1, Highly Migratory Species, of the 1982 UN Convention on the Law of the Sea (UNCLOS), very few States and no Regional Fisheries Organisations had introduced shark fisheries management measures prior to the 1990s. The vulnerability of sharks to unregulated fishing activities, declining shark stocks and increasing trade demand for their products did not really attract international attention until 1994, when the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), adopted Resolution Conf. 9.17 'The Status of International Trade in Shark Species'. This noted the lack of specific management or conservation measures for sharks at multilateral or regional level and, *inter alia*, asked Parties to CITES, the UN Food and Agriculture Organization (FAO) and other international fisheries management organisations to establish programmes to provide biological and trade data. Subsequently, shark conservation, management and data collection programmes have received greatly increased attention within CITES, FAO, regional fisheries organisations, at least some shark fishing States, and through the Convention on Migratory Species.

A significant proportion of threatened shark species are migratory, some of them undertaking very large scale movements across and around ocean basins. These extensive migrations mean that conservation efforts in one State can be undermined by actions in the waters of other States or on the high seas. Such species therefore require conservation and management action across their entire range. Although a number of international management measures include, in theory, provisions for the conservation and management of migratory sharks (see section 4), these have generally failed so far to deliver practical improvements in the conservation status of the species, or may be too recently adopted to have taken effect.

The highly migratory white shark *Carcharodon carcharias*, whale shark *Rhincodon typus* and basking shark *Cetorhinus maximus* are already included in Appendices of the Convention on Migratory Species (CMS) as well as in Annex I of UNCLOS and Appendix II of the Convention on International Trade in Endangered Species (CITES) due to their unfavourable conservation status, which is mainly caused by target and bycatch fisheries mortality that is partly driven by international trade demand. CMS has recognised through its Recommendation 8.16 on "Migratory sharks" (Annex 1) that these and potentially other shark species could likely benefit

from conservation measures delivered through CMS in cooperation with other partners. Since the greatest threats to shark stocks arise from target and bycatch fisheries, it follows that CMS may have greatest impact if it is able to develop measures that complement the activities of the fisheries management bodies that are already engaged in national, regional and international shark conservation and management, for example by identifying and addressing the gaps left by the implementation of traditional fisheries measures and the potential for synergistic efforts. This paper seeks to highlight some of the major gaps that might benefit from CMS action by identifying all currently known migratory shark species with an unfavourable conservation status, their global and regional distribution, and the national, regional and international fisheries or conservation management actions that are already in place.

1.2 Objectives

This study was commissioned from the IUCN Species Survival Commission Shark Specialist Group (IUCN SSG) by the UK Department for Environment, Food and Rural Affairs and the CMS Secretariat, with the following brief.

1.2.1 Phase 1

The initial objectives of this study are to prepare a migratory shark species database, and to use the database to develop a resource paper (this document) that will provide a contextual basis for the 2007 Seychelles Meeting to Identify and Elaborate an Option for International Cooperation on Migratory Sharks under the Convention on Migratory Species. The three primary agenda items to be supported by this paper are:

- i) an analysis of the conservation status of sharks defined as migratory under CMS (agenda item 4);
- ii) a review of existing international, regional and other initiatives to improve the conservation status of migratory sharks (agenda item 5); and
- iii) options for international cooperation on migratory shark conservation and management under CMS (agenda item 6).

1.2.2 Phase 2

The second phase of the study expanded the database to include migratory batoids, reviewed all the cartilaginous fish species in order to identify outstanding candidate species for listing in CMS Appendix I and II on the basis of their conservation and migratory status, and clarified the level of completion required with respect to populations or partial listings. The results of this phase of the study were prepared for presentation to the 14th Meeting of the CMS Scientific Council (ScC) in March 2007.

2 Methods, definitions and datasets

2.1 Methodology

The IUCN Shark Specialist Group (SSG) Secretariat, in consultation with the SSG's volunteer network, developed the migratory shark species database from information collated over the past decade during the SSG's programme of undertaking Red List Assessments for all species of Chondrichthyan fishes (the sharks, skates, rays and chimaeras). The published, submitted and draft IUCN Red List assessments of migratory sharks were used as the basis for determining whether these species are of unfavourable conservation status as defined by CMS (Annex 4), and hence to identify potential candidate species in addition to those already listed for conservation action through CMS (Section 3).

The database was also used to identify those range States with a significant number of migratory species with unfavourable conservation status. This list of States was compared with the list of States identified in FAO data that report the largest shark landings (including from high seas stocks) and which therefore appear to have the greatest international impact upon shark stocks (Lack and Sant 2006). These two criteria are suggested for the identification of likely important partners in any CMS initiative on sharks. The SSG maintains a watching brief on developments in international, regional and national conservation and management initiatives for sharks, and used this information to summarise existing initiatives to improve the conservation status of migratory sharks. The membership and engagement of the above States in relevant shark conservation and management initiatives was reviewed (Section 4).

A SWOT analysis (Section 5, Table 11) was used to clarify the options for international cooperation on migratory shark conservation and management under CMS.

2.2 Definition of migratory species

Species included in this analysis were those that fall under the definition given in Article I of CMS i.e. "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) National jurisdictional boundaries include national land borders and the outer 200 mile EEZ boundary of each nation.

While it is easy to identify many shark species that are clearly migratory as defined above, data are currently inadequate to identify conclusively all migratory sharks. Several species are considered to be 'possibly migratory' where there is evidence suggesting that migrations occur

but their nature remains uncertain. The GROMS database was consulted and found to include a subset of the shark species identified by this study, but also some sharks that are apparently not migratory but likely restricted to very small home ranges.

It should be noted that while a species that occurs in more than one ocean basin may undertake seasonal migrations of similar length in different regions, it is possible in one region for the entire migration to be undertaken without crossing a national boundary, whereas in another the migrating stock may cross several, where States have shorter coastal fringes.

Since many migratory shark species are listed on Annex I 'Highly Migratory Species' of UNCLOS and potentially covered by the UN Fish Stock Agreement (FSA), which also has a remit for 'straddling fish stocks' it is useful to note the FAO definitions (or application) of these terms from Maguire *et al.* (2006).

'Highly migratory species' are simply defined (legally) as those listed in Annex I of UNCLOS (see section 4). In practical terms, however, these species "*are in general capable of migrating relatively long distances, and stocks of these species are likely to occur both within exclusive economic zones and on the high seas*". They are important for fisheries "*in all oceans and semi-enclosed seas, except for polar regions*".

There is no formal definition of 'straddling fish stocks' in either UNCLOS or FSA, but article 63, clause 2 of the former refers to: "*the same stock or stocks of associated species [which] occur both within the exclusive economic zone and in an area beyond and adjacent to the zone*", while the FSA refers to "*stocks occurring both within and beyond the exclusive economic zone*". These stocks may be much more localized and not necessarily migratory but many, particularly in temperate waters, will undertake seasonal or breeding migrations. They primarily occur in a few regions where continental shelves extend beyond the 200 mile exclusive economic zone (EEZ) limit, or in high productivity areas where predominantly coastal stocks extend into the high seas, or high seas stocks are attracted into the EEZ. Straddling stocks can also be transboundary stocks, which occur within more than one State EEZ, although transboundary stocks do not always extend into the high seas. Transboundary stocks frequently are migratory, particularly in temperate seas.

Finally, the term 'high seas stocks' is used to specify those fish stocks that are not found in EEZs and are neither 'highly migratory' nor 'straddling'. The latter are, therefore, excluded from the CMS definition of migratory species because, although they may potentially travel long distances, they do not cross national boundaries and enter EEZs. Most commercially important high seas stocks, as defined by Maguire *et al.* (2006), are deep-water species that are fished at depths of 500 to 1,000 m or more, but there are also some pelagic species. Many deepwater shark stocks occupy a relatively small range in their stable low energy environment and do not migrate, being confined to narrow depth bands on continental and island slopes, oceanic rises and sea mounts. At least a few deepwater sharks, however, show marked segregation by age and sex, suggesting that they probably carry out long distance migrations around or across ocean basins but probably without crossing State boundaries into EEZs.

2.3 Taxonomy and nomenclature

Class Chondrichthyes, the cartilaginous fishes, is comprised of the sharks, batoids (including skates, stingrays, guitarfishes and sawfishes) and chimaeroid fishes, including about 60

families, 189 genera and about 1,200 living species (Compagno *et al.* 2005, Compagno 2001 and in preparation). Chondrichthyan fishes occur in almost every marine habitat and a few species are found in some rivers and lakes. The chimaeras fall in Subclass Holocephalii and the sharks and rays in Subclass Elasmobranchii. Although traditional classifications divided the elasmobranchs into sharks (Squalii, Pleurotremata) and rays (Batoidea, Hypotremata), current taxonomic research has demonstrated that the elasmobranchs should be subdivided into two Superorders, Squalomorphii (squalomorph sharks, containing the batoids in Order Rajiformes) and Galeomorphii (galeomorph sharks). The smaller bottom-living species tend not to be strong swimmers and to have a limited range, but some of the larger pelagic species undertake regular, even continuous migrations that may cross ocean basins.

2.4 Data sources

Much of the quantitative analysis presented in this document draws upon published IUCN Red List data, the Red List data sheets submitted in 2006 but not yet published and, to a lesser extent, draft Red List assessments still in preparation by the IUCN Species Survival Commission Shark Specialist Group (SSG). These data sheets include all key literature identified for each species, and have been compiled during the Shark Specialist Group's Global Assessment of Chondrichthyan Fishes, which is scheduled for completion at the end of 2007.

The FAO Catalogue of Sharks of the World (Compagno 1984, 2001 and in preparation) has been a particularly important source of information, both for published Red List assessments and for those species not yet reviewed for the Red List. Information on the major shark fishing nations is derived from the FAO database, with this information extracted from a recent TRAFFIC review by Lack and Sant (2006). Finally, SSG members were also consulted and asked for their feedback on the provisional list of migratory species prepared during this study.

2.5 Database structure

No database specification was provided for this project. Excel was therefore used for the construction of the prototype migratory shark species database since this can easily be exported into more complex database formats. Annex 5 describes the structure of the database prepared for this study and the fields included.

The database includes information, where available, on CMS migratory status, global and regional Red List (threatened) status, legal and management status, range States, and a bibliography. This information is not comprehensive. In particular, information on the national legal and management status of sharks is not readily available and likely incomplete (much of this was obtained in the form of 'personal communications' from the members of the IUCN SSC Shark Specialist Group network who kindly assisted with research for this study).

Summing the columns for each State in the 'Range' section of the database provides an index of the number of CMS migratory shark species occurring in each State. This can be sorted to show the range States by the number of shark species occurring in their waters. When these data are amalgamated, the range States can be identified in whose waters the largest number of species of migratory shark occur (see section 3.3, Table 5).

3 Conservation status of migratory sharks

3.1 Global conservation status of sharks

The CMS definition of favourable conservation status is given in Annex 4. Migratory sharks whose conservation status is not favourable generally fail to meet the definition in Article 1(c)4: “*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*”. Many shark species’ abundance is greatly reduced below historic levels and the majority of these do not benefit from any wildlife (or in their case fisheries) management. These species qualify for inclusion in Threatened or Near Threatened IUCN Red List Categories using Criterion A (population decline).

Examination of the global status of all shark species published in the 2006 Red List and summarised in Table 1 (about two thirds of all living sharks), reveals that a much higher percentage of migratory species are of unfavourable conservation status (48.89% are assessed as Threatened: Critically Endangered, Endangered or Vulnerable, and 28.89% as Near Threatened), than non-migratory species (11.3% and 12.9% respectively). The degree of threat to the small number of possibly migratory species (that may meet CMS criteria) is also high. Their status is primarily affected by depletion in unsustainable target and bycatch fisheries.

Correspondingly, therefore, a much smaller proportion of migratory species than non-migratory species are Data Deficient or Least Concern. The latter arises partly from the large proportion of Data Deficient and/or Least Concern deepwater species that are not known to be migratory and/or are out of range of fisheries, and partly by the high proportion of Australian endemics that are in favourable conservation status because they are largely unfishes or well managed.

The 22 migratory and three possibly migratory shark species that have so far been evaluated as threatened globally using the IUCN Red List categories and criteria are listed in Table 3 with details of their migratory behaviour. A further 13 migratory and 12 possibly migratory species are listed as ‘Near Threatened’, because they are close to meeting the qualifying level of decline for a Vulnerable IUCN Red List classification. This may also qualify them for consideration by CMS as species with an unfavourable status.

This is not a complete review of the status of shark species, since the Red List programme for the chondrichthyan fishes is still incomplete, with Red List assessments not yet undertaken, incomplete, or in need of review for a number of the pelagic shark species that are likely to be of concern to CMS. This review should, therefore, be updated in 2007 when all Red List assessments for migratory species have become available. These additional assessments are unlikely to result in major changes to this overall picture, although several of the migratory species currently classified as Data Deficient may prove to qualify for Threatened status.

It is interesting to compare these results with the conclusions of Maguire *et al.* (2006), which are broadly similar to the results of the IUCN Red List Programme for migratory shark species presented here. These authors describe the state of highly migratory fish stocks (species listed in UNCLOS Annex I - see Table 6), straddling fish stocks, and stocks of other high-seas fishery resources, based on an FAO classification presented in Table 2. Formal assessments are lacking for most of the stocks examined and analysis is hampered because catches and landings from straddling and highly migratory fish stocks are not reported separately.

Nevertheless, the compilation of available assessments and FAO's analyses indicate that about 30 percent of the stocks of highly migratory tuna and tuna-like species, more than 50 percent of the highly migratory oceanic sharks and nearly two-thirds of the straddling stocks and the stocks of other high-seas fishery resources are overexploited or depleted (in other words below or significantly below 50% of their unfished biomass).

Table 1. Comparison of the global Red List status of non-migratory, migratory and possibly migratory shark species (published and pending publication assessments).

Category	Non-migratory		Migratory		Possibly migratory	
	Number	Percentage*	Number	Percentage*	Number	Percentage*
Critically Endangered	6	2.3%	2	4.44%	0	0.00%
Endangered	8	3.1%	3	6.67%	0	0.00%
Vulnerable	15	5.9%	17	37.78%	3	13.64%
Near Threatened	33	12.9%	13	28.89%	12	54.55%
Data Deficient	118	46.1%	6	13.33%	5	22.73%
Least Concern	75	29.3%	4	8.89%	2	9.09%
Not Evaluated	6	2.3%	2	4.44%	3	13.64%
LR/cd	1	0.4%	0		0	
Total	262		47		25	
Total evaluated	256		45		22	
Total threatened	29	11.3%	22	48.89%	3	13.64%

* The percentage of the total number of species evaluated.

Table 2. FAO classification of fish stock status (from Maguire *et al.* 2006)

Classification	Definition	Highly migratory shark stocks	All straddling fish stocks
Depleted	Catches are well below historical optimal yields, irrespective of the amount of fishing effort exerted	15%	6%
Overexploited	The fishery is being exploited above the optimal yield/effort which is believed to be sustainable in the long term, with no potential room for further expansion and a higher risk of stock depletion/collapse	40%	58%
Fully exploited	The fishery is operating at or close to optimal yield/effort, with no expected room for further expansion	35%	19%
Moderately exploited	Exploited with a low fishing effort. Believed to have some limited potential for expansion in total production	10%	12%
Not known	Not much information is available to make a judgment, but stocks are at least fully exploited.	39%	0%
Underexploited	Undeveloped or new fishery. Believed to have a significant potential for expansion in total production	0%	4%
Recovering	Catches are again increasing after having been depleted or a collapse from a previous high	0%	1%

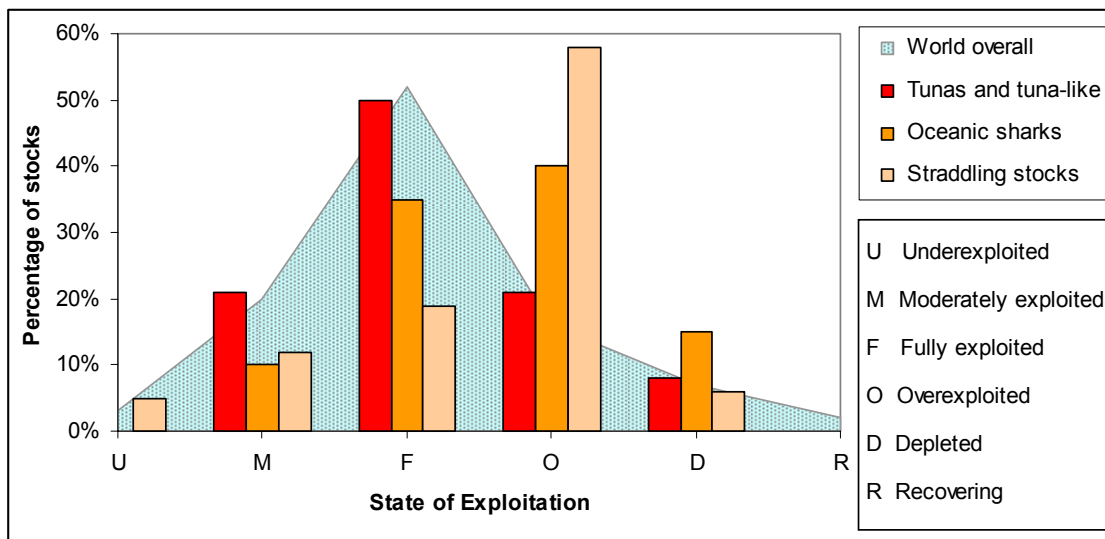
Focusing on shark stocks alone (many of these are species group/area combinations): only 10% of the highly migratory oceanic sharks are assessed as moderately exploited (exploited with a low fishing effort; believed to have some limited potential for expansion in total production), while 35% are fully exploited, 40% are overexploited, 15% depleted and 39% unknown (but at least fully exploited). No highly migratory oceanic shark stocks are reported as underexploited or recovering (Maguire *et al.* 2006). Fully exploited stocks are considered to be around maximum sustainable yield (MSY), or 50% of unfished biomass, but it is important to note that the MSY for many large shark species is higher than 50% (Cortes in press).

Furthermore, as noted by Clarke *et al.* 2006, “the MSY reference point is the highest possible catch that could theoretically be sustainable, and thus any catch that approaches or exceeds this level is of concern”. Based on this FAO analysis, therefore, at least the 55% of overexploited and depleted stocks is below MSY, and likely up to 90% of all highly migratory shark stocks are being unsustainably exploited.

The status of straddling shark stocks is not distinguished from that of other straddling fish stocks, but straddling stocks (these are present and exploited both within and beyond State waters) are generally more seriously depleted than those of the highly migratory oceanic stocks. Overall, 4% of all straddling fish stocks are underexploited, 12% moderately exploited, 19% fully exploited, 58% overexploited, 6% depleted and 1% recovering (Maguire *et al.* 2006). The biology of sharks and widespread lack of management for most straddling shark stocks indicates that the overall status of straddling shark stocks is likely to be worse than the average for all straddling stocks, although some Northwest Atlantic straddling shark stocks may now be classified as ‘recovering’ under management.

Straddling stocks are stocks that are present and exploited both within and beyond State waters. Those shark species listed in Maguire *et al.* (2006) from information provided by NEAFC include the Iceland catshark (*Apristurus* spp.), gulper shark (*Centrophorus granulosus*), leafscale gulper shark (*Centrophorus squamosus*), black dogfish (*Centroscyllium fabricii*), Portuguese dogfish (*Centroscymnus coelolepis*), longnose velvet dogfish (*Centroscymnus crepidater*), rabbit fish (rattail) (*Chimaera monstrosa*), frilled shark (*Chlamydoselachus anguineus*), kitefin shark (*Dalatias licha*), birdbeak dogfish (*Deania calceus*), greater lanternshark (*Etmopterus princeps*), velvet belly (*Etmopterus spinax*), blackmouth dogfish (*Galeus melastomus*), mouse catshark (*Galeus murinus*), bluntnose six-gilled shark (*Hexanchus griseus*), large-eyed rabbit fish (ratfish) (*Hydrolagus mirabilis*), sailfin roughshark (*Oxynotus paradoxus*), round skate (*Raja fyllae*), Arctic skate (*Raja hyperborea*), Norwegian skate (*Raja nidaroensis*), straightnose rabbitfish (*Rhinochimaera atlantica*), knifetooth dogfish (*Scymnodon ringens*), and Greenland shark (*Somniosus microcephalus*) in the Northeast Atlantic. The straddling shark stocks that occur in other regions are not identified by species.

Figure 1. Summary of the state of exploitation of highly migratory tuna and tuna-like species, highly migratory oceanic sharks, and straddling stocks. From Maguire *et al.* 2006.



3.2 Conservation status of sharks listed on CMS

Three threatened shark species are currently included in the Appendices of the Convention on Migratory Species (CMS), in recognition of their unfavourable conservation status and need for concerted international conservation measures. Whale shark *Rhincodon typus* was listed on Appendix II in 1999, white shark *Carcharodon carcharias* on Appendices I and II in 2002, and basking shark *Cetorhinus maximus* on Appendices I and II in 2005. Several other highly migratory shark species exhibit similar characteristics to those described below. Those that require concerted international conservation measures may in future be nominated for inclusion in the CMS Appendices.

All three CMS listed species have been assessed as Vulnerable globally on the IUCN Red List of Threatened Species on the basis of recorded population declines. Some regional populations are also assessed as Threatened (see Table 4) and several range States legally protect these species. Population data are scarce and generally sourced from fisheries records. Records from fisheries targeting basking sharks in the Northeast Atlantic, Ireland, Scotland, Japan and Norway all show catch declines of 90% or more, with fisheries in the Canadian Pacific and California showing declines of at least 30%; some recorded declines occurred in as little as ten years. Catch of whale shark in targeted fisheries in the Philippines declined by an average of 27% per year between 1990 and 1997, and in Taiwan by 60-70% between 1995 and 2002. Reductions in catch per unit effort of great white sharks of over 70% have been reported in the US pelagic longline fishery, in tuna traps and other fishing gear in the Adriatic Sea, and in game fisheries in Australia. Fishing activity, particularly target fisheries, has usually been focused on aggregations of these species where effort is more profitable. Many of these aggregations may no longer exist.

The biology of these species, particularly their low intrinsic rate of population increase, mean that they will be very slow to recover from such depletion and may not recover if even small levels of exploitation continue. Other threats include changes in predator/prey abundance due to fisheries interactions, boat strike, entanglement in marine debris, and pollution. Potential threats to the species include habitat modification and climate change, but the latter is generally considered of less immediate importance than direct mortality from anthropogenic causes. Non-consumptive uses such as tourism can provide significant economic benefits and a major incentive for conservation, if well managed, and is already underway for all three species in various regions.

Maguire *et al.* (2006) also reviewed the status of these species, concluding that the basking shark “is probably overexploited globally with some areas being depleted”; that “unless demonstrated otherwise, it is prudent to consider the [whale shark] as being fully exploited globally”; and that the white shark is sensitive to harvest.

The three species have global distributions that overlap in places – distribution maps are included in Annex 8. Their distribution also overlaps with many other large migratory pelagic and coastal sharks. Records of long distance migration exist for all three species, sometimes crossing oceans (see Table 3). All three species aggregate at key feeding and possibly mating or pupping grounds (centres of abundance for these species are broadly indicated in Annex 8),

with individuals recorded as returning regularly to some of these sites. These aggregations make these species vulnerable to target fisheries, particularly if mature females are taken.

3.3 Regional status and distribution of other migratory sharks

Regional assessments of threat have also been produced for other species of migratory shark, although these are still incomplete. Table 4 provides a summary of the distribution by subdivision of ocean basin of all known migratory shark species, and those for which a regional threat assessment is available. The database has also been used to extract a list of those 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 (Table 5). Note that these data are dependent at least partly upon the survey effort that has been undertaken in these waters, including observations of their catches and landings, and may not be an accurate reflection of their migratory shark biodiversity or relative abundance of listed species.

Table 5. States and entities in whose waters most migratory shark species are reported.

Australia ^{1,2}	Egypt	Mozambique ²
Bahamas	India ²	Nicaragua
Brazil	Indonesia	South Africa ^{1,2}
China ¹	Japan ^{1,3}	Spain ³
Colombia	Madagascar	Taiwan Province of China ^{1,2}
Costa Rica	Mexico ^{1,2}	USA ^{1,3}
Cuba	Morocco	Viet Nam

Key: Aggregations reported of 1) white sharks, 2) whale sharks, 3) basking sharks (now largely extirpated by fisheries in Japan and northern Spain).

Significant records of white sharks are also reported from New Zealand, Chile, Korea, and in the Western Central Mediterranean and Tyrrhenian Sea.

Whale shark aggregations are also reported from Malaysia (Borneo), Philippines, Sri Lanka, Maldives, Seychelles, Iran, Belize and Honduras.

Basking shark aggregations are primarily reported from higher latitudes where overall shark biodiversity is fairly low: Norway, UK, Ireland, France and Italy.

There are likely other unreported aggregation areas, for example for whale sharks in Indonesia and other locations in Southeast Asia.

Table 3. Migratory behaviour of Threatened and Near Threatened migratory and possibly migratory shark species. (Published and pending publication assessments. CR: Critically Endangered, EN: Endangered, VU: Vulnerable, NT: Near Threatened.)

Species name	English name	Global status	Summary of migratory behaviour	Ref
<i>Isogomphodon oxyrinchus</i>	Daggernose shark	CR	Makes seasonal migrations. More common in landings samples from north Brazil fish markets in the second half of the year. Believed to migrate north towards Central America and the Caribbean as the discharge from the Amazon River increases in the first half of the year.	1
<i>Squatina squatina</i>	Angelshark	CR	Seasonally migratory in the northern parts of its European range, making northwards incursions in summer.	3
<i>Carcharias taurus</i>	Sand tiger	EN	Migrations are well studied in the western North Atlantic and also occur or are thought to occur in Australia, the Southwest Atlantic and off South Africa. Migratory patterns seem to differ between regions and cannot be generalised, but the synchronicity of movements in each country suggests a high degree of philopatry and possibly natal homing. Migrations are probably governed by strong environmental cues such as water temperature.	2
<i>Sphyrna lewini</i>	Scalloped hammerhead	EN	Circum-global in warm temperate and tropical seas. Highly mobile and aggregating in large schools, sometimes segregated by age and sex. Seasonally migratory in parts of its range; resident in other areas.	14
<i>Sphyrna mokarran</i>	Great hammerhead	EN	Apparently nomadic and migratory. Some populations (e.g. off Florida and in the South China Sea) moving to higher latitudes in summer. (The global assessment for this species is submitted and will be published later in 2007).	3
<i>Carcharhinus longimanus</i>	Oceanic whitetip shark	VU	Population dynamics and structure are little known. Exhibits size and sexual segregation. Could potentially undertake long-distance oceanic movements. Longline catches in the Central Pacific show it definitely increases in abundance with increasing distance from land, and it does not congregate around land masses. Most abundant in the tropics from 20°N to 20°S, but can occur far beyond its normal range with movements of warm-water masses.	3
<i>Carcharhinus obscurus</i>	Dusky shark	VU	Strongly migratory in temperate and subtropical areas in the Eastern North Pacific and Western North Atlantic, moving north during warmer summer months and retreating south when the water cools. Off the southern coast of Natal, South Africa newborn sharks are found in a nursery area, larger immature sharks over 90 cm move out of this area, with females tending to move north and males south, but there is some overlap in this partial sexual segregation. This pattern is complicated by seasonal, temperature-related migrations as elsewhere in the range of these sharks, going southwards in spring and summer and northwards in winter, and also a tendency for the sharks to move into deeper water during cooler months. There may be other factors affecting the distribution of these young sharks. The young form large feeding schools or aggregations.	4
<i>Carcharhinus plumbeus</i>	Sandbar shark	VU	Some stocks migrate seasonally, often in large schools, as water temperatures change. Young form mixed-sex schools on shallow coastal nursing grounds, moving into deeper, warmer water in winter.	4
<i>Carcharhinus signatus</i>	Night shark	VU	Possibly seasonal geographic migrations within its tropical Atlantic distribution.	4
<i>Carcharodon</i>	White shark	VU	Capable of swimming long distances and for extended periods; long distance migrations of 3,500km recorded. While	5

1 Charvet-Almeida, P. pers. comm., Lessa *et al.* (1999)

2 Bass *et al.* (1975), Gilmore (1983), Gilmore (1993), Branstetter and Musick (1994), Pollard *et al.* (1996), Otway and Parker (1999), Lucifora *et al.* (2003), Bass *et al.* (1975), Dudley (2000), Hueter (1998), Gilmore (1993), Otway and Parker (1999), Allen and Peddemors (2000), Otway *et al.* (2004), Otway *et al.* (1999), Stow *et al.* (2006).

3 Compagno in preparation

⁴ Compagno in prep., Compagno *et al.* 2005

5 Fergusson (1996), Pardini *et al.* (2001), Bonfil *et al.* (2005), Barrull and Mate (2001), Bonfil *et al.* (2005), Chen (1996), Dewar *et al.* (2004).

Species name	English name	Global status	Summary of migratory behaviour	Ref
<i>carcharias</i> *			white sharks are also considered to be a migratory species within their home range, it is possible that they may also move in and out of these areas on a seasonal basis. Equatorial waters may deter large-scale movement but are not a complete barrier since sharks are recorded from very deep water in the tropics. Genetic and tagging research indicates exchange between populations worldwide.	
<i>Cetorhinus maximus</i> *	Basking shark	VU	Seasonal migrations occur, from deep to shallow water and/or from lower to higher latitudes in summer (of distances up to 3,000 km). Most records are from a narrow range of water temperature: 8°–14°C in the UK, Japan and Newfoundland, up to 24°C in New England, USA. Records in warmer waters are generally of moribund or stranded specimens, but healthy sharks may occur in deep cold water. At least some populations are migratory and possibly seasonally segregated by sex; their winter distribution and locations used by pregnant females are unknown, although it seems likely that wintering sharks occur mainly in deep shelf or shelf edge water.	6
<i>Galeorhinus galeus</i>	Tope shark	VU	Migrations of 16,000km recorded. At least in some areas (Northeast Atlantic, Tasman Sea) they also extend offshore up to 1,610 km from the coast.	7
<i>Hemipristis elongatus</i>	Snaggletooth shark	VU	Poorly known behaviour, may migrate in parts of its Indo-West Pacific shelf range.	3
<i>Isurus oxyrinchus</i>	Shortfin mako	VU	May be the fastest shark and one of the swiftest and most active fishes. Highly migratory and has a tendency to follow movements of warm water masses polewards in the summer, in the extreme northern and southern parts of its range. Catches in the KwaZulu-Natal shark nets indicate inshore movements from deeper water over the continental slopes off South Africa. Long-range movements are being studied by conventional tagging in the North Atlantic.	9
<i>Isurus paucus</i>	Longfin mako	VU	Possibly worldwide in tropical oceanic waters. Likely migratory, but may be slower and less active than its better-known relative, the shortfin mako.	8
<i>Lamna nasus</i>	Porbeagle shark	VU	Occurs singly and in schools and feeding aggregations. May come inshore and to the surface in summer, but will winter offshore and beneath the surface. Fisheries catches in Europe indicate population segregation by size (age) and sex. Porbeagle seem to constitute a single population in the Northwest Atlantic that undertakes extensive migrations between southern Newfoundland (Canada) in summer to at least Massachusetts (USA) in the winter. Longterm tagging data suggests limited mixing between populations on either side of the Atlantic.	9
<i>Nebrius ferrugineus</i>	Tawny nurse shark	VU	Possible seasonal or breeding migrations in its coastal tropical Indo-Pacific range. Occurs off South Africa and is possibly a summer migrant from Mozambique.	11
<i>Negaprion acutidens</i>	Sharptooth lemon shark	VU	Probably a seasonal visitor from Mozambique to northern KwaZulu-Natal, South Africa.	10
<i>Rhincodon typus</i> *	Whale shark	VU	Highly migratory, making long-distance, long-term migrations. Tagging and photo-identification studies indicate regular visits to favoured feeding sites to feed at annual, seasonal or lunar fish and invertebrate spawning events.	11
<i>Odontaspis ferox</i>	Smalltooth	VU	Poorly known biology and behaviour, but an active offshore swimmer which may carry out seasonal migrations.	15

6 Sims *et al.* (2003), Sims *et al.* (2005), Skomal (2005).

7 Brown *et al.* (2000), Duarte *et al.* (2002), Dudley, S. (pers. comm.), Fitzmaurice (1979), Lucifora *et al.* (2004), Olsen (1990), Peres and Vooren (1991), West and Stevens (2001)

8 Compagno (2001)

9 Campagna and Joyce (2004).

10 Dudley, S. pers. comm.

11 Heyman *et al.* (2001) Wilson *et al.* (2001), CMS listing proposal.

Species name	English name	Global status	Summary of migratory behaviour	Ref
	sand tiger			
<i>Alopias pelagicus</i>	Pelagic thresher	VU	A little-known, active, strong-swimming species, probably migratory but with movements little-known. In the eastern North Pacific there is a possible population centre off central Baja California, which tends to shift northwards (along with other oceanic sharks) during strong El Niño events.	15
<i>Alopias superciliosus</i>	Bigeye thresher	VU	Little is known of migratory movements, but inferred migrator based on behaviour of other thresher sharks. Listed as a highly migratory oceanic shark.	16
<i>Alopias vulpinus</i>	Thresher shark	VU	In the northwestern Indian Ocean and off the west coast of North America they show spatial and depth segregation by sex. Off the west coast of North America (and probably elsewhere) the species is seasonally migratory, and moves northwards from Baja California into California waters during the spring, with adult males tending to travel farther northwards than females and reaching the coast of British Columbia. Juveniles are mostly found in shallow warm-temperate inshore waters, particularly off southern California where an important nursery area occurs. Juveniles may be less cold-tolerant than adults, and seldom range north of Central California. Both adults and juveniles congregate in inshore waters of southern California, primarily during spring and summer.	15
<i>Sphyrna tudes</i>	Smalleye hammerhead	VU	May migrate seasonally along its southwest Atlantic coastal range. Little known but inferred migrator on basis of distribution and behaviour other hammerheads. Listed as a highly migratory oceanic shark.	16
<i>Squalus acanthias</i>	Piked dogfish	VU	Usually coastal and demersal, they migrate north and south as well as nearshore and offshore travelling in large, dense "packs", segregated by size and sex. Apparently make latitudinal and depth migrations to stay within their optimum range. Movements seem to be correlated to water temperature; the sharks favour a temperature range with a minimum of 7 to 8°C and maximum of 12 to 15°C.	12
<i>Hexanchus griseus</i>	Bluntnose sixgill shark	NT	Further data are required on long-range movements, but this powerful swimmer is probably migratory in temperate areas where it occurs. Tagging studies off South Africa and Namibia show movements of 0-530km from the tagging site. There was no exchange between Namibian and South African sharks, and Namibian sharks travelled less than the latter, 0 to 130 km vs 7 to 539 km ¹³ . Tagging studies and colouration suggest that adjacent breeding bays may have separate populations or subpopulations that return to their breeding grounds each year. Time-lapse video observations in the Strait of Georgia, British Columbia, recorded more sharks in summer than in other months.	14
<i>Somniosus microcephalus</i>	Greenland shark	NT	At higher latitudes, this species may migrate seasonally into warmer near shore waters.	15
<i>Pseudocarcharias kamoharai</i>	Crocodile shark	NT	Offshore oceanic species that may migrate through offshore areas of EEZs.	9
<i>Leptocharias smithii</i>	Barbeled houndshark	NT	Possibly seasonally migratory within its west African coastal range. Pregnant females occur July to October off Senegal, which may perhaps be evidence that they seasonally migrate.	15
<i>Mustelus canis</i>	Dusky smoothhound	NT	Northern population migrates inshore and north in summer, south and offshore in winter.	14
<i>Carcharhinus</i>	Silvertip shark	NT	May not disperse widely between sites. Young are restricted to shallower water closer to shore while adults are more	15

12 Hjertenes (1980), Ketchen (1986), McFarlane and King (2003), Compagno (1984a and b), Compagno in prep.

13 Ebert (1994), Compagno in prep., Dunbrack and Zielinski (2003).

14 Compagno in prep., Compagno 2001, Compagno *et al.* 2005

16. Maguire (2006).

Species name	English name	Global status	Summary of migratory behaviour	Ref
<i>albimarginatus</i>			wide ranging, with little overlap with the young. They have a strong preference for offshore islands, coral reefs and banks. Ranges from inside lagoons and near dropoffs to well offshore, but is not truly oceanic.	
<i>Carcharhinus amblyrhynchoides</i>	Graceful shark	NT	Poorly known tropical inshore and offshore shelf coastal-pelagic Indo-Pacific shark. Migrations not described.	15
<i>Carcharhinus amblyrhynchos</i>	Gray reef shark	NT	Active, strong-swimming social coastal-pelagic and inshore Indo-Pacific species that forms daytime schools or aggregations in favoured areas such as reef passes, lagoons, or near passes and drop-offs. Sonic-tagged individuals have ventured several kilometres offshore at depths less than 100 m. Migrations not described.	15
<i>Carcharhinus brachyurus</i>	Bronze whaler	NT	Apparently migratory in the northern parts of its range, moving northwards in the spring and summertime and southwards in fall and winter. Uses inshore bays and open coastline for nursery grounds in South Africa, and neonates occur there during spring (October-December); Namibian sharks have a later breeding period, during summer (December to March), and may form a separate breeding population from South African sharks.	15
<i>Carcharhinus brevipinna</i>	Spinner shark	NT	Highly migratory off Florida and Louisiana in the Gulf of Mexico, moving inshore in spring and summer to reproduce and feed, but possibly moving southwards and into deeper water during the fall and winter. Young are born in spring to early summer here; in summer off Senegal. There is a nursery ground for one population on the Natal coast; adult females occur there year-round, males seasonally in summer. Tagging studies off South Africa suggest that young sharks prefer slightly lower temperatures than adults, moving south from Natal when temperatures rise.	15
<i>Carcharhinus dussumieri</i>	Whitecheek shark	NT	Tropical inshore Indo-west Pacific shark with poorly known behaviour.	15
<i>Carcharhinus falciformis</i>	Silky shark	NT	An active shark species, found with tuna schools in the eastern Pacific. Population dynamics and structure are poorly known. Longline sampling in the Eastern and Central Pacific shows this shark to be much more abundant offshore near land than in the open ocean, unlike the blue shark (<i>Prionace glauca</i>) and the oceanic whitetip shark, (<i>Carcharhinus longimanus</i>), which occur with it.	15
<i>Carcharhinus galapagensis</i>	Galapagos shark	NT	Circumtropical. Mostly known from around islands, although it does occur off coasts of continents in a few places (mostly in the tropical Eastern Pacific, but possibly also Spain in the Eastern Atlantic). Capable of crossing considerable distances of open ocean between islands. Juveniles seem to be restricted to shallower water, in 25 m or less, which they apparently use as nursery grounds, while the adults range well offshore.	15
<i>Carcharhinus leucas</i>	Bull shark	NT	A northwards movement along the West Atlantic coast during summer from its tropical stronghold, and a southwards retreat when the water cools. Commonly migrates into fresh water.	3
<i>Carcharhinus limbatus</i>	Blacktip shark	NT	Off Florida these sharks are seasonally migratory and absent during winter months. There is evidence of population segregation off Natal, South Africa, where mostly adult males and non-pregnant females occur, with the addition of few young and adolescent sharks and periodic influxes of pregnant females during the spring. Pregnant females mostly do not pup there but apparently migrate elsewhere, possibly to nursery grounds in southern Mozambique.	15
<i>Carcharhinus macloti</i>	Hardnose shark	NT	Forms large aggregations in Indian and North Australian waters. In Bombay waters over 95% of the individuals caught are males, the rest females, indicating strong sexual segregation within its populations.	15
<i>Carcharhinus melanopterus</i>	Blacktip reef shark	NT	Thought to penetrate into brackish lakes and estuaries in Madagascar and into fully fresh water in Malaysia, but its ability to tolerate fresh water for any length of time is uncertain. At the northern and southern extremes of its range the blacktip may be a migrant, but this is uncertain.	15
<i>Carcharhinus perezi</i>	Caribbean reef shark	NT	Poorly studied. Different life-history and reproductive stages may be segregated to some extent within its Western Atlantic range. For example, there may be a pupping ground off the northern coast of Brazil.	15
<i>Carcharhinus sealei</i>	Blackspot shark	NT	Small, common, coastal Indo-west Pacific shark. Abundance varies seasonally off Natal, South Africa.	15

Species name	English name	Global status	Summary of migratory behaviour	Ref
<i>Galeocerdo cuvier</i>	Tiger shark	NT	Tiger sharks in continental waters are believed to migrate into higher latitudes in summer ¹⁵ , but evidence for this is largely anecdotal. It is unclear whether these migrations are in response to thermal conditions and physiological constraints, or are the result of changes in prey abundance or distribution. In general, the influence of prey availability on tiger shark movements has been overlooked although they can move relatively large distances ¹⁶ , including across ocean basins and to oceanic islands, and appear to take advantage of seasonally abundant food resources. For example, tiger sharks are only present in large numbers at the Houtman Abrolhos Islands, Western Australia, during the Western rock lobster fishing season, when discarded bait is an abundant food source.	17
<i>Negaprion brevirostris</i>	Lemon shark	NT	Some populations migrate seasonally, moving into deeper water or lower latitudes in winter.	15
<i>Prionace glauca</i>	Blue shark	NT	Highly migratory species, migrating continuously across and around ocean basins, including between State EEZs and across the high seas.	15
<i>Eusphyra blochii</i>	Winghead shark	NT	Shallow water tropical Indo-West Pacific continental and insular shelf species. No information on migrations and biology poorly known, but inferred migrator on basis of distribution and behaviour of other hammerheads. Listed as a highly migratory oceanic shark.	18
<i>Sphyrna corona</i>	Mallethead shark	NT	Very poorly known East Pacific continental shelf species. No information on possible migrations and biology poorly known, but inferred migrator on basis of distribution and behaviour other hammerheads. Listed as a highly migratory oceanic shark.	18
<i>Sphyrna zygaena</i>	Smooth hammerhead	NT	Young sharks sometimes occur in huge migrating schools.	15

* Species already listed on CMS

¹⁵ Bigelow & Schroeder 1948, Stevens 1984, Randall 1992

¹⁶ Kohler *et al.* 1998, Holland *et al.* 1999, Simpfendorfer *et al.* 2001

¹⁷ Heithaus 2001

¹⁸ Maguire *et al.* 2006

Table 4. The regional status and regional distribution of migratory sharks. (Dark grey boxes indicate that the species is absent. Light grey boxes indicate possible occurrence. White boxes indicate confirmed distribution. Published (**bold**) and draft regional IUCN Red List assessments are given if available.)

Species name	Global Category	Regional/Subpopulation Status by Ocean Basin															
		NE Atlantic	NW Atlantic	CE Atlantic	CW Atlantic	SE Atlantic	SW Atlantic	Med. Sea	South ern Ocean	E Indian Ocean	W Indian Ocean	NE Pacific	NW Pacific	CE Pacific	CW Pacific	SE Pacific	SW Pacific
<i>Alopias pelagicus</i>	DD**/VU																
<i>Alopias superciliosus</i>	DD**/VU		EN		EN		NT	DD		VU				VU			
<i>Alopias vulpinus</i>	DD/VU	NT	EN					VU		VU		NT					
<i>Carcharhinus acronotus</i>	NE		LC				DD										
<i>Carcharhinus albimarginatus</i>	DD**/NT									LC							LC
<i>Carcharhinus altimus</i>	DD**/DD									LC							LC
<i>Carcharhinus amblyrhynchoides</i>	NT																
<i>Carcharhinus amblyrhynchos</i>	NT																
<i>Carcharhinus amboinensis</i>	DD										NT						
<i>Carcharhinus brachyurus</i>	NT									LC	LC	DD	VU			DD	LC
<i>Carcharhinus brevipinna</i>	NT		VU/LC		VU						LC						
<i>Carcharhinus dussumieri</i>	NT									LC							LC
<i>Carcharhinus falciformis</i>	LC/NT		VU		VU		NT	DD		NT	NT			VU	NT	VU	NT
<i>Carcharhinus galapagensis</i>	NT										DD						DD
<i>Carcharhinus isodon</i>	NE																
<i>Carcharhinus leucas</i>	NT		LC	VU	NT						VU						

Species name	Global Category	Regional/Subpopulation Status by Ocean Basin															
		NE Atlantic	NW Atlantic	CE Atlantic	CW Atlantic	SE Atlantic	SW Atlantic	Med. Sea	South ern Ocean	E Indian Ocean	W Indian Ocean	NE Pacific	NW Pacific	CE Pacific	CW Pacific	SE Pacific	SW Pacific
<i>Carcharhinus limbatus</i>	NT		VU/LC		VU						VU						
<i>Carcharhinus longimanus</i>	VU		CR														
<i>Carcharhinus macloti</i>	NT									LC							LC
<i>Carcharhinus melanopterus</i>	NT																
<i>Carcharhinus obscurus</i>	NT/VU		EN		VU		NT	DD		NT							NT
<i>Carcharhinus perezi</i>	NT																
<i>Carcharhinus plumbeus</i>	NT/VU		LR/cd/VU				EN	EN		NT	DD		NT				NT
<i>Carcharhinus porosus</i>	DD						VU										
<i>Carcharhinus sealei</i>	NT																
<i>Carcharhinus signatus</i>	VU					DD											
<i>Carcharhinus sorrah</i>	DD**									LC					NT		LC
<i>Carcharias taurus</i>	VU		EN	CR			CR	CR		NT	NT						CR
<i>Carcharodon carcharias*</i>	VU							EN									
<i>Cetorhinus maximus*</i>	VU	EN						VU				EN	EN				
<i>Eusphyra blochii</i>	NT																
<i>Galeocerdo cuvier</i>	NT		NT	VU													
<i>Galeorhinus galeus</i>	VU	DD				DD	CR	VU				LC				DD	VU
<i>Hemipristis elongatus</i>	VU																

Species name	Global Category	Regional/Subpopulation Status by Ocean Basin															
		NE Atlantic	NW Atlantic	CE Atlantic	CW Atlantic	SE Atlantic	SW Atlantic	Med. Sea	Southern Ocean	E Indian Ocean	W Indian Ocean	NE Pacific	NW Pacific	CE Pacific	CW Pacific	SE Pacific	SW Pacific
<i>Hexanchus griseus</i>	NT																
<i>Isogomphodon oxyrinchus</i>	CR																
<i>Isurus oxyrinchus</i>	NT	VU	VU					CR				NT			VU		
<i>Isurus paucus</i>	VU																
<i>Lamiopsis temmincki</i>	NE																
<i>Lamna ditropis</i>	DD/LC																
<i>Lamna nasus</i>	VU	CR	EN			NT	NT	CR	NT							NT	NT
<i>Leptocharias smithii</i>	NT																
<i>Megachasma pelagios</i>	DD																
<i>Mustelus asterias</i>	LC	LC						VU									
<i>Mustelus canis</i>	NT																
<i>Mustelus mustelus</i>	LC	DD						VU									
<i>Nasolamia velox</i>	NE																
<i>Nebrius ferrugineus</i>	VU									LC							LC
<i>Negaprion acutidens</i>	VU									LC					EN		LC
<i>Negaprion brevirostris</i>	NT			CR			VU					DD		DD		DD	
<i>Notorynchus cepedianus</i>	DD																
<i>Odontaspis ferox</i>	DD/VU							EN			VU						VU
<i>Odontaspis noronhai</i>	DD																
<i>Prionace glauca</i>	NT	VU	VU					VU				NT	NT				
<i>Pseudocarcharias kamoharai</i>	NT																

Species name	Global Category	Regional/Subpopulation Status by Ocean Basin															
		NE Atlantic	NW Atlantic	CE Atlantic	CW Atlantic	SE Atlantic	SW Atlantic	Med. Sea	Southern Ocean	E Indian Ocean	W Indian Ocean	NE Pacific	NW Pacific	CE Pacific	CW Pacific	SE Pacific	SW Pacific
Rhincodon typus *	VU		LC	DD	LC					VU	VU			VU	VU	VU	VU
Rhizoprionodon acutus	LC																
Rhizoprionodon terraenovae	LC																
Somniosus antarcticus	DD																
Somniosus microcephalus	NT																
Somniosus pacificus	NE																
Sphyrna corona	NT																
Sphyrna lewini	NT/EN		EN		EN	VU	EN			LC		VU		EN		NT	LC
Sphyrna media	DD																
Sphyrna mokarran	EN		EN	CR	EN					DD	EN						DD
Sphyrna tiburo	LC																
Sphyrna tudes	VU																
Sphyrna zygaena	NT							VU		LC							LC
Squalus acanthias	VU	CR	EN				VU	EN		LC	LC	VU	EN			VU	LC
Squalus megalops	DD									LC							LC
Squalus mitsukurii	DD									EN							NT
Squatina squatina	CR																

* Species already listed on CMS.

4 Legal and management status of migratory sharks

4.1 Global legal and management status

The main global measures adopted to date at least partly in order to deliver the conservation and management of migratory shark populations (or hopefully having significant potential to do so in the medium to long-term) are fisheries initiatives; these are considered first below. They have generally not performed well in delivering their shark conservation and management objectives, indeed the lack of implementation of these shark fisheries conservation and management measures has been highlighted at every recent UN General Assembly (see Annex 6). Shark fisheries are a relatively low priority for fisheries managers 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. Reasons for the lack of a detectable beneficial impact on fish stocks arising from the Fish Stock Agreement are reviewed by Maguire *et al.* (2006). They include shortage of data and the relatively short period since this agreement entered into force, when recovery of fish stocks requires several decades; reasons which are equally valid for most of the following initiatives. Global biodiversity measures for sharks, which include the listing of three species on appendices of CMS and CITES, are also too recent to have been implemented.

4.1.1 United Nations Convention on the Law of the Sea (UNCLOS)

UNCLOS was adopted in 1982 and came into force in 1994 (www.un.org/Depts/los/). It provides a framework for the conservation and management of fisheries and other uses of the seas by giving coastal States rights and responsibilities for the management and use of fishery resources within their national jurisdictions and enabling the establishment of EEZ. These responsibilities include having due regard to the rights and duties of other States (Article 56).

For stocks that occur within the exclusive economic zones of two or more coastal States, or both within the exclusive economic zone and in an area beyond and adjacent to it (Article 63), UNCLOS calls upon the coastal States and States fishing in the high seas to seek agreement upon the measures necessary for the conservation and development of those stocks in the adjacent high seas area, either directly or through appropriate subregional or regional organizations. Such stocks are likely to include the highly migratory species listed in UNCLOS Annex 1 (see Table 6) and other species that fall within the CMS definition of migratory. UNCLOS also calls upon the coastal States and other States fishing highly migratory species to cooperate in ensuring conservation and promoting the optimum utilization of those resources in their whole area of distribution. With respect to the high seas, UNCLOS recognizes the free access and the freedom of fishing to all States, calling upon all States and particularly upon fishing States to cooperate in the conservation and management of fishery resources occurring in the high seas Maguire *et al.* 2006).

Article 64 on Highly Migratory Species reads: “*The coastal State and other States whose nationals fish in the region for the highly migratory species listed in Annex I shall cooperate directly or through appropriate international organizations with a view to ensuring conservation and promoting the objective of optimum utilization of such species throughout the region, both within and beyond the exclusive economic zone. In regions for which no appropriate international organization exists, the coastal State and other States whose nationals harvest these species in the region shall cooperate to establish such an organization and participate in its work.*” Annex I lists the following shark taxa: *Hexanchus griseus*; *Cetorhinus maximus*; Family Alopiidae (three species); *Rhincodon typus*; Family Carcharhinidae (over 50 species, not all of which are migratory and/or oceanic);

Family Sphyrnidae (eight species, several of which are not oceanic and may not be migratory); and Family Isurida (currently Family Lamnidae). Coastal States are also required, under UNCLOS, to consider the effects of fishing on associated and dependent species (Article 61(4)), which is directly relevant to shark bycatch.

Other important provisions affecting the conservation and management of migratory sharks arise from the 1995 Agreement for the Implementation of the Provisions of UNCLOS relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks. The UN Fish Stock Agreement (UNFSA) amplifies and facilitates the implementation of UNCLOS provisions relating to the conservation and management of high seas fish stocks, by setting out detailed mechanisms for co-operation between coastal and fishing States, including the establishment of regional fisheries arrangements or organisations. Adopted in 1995, it received its 30th ratification and came into force in 2001, thus establishing firm rules and conservation measures for high seas fishery resources. Unfortunately, to date, there are only a very few such management initiatives in evidence and the impact upon any listed fish species has been minimal (e.g. Maguire *et al.* 2006).

Table 6. Migratory/possibly migratory sharks included on UNCLOS Annex 1, Highly Migratory Species

<i>Hexanchus griseus</i>	<i>Carcharhinus plumbeus</i>
	<i>Carcharhinus porosus</i>
<i>Cetorhinus maximus</i> (CMS Appendix I & II, 2005. CITES Appendix II, 2002)	<i>Carcharhinus sealei</i>
	<i>Carcharhinus signatus</i>
Family Alopiidae	<i>Carcharhinus sorrah</i>
<i>Alopias pelagicus</i>	<i>Galeocerdo cuvier</i>
<i>Alopias superciliosus</i>	<i>Isogomphodon oxyrinchus</i>
<i>Alopias vulpinus</i>	<i>Lamiopsis temmincki</i>
	<i>Nasolamia velox</i>
<i>Rhincodon typus</i> (CMS Appendix II, 1999. CITES Appendix II, 2004)	<i>Negaprion acutidens</i>
	<i>Negaprion brevirostris</i>
Family Carcharhinidae	<i>Prionace glauca</i>
<i>Carcharhinus acronotus</i>	<i>Rhizoprionodon acutus</i>
<i>Carcharhinus albimarginatus</i>	<i>Rhizoprionodon terraenovae</i>
<i>Carcharhinus altimus</i>	Family Isurida (currently Family Lamnidae)
<i>Carcharhinus amblyrhynchoides</i>	<i>Carcharodon carcharias</i>
<i>Carcharhinus amblyrhynchos</i>	(CMS Appendix I & II, CITES Appendix II, 2002)
<i>Carcharhinus amboinensis</i>	<i>Lamna ditropis</i>
<i>Carcharhinus brachyurus</i>	<i>Lamna nasus</i>
<i>Carcharhinus brevipinna</i>	<i>Isurus oxyrinchus</i>
<i>Carcharhinus dussumieri</i>	<i>Isurus paucus</i>
<i>Carcharhinus falciformis</i>	Family Sphyrnidae
<i>Carcharhinus galapagensis</i>	<i>Eusphyrna blochii</i>
<i>Carcharhinus isodon</i>	<i>Sphyrna corona</i>
<i>Carcharhinus leucas</i>	<i>Sphyrna lewini</i>
<i>Carcharhinus limbatus</i>	<i>Sphyrna media</i>
<i>Carcharhinus longimanus</i>	<i>Sphyrna mokarran</i>
<i>Carcharhinus macloti</i>	<i>Sphyrna tiburo</i>
<i>Carcharhinus melanopterus</i>	<i>Sphyrna tudes</i>
<i>Carcharhinus obscurus</i>	<i>Sphyrna zygaena</i>
<i>Carcharhinus perezii</i>	

UNFSA calls for Parties to protect marine biodiversity, minimise pollution, monitor fishing levels and stocks, provide accurate reporting of and minimise by-catch and discards, and gather reliable, comprehensive scientific data as the basis for management decisions. It mandates a precautionary, risk-averse approach to the management of straddling and highly migratory stocks and species in cases where scientific uncertainty exists. States are directed to pursue co-operation for such species through subregional fishery management organisations or arrangements.

The Agreement specifically requires coastal States and fishing States to co-operate to ensure the conservation and optimum utilisation of the species listed on Annex I (Table 6). Other species and populations may qualify as 'straddling stocks' under Article 63(2) of the Convention, particularly in areas where jurisdiction has not been extended to the 200 mile limit (e.g. Mediterranean). Coastal and fishing States are also required to agree measures to ensure the conservation of qualifying chondrichthyan species or stocks that straddle coastal waters and high seas.

Finally, UNFSA does not explicitly address fisheries for other high seas fisheries resources (those that are neither straddling nor migratory stocks – for example the fisheries for deepsea species on continental shelf slopes outside EEZs that have arisen since UNCLOS). Thus, for chondrichthyans that occur only on the high seas, fishing States must take measures themselves and/or in co-operation with other fishing States to ensure that these stocks are conserved. It should be noted that some of these high seas species may be highly migratory, even undertaking regular movements across ocean basins, but if they never enter State EEZs (i.e. do not cross a national jurisdictional boundary), may technically not qualify as migratory under CMS.

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

The UNFSA is complemented by the voluntary FAO Code of Conduct for Responsible Fisheries, which sets out principles and international standards of behaviour for responsible practices. The FAO Conference that adopted the Code of Conduct in 1995 also requested FAO *inter alia* to elaborate appropriate technical guidelines in support of the implementation of the Code, in collaboration with members and interested organisations. The voluntary IPOA-Sharks and its associated technical guidelines (FAO 2000) were developed by FAO within the framework of the Code of Conduct for Responsible Fisheries, probably in response to the request to FAO made in CITES Conf. Res. 9.17 (see Introduction).

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, within the context of four main elements: species conservation, biodiversity maintenance, habitat protection and management for sustainable use (see Annex 3 for full text). It called upon all States to produce a Shark Assessment Report (SAR) and, if they have shark fisheries, to develop and implement National Plans of Action (NPOA) by the COFI session of early 2001. The NPOA should identify research, monitoring and management needs for all chondrichthyan fishes that occur in their waters. In implementing the IPOA, States are also urged to ensure effective conservation and management of sharks that are transboundary, straddling, highly migratory and high seas stocks. The Technical Guidelines (FAO 2000) provide general advice and a framework for States to use when developing Shark Assessment Reports, National Shark Plans and joint Shark Plans for shared transboundary species of sharks.

Progress with implementation of the IPOA–Sharks has, however, been disappointing and there appears to have been little improvement in practical shark fisheries management, whether in State waters or on the High Seas. The majority of National and Regional Fisheries Management Organisations also appear not to be implementing the IPOA-Sharks effectively, if at all. This situation arises from a combination of lack of resources, lack of technical support, a primary focus on other more pressing fisheries management priorities, and because the IPOA-Sharks is wholly voluntary: States and Fisheries Management Organisations are not obliged to undertake any of the actions urged by FAO in the IPOA and it appears that few consider it to be a sufficiently high priority. The latest FAO review of progress with the IPOA–Sharks prepared for the 27th meeting of FAO’s Committee on Fisheries, 5–9 March 2007, confirmed the slow progress with implementation; fewer than 20% of FAO COFI Members have implemented an NPOA-Shark.

This lack of implementation of FAO IPOAs extends beyond sharks to far more pressing fisheries issues. Although over 80% of FAO Members have identified illegal, unreported and unregulated (IUU) fishing as a problem, less than half of COFI’s Members have developed NPOAs for IUU fishing. Fishing capacity is recognised globally as a key underlying cause of IUU fishing and a major reason why Members of Regional Fisheries Bodies have failed to agree on and implement effective management measures for overfished stocks, but fewer than 10% of Members have developed an NPOA on fishing capacity. Finally, 40% of Members have yet to implement an NPOA for seabirds – another issue of particular concern for CMS Parties because of high bycatch levels.

Both COFI and the UNGA, among others, have repeatedly called for States to implement these voluntary instruments, but it appears that these non-binding requests are falling on deaf ears.

4.1.3 Convention on International Trade in Endangered Species (CITES)

CITES was established in recognition that international cooperation is essential for the protection of certain species of wild fauna and flora from over-exploitation through international trade. It came into force in 1975, creating the international legal framework for the prevention of trade in endangered species of wild fauna and flora and for the effective regulation of international trade in other species which may become threatened in the absence of such regulation (www.cites.org). Three shark species are listed on Appendix II of CITES: basking shark *Cetorhinus maximus*, whale shark *Rhincodon typus*, and white shark *Carcharodon carcharias*, and CITES maintains an active involvement in shark conservation issues under the Resolution on the Conservation and Management of Sharks (see Annex 2). Other migratory shark species that are in unfavourable condition and depleted as a result of international trade demand are currently under consideration for debate by the Conference of Parties in mid 2007, including porbeagle shark *Lamna nasus* (also listed on Annex I of UNCLOS) and spiny dogfish *Squalus acanthias*, while a wider range of species may be discussed as a result of the work of the CITES Animals Committee’s Intercessional Shark Working Group and a document submitted by Australia. The FAO has also commissioned a background study, building on the IPOA sharks and the recommendations of the CITES Shark WG, to identify weaknesses and opportunities for improving fisheries management of species considered most threatened by international trade. A discussion paper is being prepared for use during an FAO workshop planned for 2007.

4.1.4 Convention on Migratory Species

The Convention on the Conservation of Migratory Species (CMS), adopted in 1979 and whose entry into force was in 1983 is, like CITES, one of the five global biodiversity-related conventions, with over 100 Parties. CMS espouses a migratory range approach to migratory species conservation, encouraging national level species- and ecosystem-based actions to conserve migratory species, including research. It then provides the basis for them to be coordinated across a migratory range through the development and implementation of international cooperative tools such as conservation agreements. The cooperative instruments – ranging from stand alone action plans to informal and formal international agreements with integral action plans – can be tailored to the specific needs of individual or groups of species and their habitats.

CMS is a global framework convention whose operational tools can be global or regional in scope. Its Appendices largely drive the Convention's activities, with listing on these Appendices triggering certain obligations on the part of its Parties. Thus, Parties must adopt strict protection measures for endangered migratory species (listed under Appendix I), while CMS provides a framework within which to conclude formal (legally binding) Agreements for the conservation and management of migratory species with an unfavourable conservation status and that would benefit significantly from international cooperation (listed in Appendix II). They may also cover any species that would benefit significantly from international co-operation. These Agreements are open to accession by all Range States of the species concerned, not just to the CMS Parties.

CMS's flexible nature also allows it to catalyze the development of formal or less formal (e.g. Memoranda of Understanding) international cooperative instruments for any population or any geographically separate part of the population of any species or lower taxon of wild animals, members of which periodically cross one or more national jurisdictional boundaries (Article IV (4)). The important points here being that action is neither limited to migratory species listed on Appendix II, nor by the Convention's definition of migratory species.

Many marine species are already the subject of action under CMS, through six formal Agreements for species listed on the Appendices and ten less formal MoUs developed under Article IV (4). The former include the first CMS Agreement on Wadden Sea Seals, the Agreement on Small Cetaceans of the Baltic and North Sea (ASCOBANS), Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area (ACCOBAMS), and Agreement on the Conservation of Albatrosses and Petrels (ACAP). The latter include the MoU on the Conservation and Management of Marine Turtles and their Habitats of the Indian Ocean and South-East Asia, the African Atlantic Coast Marine Turtles MoU, and the recent Pacific Islands Cetaceans MoU.

The whale shark *Rhincodon typus*, white shark *Carcharodon carcharias* and basking shark *Cetorhinus maximus* are listed on CMS (all on Appendix II, white shark and basking shark also on Appendix I). The Sixth Meeting of the CMS Conference of the Parties (1999, Cape Town) called for co-operative actions to be undertaken for the whale shark. At the Eighth CMS Conference of the Parties (November 2005, Nairobi), Australia, New Zealand and the Seychelles successfully co-sponsored a Recommendation calling for the development of a global conservation instrument for migratory sharks. Recommendation 8.16 "Migratory Sharks" (see Annex 1) was adopted by the Conference of the Parties, and strongly supported by, among other Parties, India, Philippines, Mauritania and the United Kingdom.

4.2 Regional legal and management status

Table 9 summarises the regional and national legal and management status of migratory shark species, based on a request for information to the IUCN Shark Specialist Group. This is not comprehensive, but identifies those nationally protected species and management measures at species level in various States and Regional Fisheries Bodies and Regional Agreements that were identified through this survey and from other sources.

4.2.1 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. Others are still to be established as additional conventions come into force. Additionally, 18 fisheries advisory bodies and four scientific organisations deal with specified marine resources in particular geographic areas.

Most RFBs were established before the UN Fish Stock Agreement (1995) and the FAO Compliance Agreement (1993) were adopted. Several even predate the adoption in 1982 of the UN Convention on the Law of the Sea. This means that the terms of reference of many RFBs are generally not as precautionary in their approach as that mandated by the UNFSA and do not incorporate the relatively recent introduction of the precautionary approach to fisheries management. Many RFBs also fall short in areas such as enforcement and flag-state responsibilities, which receive particular attention from the UNFSA. Two recent reviews have criticised their performance (Willock and Lack 2006) and recommended improvements (IUCN 2006).

Willock and Lack (2006) concluded that *“RFMOs have generally failed to prevent over-exploitation of straddling and highly migratory fish stocks, to rebuild overexploited stocks and to prevent degradation of the marine ecosystems in which fishing occurs. Not only have broader, international expectations not been met but RFMOs have also largely failed to meet the objectives of their own governing conventions, generally characterized as conservation and sustainable utilization of target stocks under their mandate. It is difficult to identify examples of sustainable management of target stocks by RFMOs.”*

IUCN (2006) notes *“it is time to consider necessary changes to the way RFMOs promote the conservation and sustainable and equitable use of marine living resources. As appropriate to the individual circumstances of each RFMO, these steps should eliminate gaps in the management of marine living resources, should include changes to institutional arrangements for RFMOs, should focus on changes with respect to conservation and sustainable use management measures, should provide for closer linkages between scientific advice and conservation and management measures, and should provide for reforms in enforcement measures.”*

Those RFBs in existence or currently being formed will address most fisheries targeting straddling stocks (Maguire *et al.* 2006), but only a few organisations cover whole ocean basins, leaving some high seas fish stocks unmanaged. Even the largest RFMOs tend to have only some 15 to 30 members (see Annex 7). 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. Recommendations in IUCN (2006) include establishing new or expanded RFMOs to cover geographic and species gaps.

Furthermore, RFMOs with jurisdiction over fisheries that take a large bycatch of oceanic and highly migratory sharks (whether utilised or discarded) are aware of these bycatch issues and may be undertaking data collection programmes. Most have, however, failed to regulate it (Maguire *et al.* 2006), other than through the shark finning bans that have now been adopted by many of the tuna RFMOs. (See Annex 7 for some examples of these, their membership and oceanic coverage.)

Chondrichthyan fish species are not usually included within the species-specific marine resource management remit of most RFMOs, which were often established to manage defined taxa (such as tunas and billfishes), although some (e.g. ICCAT) do already include sharks and many more could choose to do so, particularly if the fisheries within their remits have significant impacts on or catches of sharks (RFBs often have a mandate enabling conservation and management measures to be implemented for related or bycatch species). Only a few, however, have actually implemented specific measures for sharks beyond basic catch reporting requirements and finning bans. With the exception of finning bans, if others follow suit by expanding their remit to sharks, this is most likely to be within the context of RFB data collection and monitoring duties, rather than as a subject of targeted fisheries management activities. This is because, perhaps understandably, RFBs tend to focus their limited resources on management efforts for the most important, valuable and high volume target fisheries within their remit.

IUCN SSG and TRAFFIC (2002a&b) summarised the potential for a selection of RFBs and advisory bodies to cover the monitoring and management of shark species. This review is updated (not comprehensively) here.

- The Commission for the Conservation of Antarctic Marine Living Resources (CCAMLR) has prohibited directed fishing on shark species in the Convention Area, other than for scientific research purposes, and is encouraging the live release of shark bycatch. The prohibition will apply until advice from the Scientific Committee is that such fishing may occur in the Convention Area (Conservation Measure 32-18 (2006) on the conservation of sharks).
- The Commission for the Conservation of Southern Bluefin Tuna (CCSBT) Ecologically Related Species Working Group has developed an identification guide for shark species incidentally caught in SBT fishing grounds, to assist in developing abundance indices for these species.
- The International Commission for the Conservation of Atlantic Tunas (ICCAT) has conducted stock assessments for the two highly migratory shark species (blue shark *Prionace glauca* and shortfin mako *Isurus oxyrinchus*) that are most regularly caught as bycatch in its fisheries, may make similar efforts for porbeagle *Lamna nasus*, is encouraging the collection and submission of shark catch data, and has adopted a shark finning ban.
- The Inter-American Tropical Tuna Commission (IATTC) is estimating catches and incidental fishing mortality on sharks, promotes live release of sharks from purse seines, and has adopted a shark finning ban.
- The Indian Ocean Tuna Commission (IOTC) records nominal catch and discards of non-target species and has adopted a shark finning ban, the latter partly in response to reports of a large shark finning fleet active in the Commission's area.
- The Northwest Atlantic Fisheries Organisation (NAFO) has adopted a shark finning ban.

- The Northeast Atlantic Fisheries Commission (NEAFC) has adopted a shark finning ban and is beginning to regulate deepwater shark fisheries (straddling, transboundary and high seas stocks).
- The Western Central Pacific Fish Commission adopted a Resolution “Conservation and Management Measure for Sharks in the Western and Central Pacific Ocean”. Since this applies only to vessels of over 24m in length, it excludes the majority of vessels taking sharks.

4.2.2 Regional Agreements, Conventions and management bodies

The remit of the many Regional Seas Conventions (generally established under the auspices of the United Nations Environment Programme’s Regional Seas Programme, www.unep.ch/seas/) usually includes, *inter alia*, protected areas and the protection and management of biodiversity (wild animals and plants). They generally oblige States to take appropriate measures for the conservation and management of listed species, including the establishment of co-operation programmes to assist with protected species management and conservation, and the development of regional recovery programmes. Only one Regional Seas Convention (the Barcelona Convention) is known to list chondrichthyan fishes but all could potentially do so.

The Convention for the Protection of the Mediterranean Sea against Pollution (Barcelona Convention) was adopted in 1976, and entered into force in 1978. It was revised in 1995 and renamed the Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean. The Barcelona Convention ‘Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean’ lists eight species of chondrichthyan fish: white shark *Carcharodon carcharias*, basking shark *Cetorhinus maximus* and giant devil-ray *Mobular mobular* on Annex II (Endangered or Threatened species), and shortfin mako *Isurus oxyrinchus*, porbeagle *Lamna nasus*, blue shark *Prionace glauca*, white skate *Raja alba* and angel shark *Squatina squatina* on Annex III (Species whose exploitation is regulated). This legally binding instrument was adopted in 1995 and came into force in 1999 - even though the revised text of the Convention has yet to enter into effect, but only a very few Parties have used their national legislation to implement it by providing legal protection to Annex II species. All of the shark species (and possibly both rays) listed on these Annexes are migratory (see Table 3).

At the request of the Contracting Parties to the Barcelona Convention, the Mediterranean Regional Activities Centre for Specially Protected Areas (RAC/SPA) prepared an Action Plan for the conservation of Mediterranean species of cartilaginous fish, focusing on species and habitat protection; improved monitoring and data collection; education and sustainable management for adoption by the Contracting Parties.

Other examples of regional seas conventions which could potentially include chondrichthyan fish within their remit include the Convention for the Protection and Development of the Marine Environment of the Wider Caribbean, the East African Regional Convention and the Convention for the Protection of the Natural Resources and Environment of the South Pacific. To date, very few marine species, none of them chondrichthyans, are listed, even though many species clearly qualify for inclusion and could benefit from appropriate management within the State EEZs.

The OSPAR Convention for the Protection of the Marine Environment of the North-East Atlantic considers shark conservation issues, but has no competence to adopt programmes or measures on questions relating to fisheries management; it can only draw these matters to the attention of

the authority or international body competent for that question. The OSPAR Strategy on the Protection and Conservation of the Ecosystems and Biological Diversity of the Maritime Area includes provisions for producing a list of threatened and/or declining species and habitats. This list has no legal status but is intended to guide the OSPAR Commission in setting priorities for its further work on the conservation and protection of marine biodiversity. The basking shark is included on OSPAR's initial list for all OSPAR regions and additional species, some of which are migratory, are under consideration for addition to this list.

The Association of Southeast Asian Nations (ASEAN) Agreement on the Conservation of Nature and Natural Resources (1985) covers Brunei, Indonesia, Malaysia, the Philippines, Singapore and Thailand and was at the time considered to be one of the most modern, comprehensive and forward-looking of all conservation treaties. Its Parties were required to give special protection to threatened and endemic species, to preserve the critical habitats of endangered or rare species, species that are endemic to a small area, and migratory species, and to implement sustainable management plans for harvested species. It has, therefore, the potential to be applied to the conservation and management of threatened, rare, migratory and or harvested chondrichthyan fishes of the ASEAN region. Unfortunately, it seems unlikely to enter into force (Koh 2003).

The new African Biodiversity Convention also has potential for application to the conservation and management of sharks.

4.3 National legal and management status of migratory sharks

4.3.1 National Shark conservation and management measures

The guiding principles of the FAO IPOA–Sharks (section 4.1.2 and Annex 3) are that States contributing to fishing mortality of a species or stock should participate in its conservation and management, and that shark resources should be used sustainably. Although wholly voluntary, the IPOA called upon all States to produce a Shark Assessment Report (SAR) and, if they have shark fisheries, to develop and implement National Plans of Action (NPOAs, or Shark Plans). In implementing the IPOA, States are also urged to ensure effective conservation and management of sharks that are transboundary, straddling, highly migratory and high seas stocks.

Progress with implementation has been disappointing. Only a small proportion of shark fishing nations have produced National Shark Plans, and many of the Shark Plans that have been drawn up are weak and/or unlikely to be implemented effectively. On the other hand, some States without Shark Plans (e.g. New Zealand and Canada) have more effective shark fisheries management measures in place than do States with draft or formally adopted Shark Plans.

Several States have made more progress with the protection and management of sharks under biodiversity conservation legislation than through shark fisheries management. Table 9 presents the legal and management status of migratory sharks by species in the relatively small number of range States that are known to be implementing some form of species-specific management. This list is certainly incomplete since new regulations are continually being introduced, but it provides a broad overview of the type of national management that is currently being applied to the conservation and management of migratory sharks.

It is helpful, in addition to focusing on management initiatives for individual migratory shark species, to summarise activities by the most important migratory shark range States. The States with highest reported migratory shark biodiversity have already been identified in section 3 and Table 5. The other very important consideration is the relative impact of States upon migratory shark stocks through fisheries mortality. While it is not easy to determine the precise levels of catches and landings of migratory sharks, FAO landings data have been used by Lack and Sant (2006) to identify the top 20 shark catching countries in 2003. These are most likely also the major fishers of migratory sharks, since the largest shark fishing nations tend to catch large numbers of highly migratory coastal and pelagic shark species, either in target fisheries or as a utilised or discarded bycatch, particularly from tuna and billfish fisheries. These States are listed in Table 7.

Table 7. Top twenty shark catching countries in 2003 (Lack and Sant 2006).

Country	% of world shark catch	Country	% of world shark catch
1. Indonesia	14.09	11. Thailand	2.89
2. Taiwan, Prov. of China	7.87	12. France	2.63
3. India	7.38	13. Sri Lanka	2.49
4. Spain	7.19	14. United Kingdom	2.29
5. USA	4.13	15. New Zealand	2.15
6. Pakistan	3.88	16. Portugal	1.98
7. Argentina	3.7	17. Iran	1.86
8. Mexico	3.6	18. Nigeria	1.77
9. Malaysia	3.26	19. Brazil	1.47
10. Japan	2.91	20. Korea	1.47

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 included in this table are their membership of RFMOs, CMS, 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 ¹⁹	Centre of biodiversity ²⁰	CMS Party/ Signatory	RFMO Contracting/ Cooperating Party	Shark Plan
Argentina	X		X		
Australia		X	X	IOTC	X
Bahamas		X			
Brazil	X	X			X
China		X		IOTC, IATTC, ICCAT	
Colombia		X			
Costa Rica		X		IATTC	
Cuba		X			
Egypt		X	X		
France	X		X	IOTC, IATTC, ICCAT	
India	X	X	X	IOTC	
Indonesia	X	X			X
Iran	X				
Japan	X	X		IOTC, IATTC, ICCAT	X
Korea	X			IOTC, ICCAT	
Madagascar		X		IOTC	
Malaysia	X			IOTC	
Mexico	X	X		IATTC, ICCAT	X
Morocco		X	X		
Mozambique		X			
New Zealand	X		X		management
Nicaragua		X		IATTC, ICCAT	
Nigeria	X		X		
Pakistan	X		X	IOTC	
Portugal	X		X		
South Africa		X	X	ICCAT	X
Spain	X	X	X	IATTC	
Sri Lanka	X		X	IOTC	
Taiwan, Prov. China	X	X		IATTC	X
Thailand	X			IOTC	
United Kingdom	X		X	IOTC, ICCAT	X
USA	X	X		IATTC, ICCAT	X
Viet Nam		X			

¹⁹ As defined in Table 7

²⁰ As defined in Table 5

Table 9. The regional and national legal and management status of migratory sharks.

(This table was drawn up with the assistance of the IUCN Shark Specialist Group network and is not comprehensive. National species-specific conservation and management initiatives may apply to EEZ in more than one ocean basin. RFO initiatives focus on sea areas – ICCAT is Atlantic, IATTC Pacific.)

Species	Africa	Australasia	Central America & Caribbean	Central & South America	Europe	North America (US HMSF MP covers Atlantic only)
<i>Alopias pelagicus</i>	SA: bycatch limit. Recreational bag limit.					
<i>Alopias superciliosus</i>	SA: bycatch limit. Recreational bag limit.					
<i>Alopias vulpinus</i>	SA: bycatch limit. Recreational bag limit.					Pelagic species on U.S. Highly Migratory Species Fishery Management Plan (HMSFMP)
<i>Carcharhinus acronotus</i>						Small Coastal Shark on U.S. HMSFMP
<i>Carcharhinus albimarginatus</i>	SA: Recreational bag limit.					
<i>Carcharhinus altimus</i>	SA: Recreational bag limit.					Prohibited Species on U.S. HMSFMP
<i>Carcharhinus amboinensis</i>	SA: Recreational bag limit.					
<i>Carcharhinus brachyurus</i>	SA: Recreational bag limit.					
<i>Carcharhinus brevipinna</i>	SA: Recreational bag limit.					Large Coastal Shark on U.S. HMSFMP
<i>Carcharhinus falciformis</i>	ICCAT finning ban. SA: bycatch limit. Recreational bag limit.		ICCAT and IATTC: finning ban.	ICCAT and IATTC: finning ban.	ICCAT: finning ban.	ICCAT: finning ban. Large Coastal Shark on U.S. HMSFMP
<i>Carcharhinus galapagensis</i>		NZ: Protected in Kermadec Islands Marine Reserve.				Prohibited Species on U.S. HMSFMP
<i>Carcharhinus isodon</i>						Small Coastal Shark on U.S. HMSFMP
<i>Carcharhinus leucas</i>	SA: Recreational bag limit.					Large Coastal Shark on U.S. HMSFMP
<i>Carcharhinus limbatus</i>	SA: Recreational bag limit.					Large Coastal Shark on U.S. HMSFMP
<i>Carcharhinus longimanus</i>	ICCAT: finning ban. SA: Recreational bag limit.		ICCAT and IATTC: finning ban.	ICCAT and IATTC: finning ban.	ICCAT: finning ban.	ICCAT: finning ban. Pelagic Shark on U.S. HMSFMP
<i>Carcharhinus melanopterus</i>	SA: Recreational bag limit.					
<i>Carcharhinus obscurus</i>	SA: Recreational bag limit.					Prohibited Species on U.S. HMSFMP
<i>Carcharhinus plumbeus</i>	SA: Recreational bag limit.					Large Coastal Shark on U.S. HMSFMP
<i>Carcharhinus signatus</i>						Prohibited Species on U.S. HMSFMP
<i>Carcharias taurus</i>	SA: Prohibited species commercial line fishery. Recreational bag limit.	Australia: Protected Species. National Recovery Plan.			Mediterranean Sea: UNEP Action Plan urges legal protection.	Prohibited Species on U.S. HMSFMP

Species	Africa	Australasia	Central America & Caribbean	Central & South America	Europe	North America (US HMSF MP covers Atlantic only)
<i>Carcharodon carcharias</i>	SA and Namibia: Protected.	Australia: Protected in commonwealth waters including EEZ and coastal waters of all States. Recreational catch and release permitted. NZ: Protected Maldives: Protected			Mediterranean sea: Barcelona Convention Malta: Protected	Pelagic Shark on U.S. HMSFMP California: Protected. Canada: COSEWIC: Assessed as At Risk. Considering listing on Sched. 1 of the Species at Risk Act. Research programme. USA, Pacific Ocean: Limited entry, mandatory logbooks, and specific time-area closures.
<i>Cetorhinus maximus</i>	SA: Prohibited species commercial line fishery. Recreational bag limit.	NZ: Partial protection through NZ's Fisheries Act. Commercial target fishing banned, bycatch may be utilised. Being considered for full protection.			ICES areas IV-VI-VII: TAC Mediterranean sea: Barcelona Convention UK, Isle of Man, Guernsey, Malta: Protected	Pelagic Shark on U.S. HMSFMP
<i>Galeocerdo cuvier</i>	SA: Recreational bag limit.					Large Coastal Shark on U.S. HMSFMP
<i>Galeorhinus galeus</i>	SA: Recreational bag limit.	Australia: Limited entry for gillnets and longlines, net length limit, TAC, nursery closed seasons, minimum gillnet meshsize. Closed areas to shark gillnets and longlines. Recreational bag limits.				
<i>Hemipristis elongatus</i>	SA: Recreational bag limit.					
<i>Hexanchus griseus</i>					Mediterranean sea: General ban on bottom trawling below 1000m.	San Francisco Bay: recreational fishery quota set for fish per person-pole – problematic.
<i>Isogomphodon oxyrinchus</i>				Brazil: Protected		

Species	Africa	Australasia	Central America & Caribbean	Central & South America	Europe	North America (US HMSF MP covers Atlantic only)
				on Federal regulation of Endangered species.		
<i>Isurus oxyrinchus</i>	SA: bycatch limit. Recreational bag limit.	NZ: Managed under QMS	ICCAT and IATTC: finning ban	ICCAT and IATTC: finning ban. Chile: gear regulations for artisanal fishery.	ICCAT: finning ban. ICCAT shark stock assessment workshop (ICCAT 2005) recommended that directed monitoring and research investments for sharks. Bern & Barcelona Conventions	Prohibited Species on U.S. HMSFMP. Atlantic Canada: COSEWIC Assessed At Risk. Active research. Catch limits. License limitation, finning ban, gear restrictions, area and seasonal closures, bycatch limits, hook and release in recreational fisheries (Hurley 1998) Pacific Canada: Limited entry, mandatory logbooks, and specific time-area closures. Atlantic US: Commercial quotas. Recreational bag limits. ICCAT: Finning ban. Limited entry, mandatory logbooks, specific time-area closures. Pacific US: Closure of targeted longline fishery. Recreational fishery bag limits in California. Harvest guidelines for Ca, Or, Wa. US west coast swordfish longline fishery closed, may reopen.
<i>Isurus paucus</i>	SA: bycatch limit. Recreational bag limit.		ICCAT and IATTC: finning ban	ICCAT and IATTC: finning ban	ICCAT: finning ban.	Prohibited Species on U.S. HMSFMP ICCAT: finning ban.
<i>Lamna ditropis</i>						Commercial fishing banned. Recreational bag limit. Bycatch permitted.
<i>Lamna nasus</i>	SA: Recreational bag limit.	NZ: small regulated fishery with TAC.			Bern Convention. ICES area 1-XIV: TAC. Norway, Faeroe Islands: quota in EC waters. Quotas exceed total landings.	Prohibited Species on U.S. HMSFMP. COSEWIC: Assessed as At Risk but not placed on Sched. 1 of the Species at Risk Act. Quota. Ongoing monitoring programme.
<i>Megachasma pelagios</i>	SA: Recreational bag limit.					
<i>Negaprion acutidens</i>	SA: Recreational bag limit.					
<i>Negaprion brevirostris</i>						Large Coastal Shark on U.S. HMSFMP
<i>Notorynchus cepedianus</i>						Prohibited Species on U.S. HMSFMP

Species	Africa	Australasia	Central America & Caribbean	Central & South America	Europe	North America (US HMSF MP covers Atlantic only)
<i>Odontaspis ferox</i>	SA: Recreational bag limit.	Australia: Protected in NSW waters since 1984. NZ: Being considered for legal protection.				
<i>Odontaspis noronhai</i>	SA: Recreational bag limit.					Prohibited Species on U.S. HMSFMP
<i>Prionace glauca</i>	SA: bycatch limit. Recreational bag limit.	NZ: Managed under QMS	ICCAT and IATTC: finning ban	ICCAT and IATTC: finning ban	ICCAT: finning ban. Bern & Barcelona Conventions	Prohibited Species on U.S. HMSFMP. COSEWIC: Assessed as At Risk. Considering listing on Sched. 1 of the Species at Risk Act. Active research.
<i>Pseudocarcharias kamoharai</i>	SA: Recreational bag limit.					
<i>Rhincodon typus</i>	SA: Prohibited species in commercial line fishery. Research programme. Seychelles: Protected. Mozambique: Research Programme.	Australia: Protected in Commonwealth waters and Queensland, Tasmania and Western Australia. NZ: Being considered for legal protection Maldives, Philippines, Malaysia: Protected. Research Programme. India, Thailand: Protected Taiwan: recently reduced quota.	Caribbean: Honduras, Mexico, Belize (small area): Protected. Research Programme.			Prohibited Species on U.S. HMSFMP
<i>Rhizoprionodon acutus</i>	SA: Recreational bag limit.					
<i>Rhizoprionodon terraenovae</i>						Small Coastal Shark on U.S. HMSFMP
<i>Somniosus antarcticus</i>		Australia: bycatch in toothfish fishery released - survival rates unknown.				

Species	Africa	Australasia	Central America & Caribbean	Central & South America	Europe	North America (US HMSF MP covers Atlantic only)
<i>Somniosus microcephalus</i>						Canada: monitoring commercial bycatch through fishery observer data.
<i>Somniosus pacificus</i>						Prohibited Species on U.S. HMSFMP
<i>Sphyrna lewini</i>	SA: Recreational bag limit.		ICCAT and IATTC: finning ban	ICCAT and IATTC: finning ban		Large Coastal Shark on U.S. HMSFMP
<i>Sphyrna mokarran</i>	SA: bycatch limit. Recreational bag limit.		ICCAT and IATTC: finning ban	ICCAT and IATTC: finning ban		Large Coastal Shark on U.S. HMSFMP
<i>Sphyrna tiburo</i>						Small Coastal Shark on U.S. HMSFMP
<i>Sphyrna zygaena</i>	SA: bycatch limit. Recreational bag limit.		ICCAT and IATTC: finning ban	ICCAT and IATTC: finning ban		Large Coastal Shark on U.S. HMSFMP
<i>Squalus acanthias</i>	SA: bycatch limit.				ICES Area IIa and IV: TAC. ICES recommended a zero quota in 2006, but advice not heeded by EU.	Atlantic: 1999/2000 US federal dogfish rebuilding plan – not yet effective. Pacific: quotas, landings appear sustainable. Trip limits (NMFS) for the last 9 months of 2006. Gear-specific and depth-based closed areas designed to protect rockfish stocks. Canada: quota, population assessment by 2007.
<i>Squatina squatina</i>					Annex III of Bern Convention. UK: Proposed for UK Wildlife and Countryside Act in 2001 - no decision. 2001 proposal for OSPAR listing failed. OSPAR proposal again in 2006.	

4.3.2 Lessons learned from current management of migratory sharks

To summarise from the above sections, management of migratory sharks appears to be a very low priority for the majority of range States and regional fisheries bodies:

- The management of migratory sharks (and indeed the majority of shark species) is inadequate, if not completely lacking, in most of the world's oceans.
- Very few fishing States have developed national shark fisheries management plans; even fewer are actually actively applying shark fisheries management measures.
- FAO (which is not a fisheries management body) has largely failed to persuade its Members or Regional Fisheries Bodies to assign a high priority to shark fisheries management.
- The shark finning resolutions adopted by Regional Fisheries Management Organisations for pelagic/oceanic sharks are not necessarily binding. They do not apply to the fleets of non-Parties. In one case (Western Central Pacific) most Party flagged vessels taking sharks are excluded from implementing a finning ban.
- The number of species-level shark conservation actions already adopted indicates that range States consider sharks to be as high, if not a higher biodiversity conservation priority than they are a fisheries management priority.

Despite the fairly large number of fisheries and biodiversity instruments potentially available to deliver the conservation and management of migratory sharks (albeit largely under utilised), there are still gaps in many of the international regimes for managing fisheries that directly or incidentally catch sharks and rays, including migratory species. Where there is a framework for managing shark fisheries, management measures have generally not been applied and such application is likely to be a low priority compared with other more pressing fisheries management priorities.

It is unclear whether the Fish Stock Agreement has yet had an impact on the status of any of the high seas and migratory fish stocks that it covers (Maguire *et al.* 2006), including those species that are of a higher commercial value and a higher management priority than sharks.

It is also too early to determine whether CITES listings for migratory sharks has improved the regulation of trade in shark products and the sustainable management of the stocks that provide these products. CMS has not yet taken any direct action to improve the management of its listed shark species, although an Appendix I listing automatically triggers a requirement for each Party Range State to protect the species, which applies to their flagged vessels inside and outside their waters, and some States have taken action to implement these listings. These and other biodiversity instruments currently cover only a very limited number of species.

However, there certainly is a wide range of potential international instruments and agreements available to encourage or deliver improved management of chondrichthyan fish populations, both in territorial waters and EEZs and on the high seas, should the political will exist to take such steps. It unfortunately appears lacking at present for fisheries management, despite frequent reminders from FAO COFI and UNCLOS of the urgency of introducing management measures for sharks.

There appears to be scope for migratory shark management performance to improve significantly if biodiversity and fisheries instruments are used together.

Most national and regional fisheries organisations would, however, highly likely prefer to see shark management (particularly for commercially-fished species) remain within their remit and operating under fisheries agreements, such as the UN Fish Stock Agreement and FAO IPOA–Sharks, even though shark fisheries management appears to be a very low priority for these bodies. There has certainly been considerable resistance from some fisheries management bodies to the involvement of CITES in shark management matters. In addition to the lack of convincing management effort from fisheries bodies, however, the membership of RFMOs is also generally restricted to a much smaller number of Contracting and/or collaborating Parties (CPs) than is the equivalent regional membership of the international natural resource management conventions (CITES and CMS) that now list some species of migratory sharks and may shortly be considering adding additional species.

It is possible that some biodiversity instruments may even be able to provide a stronger framework within which to deliver shark conservation or trade management than do voluntary fisheries codes or agreements, or RFMOs with a tightly defined remit for the active management only of certain listed species or that understandably choose to focus on the most important commercial species within their region.

There appears to be considerable potential for CMS' and CITES' interventions to stimulate the political will necessary to make shark conservation and management a higher priority. The Contracting Parties to RFMOs, who should be playing a key role in improving the collaborative management of migratory and shared shark stocks, seem unlikely under current circumstances to take up the challenge of widening their remit to more active management for sharks. Biodiversity instruments should, after all, ideally result in their Parties mainstreaming conservation measures into their fisheries policies.

The best available option, though, is to seek ways to combine the strengths of biodiversity and fisheries instruments in order to achieve the more effective management and recovery of migratory shark populations, particularly in the key range States identified in Table 8, which are important both for shark fisheries and shark biodiversity conservation. Fisheries and biodiversity agreements do not cover completely different natural resource management priorities, but overlap significantly within the area of sustainable resource utilisation. They can complement each other and the thoughtful use of both types of instruments will yield an important synergy, equipping fisheries and natural resource managers to reverse current population declines and promote sustainable use more effectively than would be the case if only a single form of management is applied. After all, Paragraph 25 of the IPOA-Sharks notes that 'States, within the framework of their respective competencies and consistent with international law, should strive to cooperate through regional and subregional fisheries organizations or arrangements, and other forms of cooperation, with a view to ensuring the sustainability of shark stocks'. This complementarity may be particularly important for addressing the difficult issue of shark bycatch.

The case for improved management of threatened and commercially exploited species of sharks and rays is so urgent that it is important for managers and policy-makers to promote the use of all relevant management tools available to them.

5 Options for international cooperation under CMS

Key questions identified for the consideration of the Migratory Sharks Meeting include the following.

- Possible options for the development of instruments or other forms of cooperation under CMS and the types of measure that might be included;
- Potential for greater engagement with RFMOs, particularly newly established RFMOs that are applying the precautionary and ecosystem approaches to fisheries management, or for contributing to the current RFMO review;
- Most effective taxonomic coverage (listed species only, or other migratory sharks in unfavourable status driven by the same factors and facing the same management challenges); and
- geographic coverage (global or regional, by species or by population/stock).

Some of these are considered in more detail below, others may be more usefully discussed during the meeting, drawing upon this resource paper for background.

5.1 *Species and/or population considerations*

The co-ordinated management and assessment of shared migratory populations (or stocks) of chondrichthyan fishes would certainly promote an understanding of the cumulative impacts of fishing effort on the status of shared populations and greatly improve management actions for chondrichthyans. It would, however, most logically be undertaken at a regional level, not globally, and for a wide range of species, not solely for the three species listed on CMS Appendices to date (although agreements or other measures that are established for the listed species could also be used to address common problems affecting many other migratory sharks).

Unfortunately, however, a general lack of information regarding the structure and dynamics of migratory shark species hampers a comprehensive assessment of options for international cooperation under the CMS. This is even the case for two of the three listed species. Table 10 summarises the range of threatened migratory and possibly migratory sharks, current information on subpopulations, and the range States that might cooperate for the protection of those species.

For four unlisted migratory shark species (highlighted below) information exists regarding the subdivision of populations into major regions within which cooperation between nations would be important for the conservation of the species and likely more effective than a global approach. It is likely that, with further research, other subdivisions may be discovered as well as divisions at smaller scale than those currently known, that could also be addressed by CMS. This approach may be worth considering for the conservation of migratory sharks.

While CMS has traditionally focused upon collaboration between States in order to achieve the conservation of migratory species, with additional input from NGOs and IGOs, in the case of marine species it will be particularly important to seek to secure the collaboration of regional fisheries bodies. The geographic coverage of these bodies is presented in Annex 7. These RFMO areas may present a useful starting point for regional collaborative agreements or arrangements for the conservation of migratory sharks.

Table 10. Ranges of threatened migratory and possibly migratory sharks with details, where known, of subdivision of populations and nations that could cooperate for the protection of those species. (Please refer also to management information in Table 9.)

Species name	Range	Possible subdivision of populations and nations bordering those populations
<i>Rhincodon typus</i>	Cosmopolitan in tropical and warm temperate waters	Unknown population structure and dynamics.
<i>Carcharodon carcharias</i>	Cosmopolitan, mostly antitropical	Largely unknown population structure and dynamics.
<i>Cetorhinus maximus</i>	North Atlantic, South Africa, Australia, New Zealand, Japan to Taiwan, Alaska to Mexico, Peru to southern Brazil	Two known subpopulations: Pacific and Atlantic possibly with NE and NW split within both. More detailed population structure unknown.
<i>Carcharhinus signatus</i>	Delaware to Cuba, southern Brazil and Argentina, Senegal to Angola, ?Panama	East Atlantic subpopulation isolated - Senegal, Gambia, Guinea, Liberia, Ivory Coast, Ghana, Togo, Benin, Nigeria, Cameroon, Equatorial Guinea, Guinea Bissau, Gabon, Congo, Angola, Sierra Leone. SW Atlantic unclear if separate from NW Atlantic.
<i>Lamna nasus</i>	North Atlantic and Southern Ocean	Four known subpopulations: 1. NE Atlantic UK, Ireland, Norway, Denmark, Netherlands, Sweden, France, Spain, Portugal, Russia, Namibia? South Africa? [Iceland] 2. NW Atlantic US [Bermuda, Canada, Greenland] 3. Mediterranean Spain, France, Italy, Malta, Slovenia, Croatia, Albania, Greece, Macedonia, Morocco, Algeria, Tunisia, Libya, Egypt, Israel, Lebanon, Syria, Cyprus, Monaco, Serbia and Montenegro [Turkey, Bosnia and Herzegovina] 4. Southern Hemisphere unknown structure of populations within southern hemisphere.
<i>Squalus acanthias</i>	Global in temperate waters	Nine known subpopulations: 1. Australasian Australia, NZ [PNG] 2. Black Sea Russia, Ukraine, Romania, Bulgaria, Georgia [Turkey] 3. Mediterranean Spain, France, Italy, Malta, Croatia, Albania, Greece, Morocco, Algeria, Tunisia, Libya, Egypt, Israel, Lebanon, Syria, Cyprus, Monaco, Slovenia, Serbia and Montenegro [Turkey, Bosnia and Herzegovina] 4. NW Atlantic US [Bahamas, Canada, Cuba, Greenland] 5. NE Pacific US [Canada, Mexico] 6. NE Atlantic Belgium, Denmark, Faeroe Islands, Germany, Mauritania, Netherlands, Norway, Russian Federation, Senegal, Sweden, UK, Ireland, France, Portugal, Spain, Morocco [Iceland, Western Sahara] 7. NW Pacific China, Russia [China, Japan, People's Democratic Republic of Korea, Republic of Korea] 8. South America Chile 9. Southern Africa South Africa, Namibia, Angola?
<i>Negaprion acutidens</i>	Tropical indo-west and central pacific	Southeast Asia subpopulation thought to be isolated - Indonesia, Thailand, Vietnam, Cambodia.
<i>Carcharias taurus</i>	Gulf of Maine to Gulf of Mexico, southern Brazil to Argentina, Mediterranean and northwest Africa, South Africa, Red Sea, Vietnam to Japan, Australia	Two subpopulations in Australia: western and eastern. Division of remaining populations unclear.
<i>Galeorhinus galeus</i>	Cosmopolitan in temperate waters (except northwest Pacific)	Mixing occurs widely within NE Atlantic region. Mixing within southern half of Australian continent. Movements within SW Atlantic population between Brazil and Argentina – unclear if isolated from SE Pacific population. Unknown movements of South African population.

Species name	Range	Possible subdivision of populations and nations bordering those populations
<i>Carcharhinus longimanus</i>	Circumglobal in tropical and warm temperate waters	Unknown population structure and dynamics.
<i>Hemipristis elongatus</i>	South Africa and Madagascar to the Yellow Sea, Philippines, Papua New Guinea, Australia	Unknown population structure and dynamics.
<i>Isogomphodon oxyrinchus</i>	Trinidad, Guyana, Surinam, French Guinea, ?Brazil	Unknown population structure and dynamics.
<i>Isurus paucus</i>	Cosmopolitan in tropical waters	Unknown population structure and dynamics. Atlantic and Indo Pacific populations may be isolated.
<i>Nebrius ferrugineus</i>	South Africa to Taiwan, Malaysia, Indonesia, Papua New Guinea, Australia, New Caledonia, Palau, Marshall Is., Tahiti	Unknown population structure and dynamics.
<i>Sphyrna tudes</i>	Venezuela to southern Brazil	Unknown population structure and dynamics.
<i>Squatina squatina</i>	Norway to West Sahara, including the Mediterranean	Unknown population structure and dynamics.

Square brackets [...] indicate countries that are not Party to CMS

5.2 CMS Instruments and partnership arrangements

Various options are available for shark conservation and management through CMS. While the CMS COP8 Recommendation on Migratory Sharks (Annex I) refers specifically to a global instrument (e.g. an Action Plan, Treaty or MoU), the briefing for developing this paper and the scope of the Migratory Shark meeting agenda include the consideration of other options for cooperation under CMS, such as the possible application of a WSSD Partnership. Goriup and Tucker (2005) undertook a SWOT analysis for a similar study on migratory raptors, which (while not considering WSSD Partnerships) is also relevant to migratory sharks and has therefore been adapted for consideration in this study. As noted by these authors, action through CMS has a number of distinctive features and advantages compared with those possible through other Multi-lateral Environmental Agreements (MEA). The same advantages are apparent when comparing action through CMS to the potential for action through existing fisheries management frameworks. In general, CMS may:

- 1) focus attention on a discrete set of migratory species within any given geographic area;
- 2) specify and engage the range States most appropriate for these species;
- 3) more easily facilitate joint action (including by drawing together the existing legislation), information exchange and integration, and best practice development across the geographical area of the instrument, whether through a formal, binding Agreement, an MOU, a stand-alone AP or a WSSD-type partnership; and
- 4) provide the possibility for better access to other types of assistance, including other biodiversity-related conventions and international organisations, and integration into the entire world of environment and development.

However, there are also disadvantages that have to be borne in mind, including:

- 5) the additional administrative and financial burden for under-resourced environmental ministries, even when actions are closely correlated with obligations under other MEAs;

- 6) if a legally binding Agreement, rather than an MoU or partnership is adopted, the considerable time likely to be needed to negotiate, adopt and ratify a new instrument, and for the first meeting of Signatories to convene and begin to pursue implementation; and
- 7) continued reliance on national conservation priorities.

An alternative to the CMS instrument option is to consider a less formal, voluntary partnership arrangement for promoting dialogue, cooperation and collaboration between stakeholders. Indeed, a Type II Partnership model endorsed by the World Summit on Sustainable Development (WSSD, Johannesburg, 2002) is now being developed for the Conservation of Migratory Waterbirds in the East Asian-Australian Flyway. This is considered by CMS to meet the key requirements for a species agreement under Article IV of the Convention because of the international cooperation framework that it embodies. It may well serve as a bridge to a more formal instrument under its auspices. Advantages are that the partners are not confined to governments, but can include international non-governmental and inter-governmental organisations (such as regional fisheries bodies), and the business sector, potentially including the fishing and processing industry.

Table 11. Strengths, weaknesses, opportunities and threats (SWOT) of potential CMS instruments or partnership arrangements for migratory sharks (adapted from Goriup and Tucker 2005)

Type of CMS Instrument	Main Characteristics	Strengths	Weaknesses	Opportunities	Threats
1. WSSD Type II Partnership Arrangement	<p>An informal voluntary framework to promote dialogue, cooperation and collaboration between a range of stakeholders, from all levels of government to non-governmental organisations, industry, community groups and local people.</p> <p>Requires a Secretariat for effective functioning.</p> <p>Ideally associated with an Action Plan (see below) and would act as the institutional umbrella to support AP implementation.</p> <p>The species covered do not have to be listed in Appendix II of CMS.</p>	<p>Meets the key requirements for a regional species agreement under Article IV of the Convention.</p> <p>May serve as a bridge to a more formal instrument under CMS auspices.</p> <p>Membership not restricted. Partners are not confined to governments, but can include international non-governmental and inter-governmental organisations (e.g. RFOs), the fishing and processing industry</p> <p>Can be developed quickly with little formal procedure (no need for formal ratification).</p>	<p>Not legally binding and therefore depends for effectiveness entirely on the goodwill of the partners, and the willingness of government partners to establish national partnership networks, and to support and provide resources to the Secretariat.</p> <p>Might be ineffective if established without an accompanying Action Plan (see below), or unless coordination functions are outsourced.</p>	<p>Relatively quick and simple to negotiate and establish and potentially expedient. Any relevant potential partners may become engaged in the process.</p> <p>The Partnership could serve as a bridge to a more formal arrangement, potentially including a new MoU or a formal Agreement.</p>	<p>The CMS COP will not provide the CMS Secretariat with the additional financial and/or manpower resources needed to coordinate the Partnership, and <i>ad hoc</i> voluntary financial contributions are probably not sustainable over the longer term.</p> <p>Participants in the Partnership will not give sufficient support because it is not legally binding.</p>

Type of CMS Instrument	Main Characteristics	Strengths	Weaknesses	Opportunities	Threats
2. Action Plan	<p>A non-binding stand-alone instrument.</p> <p>May be associated with a partnership arrangement, MoU or Agreement that can act as the institutional umbrella to support its implementation (see above and below).</p> <p>May also be recommended as part of a Concerted Action by the CMS COP to the Ranges States of a migratory species listed in Appendix I if individual national level actions have not improved its conservation status so that they take further coordinated measures considered appropriate to benefit the species under Article III(6).</p>	<p>Can be developed quickly with little formal procedure (no need for signatures by the participating agencies).</p> <p>Enjoys the international legitimacy of CMS along with the benefits derived from the Convention's close partnership with the United Nations Environment Programme (UNEP).</p> <p>Provides a stable and long-term political framework for initial implementation and later evolution (e.g. to an MoU or Agreement).</p> <p>There are no regular administrative duties or financial contributions to be paid: the CMS Secretariat usually does the administrative work.</p>	<p>Not legally binding and therefore depends for effectiveness entirely on the goodwill of the participating States.</p> <p>No organisational structure created for its implementation, so the CMS Secretariat has to coordinate it, unless associated with a partnership arrangement and/or coordination functions are outsourced.</p>	<p>The material for an Action Plan is readily available and any Range State willing to participate could do so quickly.</p> <p>Interested conservation IGOs and NGOs can contribute to its implementation through their on-the-ground activities.</p> <p>The Action Plan could serve as a forerunner to and be integrated within the institutional provided by an MoU or eventually a new formal Agreement.</p>	<p>The CMS COP will not provide the CMS Secretariat with the additional financial and/or manpower resources needed to coordinate the Partnership, and <i>ad hoc</i> voluntary financial contributions are probably not sustainable over the longer term.</p> <p>Participants in the Action Plan will not give sufficient support because it is not legally binding.</p>

Type of CMS Instrument	Main Characteristics	Strengths	Weaknesses	Opportunities	Threats
3. Memorandum of Understanding (under Article IV(4))	<p>A non-binding (soft law) legal and institutional framework for the delivery of an integral Action Plan. Usually aims to co-ordinate short-term measures across the range of one or more seriously endangered migratory species. Operates until conservation status improves, or a more elaborate instrument (i.e. a formal Agreement under Article IV(3) or IV(4)) is prepared, adopted by Range States and enters into force.</p> <p>Geographical coverage does not need to extend to the entire migratory range of the species concerned. Species covered do not have to be listed in Appendix II of CMS.</p>	<p>Can be developed and agreed on relatively short notice.</p> <p>Geographical coverage does not need to extend to the entire migratory range of the species concerned.</p> <p>Enjoys the international legitimacy of CMS along with the benefits derived from the Convention's close partnership with the United Nations Environment Programme (UNEP).</p> <p>Provides a stable and long-term legal and/or political framework for initial implementation and later evolution.</p> <p>Parties and other signatories must make regular reports on implementation.</p> <p>No regular administrative duties or financial contributions to be paid though voluntary contributions are encouraged; the CMS Secretariat usually does the administration.</p> <p>Higher standing than an Action Plan alone because it at minimum requires Ministerial (or equivalent) signatures, and embodies political commitments, but usually does not need ratification.</p> <p>Their simplicity allows MoUs (and/or their integral comprehensive action plans) to be fairly easily re-opened for re-negotiation or amendment.</p>	<p>Not legally binding and therefore depends for effectiveness entirely on the goodwill of the participating States.</p> <p>No organisational structure created for implementation so the CMS Secretariat has to coordinate it unless coordination is outsourced.</p> <p>Typically has a much less substantive content than an Agreement because it must not create any new commitment for the signatory Range States however the integral action plan is comprehensive and tailored to particular the species' needs.</p> <p>As an MoU does not create any organisational structure of its own, it arguably may not be as dynamically implemented as an Agreement with the daily engagement of a secretariat (unless this function is outsourced).</p>	<p>The material for an MoU and Action Plan is readily available and any Range State willing to participate could do so provided the government signs the MoU.</p> <p>The MoU could serve as a forerunner for a new formal Agreement.</p>	<p>CMS COP will not provide the CMS Secretariat with the additional financial and/or manpower resources needed to coordinate the MoU and Action Plan and hold regular meetings of the signatories to monitor implementation</p> <p>Signatories to the MoU will not give sufficient support because it is not legally binding.</p> <p>The MoU itself could provide a poor substitute for a higher level formal Agreement.</p>

Type of CMS Instrument	Main Characteristics	Strengths	Weaknesses	Opportunities	Threats
4. Article IV Agreement²¹	<p>A legally binding multilateral treaty (N.B. Article IV (3) agreements may also be legally binding). They may be concluded for species listed on Appendix II (Article IV(4)) or any population, members of which periodically cross one or more national boundaries (Article IV(3)). While initially developed for species listed on CMS Appendices, they may later be expanded to cover additional species.</p>	<p>A self-standing treaty with its own institutions for implementing an integral Action Plan.</p> <p>The legally binding nature of this instrument could unlock resources that would not be released for a stand alone Action Plan or MoU.</p> <p>Decision and policy making bodies, serviced by a Secretariat, meet on a regular basis.</p> <p>Has the potential to create a dynamic environment to address the particular needs of the species covered, and Range States.</p> <p>Provides long term legal stability for the Range States, their authorities and scientific bodies, as well as the international community of governmental and non-governmental organisations involved.</p> <p>Parties must make regular reports on implementation.</p> <p>Has flexibility in coverage of species and geographic range, and can develop organically from an MoU.</p>	<p>Needs to be ratified in accordance with the internal law making or decision making procedures of every Range State. This can take considerable time.</p> <p>The legal and institutional framework of the Agreement means the Signatories may have to stretch limited resources to a further MEA requiring regular contributions and national personnel for meetings and reporting.</p>	<p>The material for an Agreement and Action Plan is readily available and any Range State willing to be-come a Party could do so provided it ratifies the Agreement.</p> <p>The agreement could focus on the most threatened species and key range States in order to minimise delays and costs.</p> <p>The Agreement could be amalgamated later with another existing Agreement if appropriate.</p>	<p>Agreement Parties might not contribute sufficient resources to make it effective as an independent instrument.</p>

²¹ May be negotiated under Article IV (3) or (4).

Table 12. Strengths, weaknesses, opportunities and threats (SWOT) of existing management frameworks for migratory sharks

	Main Characteristics	Strengths	Weaknesses	Opportunities	Threats
1. Regional Fisheries Management Organisations	<p>Fora through which States meet and cooperate to manage fisheries for the conservation and sustainable use of marine living resources.</p> <p>Usually established by FAO (which is not itself a fishery management body).</p> <p>Some 16 RFMOs have a mandate to establish binding management measures for fisheries resources (see Annex 7). Some have a mandate enabling conservation and management measures to be implemented for related or bycatch species), many have used this to implement shark finning bans.</p> <p>Species-specific remit may be limited (e.g. to billfish and tunas) and not include sharks.</p>	<p>RFMOs in existence or currently being formed will address most fisheries targeting straddling stocks.</p> <p>There is considerable geographical overlap between many RFBs, but overlap in species responsibilities doesn't generally occur.</p> <p>Some already include sharks within their remit; more could do so if they chose.</p> <p>Several have introduced shark finning bans. Some have basic catch reporting requirements.</p>	<p>Only a few RFMOs cover whole ocean basins, leaving some high seas fish stocks unmanaged.</p> <p>Mandate does not include all fisheries resources (particularly not high seas species).</p> <p>Membership is small (some 15 to 30 at most – see Annex 7).</p> <p>Have generally failed to prevent over-exploitation or to rebuild overexploited stocks within their remit.</p> <p>Most were established before adoption of UNFSA.</p> <p>Several even predate UNCLOS. TOR generally not as precautionary as mandated by UNFSA and do not incorporate the precautionary approach to fisheries management.</p> <p>Many fall short in enforcement and flag-state responsibilities stressed by UNFSA.</p> <p>Some tend not to adopt scientific management advice.</p>	<p>Currently under review.</p> <p>Potential through this review to improve institutional arrangements, enforcement measures, application of scientific advice, geographic and species coverage and to eliminate gaps in the management of living marine resources.</p>	<p>RFBs tend to focus their limited management resources on the most important, valuable and high volume target fisheries within their remit and are unlikely to devote much effort to sharks.</p>

	Main Characteristics	Strengths	Weaknesses	Opportunities	Threats
2. FAO International Plan of Action for the Conservation and Management of Sharks	<p>Developed within the framework of the FAO Code of Conduct for Responsible Fisheries.</p> <p>Adopted in 1999.</p> <p>Highlights the action required for sharks. Overall objective to ensure the conservation and management of sharks and their long-term sustainable use.</p> <p>Calls upon all 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.</p> <p>Backed by detailed Technical Guidelines.</p>	<p>Embraces the precautionary approach.</p> <p>Encompasses all chondrichthyan fisheries, whether target or bycatch, industrial, artisanal or recreational,.</p> <p>Considers species conservation, biodiversity maintenance, habitat protection and sustainable management.</p>	<p>Wholly voluntary.</p> <p>States and Fisheries Management Organisations are not obliged to undertake any of the actions urged by FAO in the IPOA. It appears that few consider it a high priority.</p> <p>Implemented by only 40% of the top 20 shark fishing countries and fewer than 20% of all FAO COFI Members.</p> <p>Not implemented by RFMOs.</p> <p>Has so far had little impact upon shark fisheries management.</p>	<p>Urges States to ensure the effective conservation and management of transboundary, straddling, highly migratory and high seas shark stocks.</p> <p>Technical guidelines include a framework for developing joint Shark Plans for shared transboundary species of sharks.</p>	<p>Used widely as the major reason why there is no need for intervention in shark conservation or management by biodiversity departments, bodies or instruments,</p> <p>Has no Secretariat support and is under-resourced.</p>

	Main Characteristics	Strengths	Weaknesses	Opportunities	Threats
3. United Nations Fish Stock Agreement (FSA)	<p>Mandate is to promote effective implementation of UNCLOS on straddling fish stocks and highly migratory fish stocks (including many sharks). Embraces the precautionary approach. Entered into force in 2001. Intended to become a blueprint for the management of high seas fisheries for the above stocks. Too short a time since ratification to enable its impact to be assessed. Has potential to be beneficial to fish stocks in the medium to long-term.</p>	<p>The backing and authority of a UN Convention, which was developed under the direction of a UN General Assembly Resolution and adopted by consensus (without a vote) in 1995. Based on unanimous agreement of fishing nations on the importance of establishing, reinforcing and implementing effective means and mechanisms for achieving responsible fishing on the high seas. Has led to the implementation of management measures that are intended to improve the status of species fished on the high seas.</p>	<p>Does not explicitly address high seas fishery resources not included on UNCLOS Annex I Exclusions include stocks that are located entirely in the high seas (e.g. migratory deepwater and oceanic sharks that may never enter EEZs); there is reportedly resistance to extending the FSA to include them. Does not specifically call for an ecosystem approach to fisheries, although this concept is embodied in Article 5. Ratification has been poor. Performance so far is disappointing.</p>	<p>UNCLOS Annex I lists many migratory shark species whose management should be addressed under FSA. FSA calls upon coastal States and other States fishing highly migratory species to cooperate in ensuring conservation and promoting the optimum utilization of those resources in their whole area of distribution. Recently reviewed by UN Secretary General (May 2006). Current potential for improvements arising from this review.</p>	<p>May not have the desired uptake by fishing States and hence beneficial impact upon fish stocks that was envisaged when it was developed and adopted. It will take decades to find out whether the rebuilding process for depleted fish stocks has been effective under the FSA.</p>

6 Considerations for the Migratory Sharks meeting

6.1 Fisheries management versus biodiversity management

Despite its shortcomings and largely poor track record in shark population management, there is already a well-established fisheries management framework that has the potential to be applied to the conservation and management of migratory sharks. This includes national fisheries management measures and regional fisheries management through Regional Fisheries Bodies, both of which are guided by the over-arching voluntary International Plan of Action for the Conservation and Management of Sharks and the Code of Conduct for Responsible Fisheries. Furthermore, the UN Fish Stock Agreement is intended to deliver management of highly migratory species and straddling fish stocks, including the three shark species that are already listed on CMS and many other migratory shark species with unfavourable status.

The IPOA-Sharks is voluntary (and eight years after adoption apparently largely ineffective), and the UNFSA has yet to demonstrate whether it will deliver improved fisheries management. In contrast, most national and many regional fisheries management measures are mandatory and are (at least in theory) capable of being enforced. The resources and political will to introduce and implement shark fisheries management measures are, however, apparently limited to a small minority of shark fishing nations. Critics have commented that RFMOs have largely failed to meet the objectives of their governing Conventions.

In contrast to the shark fisheries management track record under the IPOA-Sharks, however, CMS has managed to develop a track record in marine species management that includes six formal Agreements and ten MoUs. Its record for terrestrial migratory species is even stronger. This indicates that it should be possible for CMS to make a difference if it engages in migratory shark conservation, because of its well-developed and flexible approach to engaging range States (whether or not Party to CMS), and other stakeholders and tailoring its activities depending upon need and circumstances.

In its traditional biodiversity field, however, CMS is generally not perceived to be challenging the statutory remit of other management bodies. Unfortunately, there is a strong possibility that this may be the perception of some stakeholders as CMS begins to take up its remit for the conservation and management of listed shark species, even more so with regards the potentially broader role outlined in its Recommendation on Migratory Sharks (Annex 1). This has certainly been the case as CITES has become engaged in issues of shark conservation and sustainable management.

For the engagement of CMS in migratory shark conservation and management to be successful, it is essential that there is, from the outset, full consultation and engagement with FAO, Regional Fisheries Management Bodies and CMS Party Fisheries Departments. If such consultation is undertaken and opportunities are pursued for developing synergies between these two schools of living natural resource management, then there is considerable potential for CMS engagement to reinvigorate the shark fisheries management measures that appear at present to be inactive or ineffective in most regions.

6.2 Potential discussion points

The following points are identified as possible subjects for consideration by CMS when developing measures for improving the status of and collaborative actions for migratory sharks. It is not suggested that all of these are of equal importance or that they should all necessarily be reviewed and debated.

6.2.1 Taxonomic coverage

- Should CMS only consider the three listed migratory shark species, or should it also consider action under Recommendation 8.16 for other migratory shark species with unfavourable status that appear to require collaborative action to address the threats operating within their range?
- Can/should CMS focus on addressing the taxonomic gaps in RFMO coverage?

6.2.2 Regional/global coverage

- Can a CMS instrument/agreement operate effectively worldwide, even if the shark species is potentially capable of worldwide movements, or should it focus at a regional level? If the latter, which regions are highest priority and how should development proceed?
- Can the problem of high seas migratory species that probably never or only rarely cross administrative boundaries between the high seas and EEZs be addressed through CMS?
- Is there scope for developing synergies between the regional activities of RFMOs and CMS; if so, which RFMOs offer greatest potential for collaborative action?
- Can/should CMS step in where there are geographic gaps in RFMO coverage?
- How can (or should) CMS contribute to the current reviews of RFMOs?

6.2.3 Threats

- It is widely agreed that where migratory sharks are in unfavourable status, this is primarily caused by unsustainable exploitation in fisheries (although other threats may contribute to unfavourable status). Can CMS help to address this major problem, and if so how?
- When bycatch fisheries for migratory sharks are a significant threat, whether retained or discarded, can this be addressed through the CMS initiative on bycatch?
- Can CMS most usefully address non-fisheries issues, e.g. the deliberate persecution or problems of reckless disturbance through ecotourism operations (diving and catch and release)?
- How important is habitat conservation and the protection of critical areas where sharks aggregate to feed or breed?

6.2.4 Conservation and management measures

- Which bodies take or should take the lead responsibility for shark conservation and management, within governments and within international intergovernmental organizations, particularly for species that are commercially exploited and which also qualify for attention under biodiversity instruments?
- What are the opportunities for maximising potential for synergies between biodiversity conservation and fisheries management measures?
- What are the strengths and weaknesses of voluntary *versus* legally binding actions?

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ANNEX 1. Convention on Migratory Species Recommendation 8.16 “Migratory sharks”

MIGRATORY SHARKS

Adopted by the Conference of the Parties at its Eighth Meeting (Nairobi, 20-25 November 2005)

Acknowledging the obligations of the global community to conserve, protect and manage migratory sharks as underpinned by, *inter alia*, the Convention on Biological Diversity, CMS, the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), the United Nations Convention on the Law of the Sea, the United Nations Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks and the FAO International Plan of Action for the Conservation and Management of Sharks, and FAO’s Committee on Fisheries;

Recognising that under CMS, Range States should take action to conserve, protect and manage migratory species, and endeavour to conclude Agreements to promote the conservation and management of migratory species;

Noting that several shark species are already listed in Appendices I and II;

Aware of the vital ecosystem role played by sharks, and the significant and continuing mortality of sharks listed on Appendix I and II through a range of impacts, including habitat destruction, target fisheries, illegal, unreported and unregulated (IUU) fishing, and as fisheries by-catch; and

Noting the importance of cooperation between Range States in furthering research, awareness raising, trade monitoring and by-catch reduction of migratory sharks, and that these activities could greatly strengthen conservation outcomes for migratory sharks;

The Conference of the Parties to the Convention on the Conservation of Migratory Species of Wild Animals

1. *Requests* all Parties to strengthen measures to protect migratory shark species against threatening processes, including habitat destruction, IUU fishing and fisheries by-catch;
2. *Encourages* the FAO Committee on Fisheries to promote greater uptake of the International Plan of Action for the Conservation and Management of Sharks as a matter of urgency;
3. *Calls* upon Range States of migratory sharks listed on Appendix I or II to develop a global migratory sharks conservation instrument, in accordance with Articles III and V of the Convention, noting that discussions on the development of the instrument could, *inter alia*:
 - (a) consider the potential value of developing subsidiary regional and/or species specific conservation management plans to the instrument;
 - (b) involve, to the greatest extent possible, governments, intergovernmental organisations, non-governmental organisations and local communities;
 - (c) identify, as appropriate, effective mechanisms to mitigate threats such as by-catch, entanglement in marine debris, and IUU fishing;
 - (d) identify viable and practical alternatives to consumptive uses of migratory sharks while recognising the cultural and economic importance of these species for some communities; and
 - (e) develop mechanisms to facilitate developing country participation in the implementation of the future instrument; and
4. *Requests* the Secretariat to bring this recommendation to the attention of the FAO Committee on Fisheries, and CITES, and to explore future avenues of cooperation with these organisations as well as with Range States of migratory sharks that will lead to enhanced protection, conservation and management of these sharks.

ANNEX 2. CITES Resolution Conf. 12.6: Conservation and management of sharks

RECOGNIZING that sharks are particularly vulnerable to overexploitation owing to their late maturity, longevity and low fecundity;

RECOGNIZING that there is a significant international trade in sharks and their products;

RECOGNIZING that unregulated and unreported trade is contributing to unsustainable fishing of a number of shark species;

RECOGNIZING the duty of all States to cooperate, either directly or through appropriate sub-regional or regional organizations in the conservation and management of fisheries resources;

NOTING that IUCN – The World Conservation Union’s Red List of Threatened Species (2000) lists 79 shark taxa (from the 10 per cent of taxa for which Red List assessments have been made);

RECOGNIZING that the International Plan of Action on the Conservation and Management of Sharks (IPOA-sharks) was prepared by FAO in 1999 and that all States whose vessels conduct directed fisheries or regularly take sharks in non-directed fisheries are encouraged by COFI to adopt a National Plan of Action for the Conservation and Management of Shark Stocks (NPOA-Sharks);

NOTING that, through the adoption of Resolution Conf. 9.17 and Decisions 10.48, 10.73, 10.74, 10.93, 10.126, 11.94 and 11.151, Parties to CITES have previously recognized the conservation threat that international trade poses to sharks;

NOTING that two shark species are currently listed in Appendix III of CITES;

WELCOMING the report adopted at the 18th meeting of the Animals Committee that noted that CITES should continue to contribute to international efforts to address shark conservation and trade concerns;

NOTING that States were encouraged by FAO to have prepared NPOAs for sharks by the COFI 24th session held in 2001;

NOTING that there is a significant lack of progress with the development and implementation of NPOAs;

CONCERNED that insufficient progress has been made in achieving shark management through the implementation of IPOA-Sharks except in States where comprehensive shark assessment reports and NPOA-Sharks have been developed;

CONCERNED that the continued significant trade in sharks and their products is not sustainable;

THE CONFERENCE OF THE PARTIES TO THE CONVENTION

AGREES that a lack of progress in the development of the FAO IPOA-Sharks is not a legitimate justification for a lack of further substantive action on shark trade issues within the CITES forum;

INSTRUCTS the CITES Secretariat to raise with FAO concerns regarding the significant lack of progress in implementing the IPOA-Sharks, and to urge FAO to take steps to actively encourage relevant States to develop NPOA-Sharks;

DIRECTS the Animals Committee to continue activities specified under Decision 11.94 beyond the 12th meeting of the Conference of the Parties, and to report on progress at the 13th meeting of the Conference of Parties;

DIRECTS the Animals Committee to critically review progress towards IPOA-Sharks implementation (NPOA-Sharks) by major fishing and trading nations, by a date one year before the 13th meeting of the Conference of the Parties to CITES;

DIRECTS the Animals Committee to examine information provided by range States in shark assessment reports and other available relevant documents, with a view to identifying key species and examining these for consideration and possible listing under CITES;

ENCOURAGES Parties to obtain information on implementation of IPOA-Sharks from their fisheries departments, and report directly on progress to the CITES Secretariat and at future meetings of the Animals Committee;

URGES FAO COFI and Regional Fisheries Management Organizations to take steps to undertake the research, training, data collection, data analysis and shark management plan development outlined by FAO as necessary to implement the IPOA-Sharks;

ENCOURAGES Parties to contribute financially and technically to the implementation of the IPOA-Sharks;

DIRECTS the Animals Committee to make species-specific recommendations at the 13th meeting and subsequent meetings of the Conference of the Parties if necessary on improving the conservation status of sharks and the regulation of international trade in these species;

RECOMMENDS that Parties continue to identify endangered shark species that require consideration for inclusion in the Appendices, if their management and conservation status does not improve; and

REQUESTS Management Authorities to collaborate with their national Customs authorities to expand their current classification system to allow for the collection of detailed data on shark trade including, where possible, separate categories for processed and unprocessed products, for meat, cartilage, skin and fins, and to distinguish imports, exports and re-exports. Wherever possible these data should be species-specific.

ANNEX 3. UN FAO International Plan of Action for the Conservation and Management of Sharks (IPOA-Sharks)

Food and Agriculture Organization of The United Nations
Rome, 26-30 October 1998

Introduction

1. For centuries artisanal fishermen have conducted fishing for sharks sustainably in coastal waters, and some still do. However, during recent decades modern technology in combination with access to distant markets have caused an increase in effort and yield of shark catches, as well as an expansion of the areas fished.
2. There is concern over the increase of shark catches and the consequences which this has for the populations of some shark species in several areas of the world's oceans. This is because sharks often have a close stock-recruitment relationship, long recovery times in response to over-fishing (low biological productivity because of late sexual maturity; few off-spring, albeit with low natural mortality) and complex spatial structures (size/sex segregation and seasonal migration).
3. The current state of knowledge of sharks and the practices employed in shark fisheries cause problems in the conservation and management of sharks due to lack of available catch, effort, landings and trade data, as well as limited information on the biological parameters of many species and their identification. In order to improve knowledge on the state of shark stocks and facilitate the collection of the necessary information, adequate funds are required for research and management.
4. The prevailing view is that it is necessary to better manage directed shark catches and certain multispecies fisheries in which sharks constitute a significant bycatch. In some cases the need for management may be urgent.
5. A few countries have specific management plans for their shark catches and their plans include control of access, technical measures including strategies for reduction of shark bycatches and support for full use of sharks. However, given the wide-ranging distribution of sharks, including on the high seas, and the long migration of many species, it is increasingly important to have international cooperation and coordination of shark management plans. At the present time there are few international management mechanisms effectively addressing the capture of sharks.
6. The Inter-American Tropical Tuna Commission, the International Council for the Exploration of the Sea, the International Commission for the Conservation of Atlantic Tunas, the Northwest Atlantic Fisheries Organization, the Sub-regional Fisheries Commission of West African States, the Latin American Organization for Fishery Development, the Indian Ocean Tuna Commission, the Commission for the Conservation of Southern Bluefin Tuna and the Oceanic Fisheries Programme of the Pacific Community have initiated efforts encouraging member countries to collect information about sharks, and in some cases developed regional databases for the purpose of stock assessment.
7. Noting the increased concern about the expanding catches of sharks and their potential negative impacts on shark populations, a proposal was made at the Twenty-second Session of the FAO Committee on Fisheries (COFI) in March 1997 that FAO organize an expert consultation, using extra-budgetary funds, to develop Guidelines leading to a Plan of Action to be submitted at the next Session of the Committee aimed at improved conservation and management of sharks.
8. This International Plan of Action for Conservation and Management of Sharks (IPOA-SHARKS) has been developed through the meeting of the Technical Working Group on the Conservation and Management of Sharks in Tokyo from 23 to 27 April 1998²² and the Consultation on Management of

22 See: "Report of the FAO Technical Working Group on the Conservation and Management of Sharks". Tokyo, Japan, 23-27 April 1998. FAO Fisheries Report No. 583.

Fishing Capacity, Shark Fisheries and Incidental Catch of Seabirds in Longline Fisheries held in Rome from 26 to 30 October 1998 and its preparatory meeting held in Rome from 22 to 24 July 1998²³.

9. The IPOA-SHARKS consists of the nature and scope, principles, objective and procedures for implementation (including attachments) specified in this document.

Nature and Scope

10. The IPOA-SHARKS is voluntary. It has been elaborated within the framework of the Code of Conduct for Responsible Fisheries as envisaged by Article 2 (d). The provisions of Article 3 of the Code of Conduct apply to the interpretation and application of this document and its relationship with other international instruments. All concerned States²⁴ are encouraged to implement it.
11. For the purposes of this document, the term “shark” is taken to include all species of sharks, skates, rays and chimaeras (Class *Chondrichthyes*), and the term “shark catch” is taken to include directed, bycatch, commercial, recreational and other forms of taking sharks.
12. The IPOA-SHARKS encompasses both target and non-target catches.

Guiding principles

13. *Participation*. States that contribute to fishing mortality on a species or stock should participate in its management.
14. *Sustaining stocks*. Management and conservation strategies should aim to keep total fishing mortality for each stock within sustainable levels by applying the precautionary approach.
15. *Nutritional and socio-economic considerations*. Management and conservation objectives and strategies should recognize that in some low-income food-deficit regions and/or countries, shark catches are a traditional and important source of food, employment and/or income. Such catches should be managed on a sustainable basis to provide a continued source of food, employment and income to local communities.

Objective

16. The objective of the IPOA-SHARKS is to ensure the conservation and management of sharks and their long-term sustainable use.

Implementation

17. The IPOA-SHARKS applies to States in the waters of which sharks are caught by their own or foreign vessels and to States the vessels of which catch sharks on the high seas.
18. States should adopt a national plan of action for conservation and management of shark stocks (Shark-plan) if their vessels conduct directed fisheries for sharks or if their vessels regularly catch sharks in non-directed fisheries. Suggested contents of the Shark-plan are found in Appendix A. When developing a Shark-plan, experience of subregional and regional fisheries management organizations should be taken into account, as appropriate.
19. Each State is responsible for developing, implementing and monitoring its Shark-plan.
20. States should strive to have a Shark-plan by the COFI Session in 2001.
21. States should carry out a regular assessment of the status of shark stocks subject to fishing so as to determine if there is a need for development of a shark plan. This assessment should be guided by article 6.13 of the Code of Conduct for Responsible Fisheries. The assessment should be reported as a part of each relevant State’s Shark-plan. Suggested contents of a shark assessment report are found in Appendix

2 See Report: “Preparatory Meeting for the Consultation on the Management of Fishing Capacity, Shark Fisheries and Incidental Catch of Seabirds in Longline Fisheries.” Rome, 22-24 July, 1998. FAO Fisheries Report No. 584.

24 In this document, the term “State” includes Members and non-members of FAO and applies *mutatis mutandis* also to “fishing entities” other than States.

B. The assessment would necessitate consistent collection of data, including inter alia commercial data and data leading to improved species identification and, ultimately, the establishment of abundance indices. Data collected by States should, where appropriate, be made available to, and discussed within the framework of, relevant subregional and regional fisheries organizations and FAO. International collaboration on data collection and data sharing systems for stock assessments is particularly important in relation to transboundary, straddling, highly migratory and high seas shark stocks.

22. The Shark-plan should aim to:

- Ensure that shark catches from directed and non-directed fisheries are sustainable;
- Assess threats to shark populations, determine and protect critical habitats and implement harvesting strategies consistent with the principles of biological sustainability and rational long-term economic use;
- Identify and provide special attention, in particular to vulnerable or threatened shark stocks;
- Improve and develop frameworks for establishing and co-ordinating effective consultation involving all stakeholders in research, management and educational initiatives within and between States;
- Minimize unutilized incidental catches of sharks;
- Contribute to the protection of biodiversity and ecosystem structure and function;
- Minimize waste and discards from shark catches in accordance with article 7.2.2.(g) of the Code of Conduct for Responsible Fisheries (for example, requiring the retention of sharks from which fins are removed);
- Encourage full use of dead sharks;
- Facilitate improved species-specific catch and landings data and monitoring of shark catches;
- Facilitate the identification and reporting of species-specific biological and trade data.

23. States which implement the Shark-plan should regularly, at least every four years, assess its implementation for the purpose of identifying cost-effective strategies for increasing its effectiveness.

24. States which determine that a Shark-plan is not necessary should review that decision on a regular basis taking into account changes in their fisheries, but as a minimum, data on catches, landings and trade should be collected.

25. States, within the framework of their respective competencies and consistent with international law, should strive to cooperate through regional and subregional fisheries organizations or arrangements, and other forms of cooperation, with a view to ensuring the sustainability of shark stocks, including, where appropriate, the development of subregional or regional shark plans.

26. Where transboundary, straddling, highly migratory and high seas stocks of sharks are exploited by two or more States, the States concerned should strive to ensure effective conservation and management of the stocks.

27. States should strive to collaborate through FAO and through international arrangements in research, training and the production of information and educational material.

28. States should report on the progress of the assessment, development and implementation of their Shark-plans as part of their biennial reporting to FAO on the Code of Conduct for Responsible Fisheries.

Role of FAO

29. FAO will, as and to the extent directed by its Conference, and as part of its Regular Programme activities, support States in the implementation of the IPOA-SHARKS, including the preparation of Shark-plans.

30. FAO will, as and to the extent directed by its Conference, support development and implementation of Shark-plans through specific, in-country technical assistance projects with Regular Programme funds and

by use of extra-budgetary funds made available to the Organization for this purpose. FAO will provide a list of experts and a mechanism of technical assistance to countries in connection with development of Shark-plans.

31. FAO will, through COFI, report biennially on the state of progress in the implementation of the IPOA-SHARKS.

Appendix A. Suggested Contents of a Shark-plan

I Background

When managing fisheries for sharks, it is important to consider that the state of knowledge of sharks and the practices employed in shark catches may cause problems in the conservation and management of sharks, in particular:

- Taxonomic problems
- Inadequate available data on catches, effort and landings for sharks
- Difficulties in identifying species after landing
- Insufficient biological and environmental data
- Lack of funds for research and management of sharks
- Little coordination on the collection of information on transboundary, straddling, highly migratory and high seas stocks of sharks
- Difficulty in achieving shark management goals in multispecies fisheries in which sharks are caught.

II Content of the Shark-plan

The Technical Guidelines on the Conservation and Management of Sharks, under development by FAO, provide detailed technical guidance, both on the development and the implementation of the Shark-plan. Guidance will be provided on:

- Monitoring
- Data collection and analysis
- Research
- Building of human capacity
- Implementation of management measures

The Shark-plan should contain:

A. Description of the prevailing state of :

- Shark stocks, populations;
- Associated fisheries; and,
- Management framework and its enforcement.

B. The objective of the Shark-plan.

C. Strategies for achieving objectives. The following are illustrative examples of what could be included:

- Ascertain control over access of fishing vessels to shark stocks
- Decrease fishing effort in any shark where catch is unsustainable
- Improve the utilization of sharks caught
- Improve data collection and monitoring of shark fisheries
- Train all concerned in identification of shark species

- Facilitate and encourage research on little known shark species
- Obtain utilization and trade data on shark species

Appendix B. Suggested contents of a shark assessment report

A shark assessment report should *inter alia* contain the following information:

- Past and present trends for:
 - Effort: directed and non-directed fisheries; all types of fisheries;
 - Yield: physical and economic
- Status of stocks
- Existing management measures:
 - Control of access to fishing grounds
 - Technical measures (including by-catch reduction measures, the existence of sanctuaries and closed seasons)
 - Others
 - Monitoring, control and surveillance
- Effectiveness of management measures
- Possible modifications of management measures

ANNEX 4. The Definition of “Favourable Conservation Status” according to the Convention on the Conservation of Migratory Species of Wild Animals

According to Article 1(c) “conservation status” will be taken as “favourable” when:

- (1) population dynamics data indicate that the migratory species is maintaining itself on a long-term basis as a viable component of its ecosystems;
- (2) the range of the migratory species is neither currently being reduced, nor is likely to be reduced, on a long-term basis;
- (3) there is, and will be in the foreseeable future, sufficient habitat to maintain the population of the migratory species on a long-term basis; and
- (4) 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.

Conversely, Article 1(d) states:

"Conservation status" will be taken as "unfavourable" if any of the conditions set out in subparagraph (c) ... is not met.

ANNEX 5. Structure of the prototype CMS Migratory Shark Database

Sheet 1: CMS Species List

Column Code	Heading(s)	Contents
A	Class	This column can be ignored or hidden. The class chondrichthyes is copied to every record, to allow data in the sheet to be filtered.
B to F	Order/Suborder; Family; Species Name; Common Name	These include taxonomy and the scientific and common names of each species. (Column D provides an identification and running total of the number of species on the list).
G	CMS Migratory classification	Defined as 'Migratory' or 'Potential'. Migratory - indicates that the species is strongly suspected as migratory under the CMS definition. Potential - indicates that the species is a possible migrant under the CMS definition, but no data are available.
H	Distribution	An overview of the distribution of each species (See Sheet 3 'Range' for the full list of range States for each species).
I	Classification	Classification by zone. i.e. coastal, oceanic, deepwater, or shelf.
J	Habitat	i.e. pelagic or benthic or both.
K	Depth range	Species' approximate depth range.
L	Migration	Descriptive field with an overview of information known on the movements of each species.
M to W	Ocean Basins	Each ocean basin in which a species occurs is marked by a 1. When filtering the species list, using the Auto-filter feature in Excel, this allows you to select species based on the Ocean basins in which they occur. E.g. For all species occurring in the North Atlantic Ocean, select '1' on both of the filter's drop-down menus under NE Atlantic and NW Atlantic.
X to AB	2006 Red List Status (Global category; Year; Regional category, Region, Year)	All assessments submitted and published on the 2006 Red List to date. Columns X and Y give the published global assessment and year of publication. Columns Z, AA and AB give the regional and subpopulation assessments published to date, the region, and the year of publication. The species list can therefore be filtered by Global and regional Red List category, and by region, using the auto filter option.*
AC to AE	In Prep Red List Status (Global category; Regional category, Region)	All assessments in preparation. These assessments have not been submitted to the Red List, are not final and may be under review, therefore there are no dates of publication. These will be updated as appropriate.
AF to AH	Global Management Status	Indicates species listed on each global instrument (e.g. CMS; UNCLOS; CITES) by Annex/Appendix
AI to AV	Regional Management (Legal and Management Status by region: Africa; Australasia; Central America & Caribbean; Central & South America; Eurasia & North Africa; Europe; North America)	Regional Management (as for Range States) is classified by Biogeographic regions and Map of Parties on the CMS website. Presence on regional lists, (e.g. Barcelona and Bern Conventions in Europe) is noted under Legal Status and any management measures are noted under Management Status . These are descriptive text fields at the moment.
AW to AY	Links to FAO Factsheet; Fishbase and 2006 RL Assessment	Hyperlinks to these documents, where available

* The organisation of Global and regional Red List categories, both published and in preparation, is difficult within the Excel spreadsheet. It is hard to standardise the presentation of these, as a regional assessment can be done for any region throughout a species' range and the specific names vary widely. At present all the information within the database is organised so that it may be filtered by the global species assessment, on the same row as the species name.

Sheet 2: Regional Fisheries Bodies by CMS Region

This sheet presents the acronyms for all relevant Regional Fisheries Bodies within each CMS Region. The Ocean that each RFB applies to (Atlantic, Pacific or Indian) and the type of body (Management, Scientific, Advisory) are given next to each, under the 'Type' field. Each RFB name is also hyperlinked directly to the webpage for each body, and the full name of each body has been added to the screen tip, so just hover over the link to see the name of the body in full. Ultimately, the intention is to link this by the range States and management for each species, but this may not be workable until the database is migrated to table format in another programme.

Sheet 3: Range

In the same way as for Ocean Region, the list of range States for each species is marked by a '1', so that species may be filtered by country, to allow the total number of species occurring in each country to be calculated using the Sum feature in Excel, and to facilitate the format for transfer to an Access-based database. A '?' denotes where a species is may occur within a range State, but its presence is not confirmed. The Range States are organised according to CMS Biogeographical Region, to allow comparisons between regions. I would like to add the CMS Status (i.e. Party, Non-party, MoU, etc) of each of these countries to this sheet, and am considering the best place and way in which to record this.

Sheets 4 and 5: RL Sum ONLY Migratory sp and RL Sum Migratory & Potential

These sheets present some summaries from the Red List status data within the database. Each sheet provides a breakdown of the number and % of species in each category on the 2006 RL (Globally, regionally and by individual region, where possible).

Sheet 4 (RL Sum ONLY Migratory sp), gives this ONLY for the species strongly suspected as being migratory (i.e. those listed as Migratory under 'CMS Migratory' in Sheet 1, Column G). Sheet 5 RL Sum Migratory & Potential, gives this for all species, including those listed as 'Potential' migrators. Under both, summaries of the Global Status, and Regional status of all evaluated species are listed.

Sheet 6: Bibliography

The bibliography can be filtered by Region(s), Specie(s), Citation and Reference. This is being built on, and can be hyperlinked to the main database itself where each citation is referred to at a later stage. There is also the potential to link directly to the documents themselves from here, if these could be collected and if the database will not be published. (The Red List Assessments, for which links are provided, also give references relevant to each species).

ANNEX 6. Text from UN General Assembly reports and Resolutions

Resolution adopted by the UNGA Fifty-eighth session (2003)

58/14. Sustainable fisheries, including through the 1995 Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks, and related instruments

Extracts from preamble:

Recognizing further the economic and cultural importance of sharks in many countries, the biological importance of sharks in the marine ecosystem, the vulnerability of some shark species to over-exploitation and the need for measures to promote the long-term sustainability of shark populations and fisheries,

Reaffirming its support for the initiative of the Food and Agriculture Organization of the United Nations and relevant regional and subregional fisheries management organizations and arrangements on the conservation and management of sharks, while noting with concern that only a small number of countries have implemented the International Plan of Action for the Conservation and Management of Sharks, adopted by the Food and Agriculture Organization in 1999,
...

Expressing concern at the reports of continued loss of seabirds, particularly albatrosses, as a result of incidental mortality from longline fishing operations, and the loss of other marine species, including sharks and fin-fish species, as a result of incidental mortality, and noting with satisfaction the imminent entry into force of the Agreement for the Conservation of Albatrosses and Petrels under the Convention on the Conservation of Migratory Species of Wild Animals,
...

Extracts from operative paragraphs:

18. *Urges* States to develop and implement national and, as appropriate, regional plans of action to put into effect the international plans of action of the Food and Agriculture Organization of the United Nations, namely the International Plan of Action for the Management of Fishing Capacity, the International Plan of Action for Reducing Incidental Catch of Seabirds in Longline Fisheries, the International Plan of Action for the Conservation and Management of Sharks and the International Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing;
...

47. *Calls upon* States, the Food and Agriculture Organization of the United Nations and subregional or regional fisheries management organizations and arrangements to implement fully the International Plan of Action for the Conservation and Management of Sharks as a matter of priority, inter alia, by conducting assessments of shark stocks and developing and implementing national plans of action, recognizing the need of some States, in particular developing States, for assistance in this regard;

48. *Urges* States, including those working through subregional or regional fisheries management organizations and arrangements in implementing the International Plan of Action for the Conservation and Management of Sharks, to collect scientific data regarding shark catches and to consider adopting conservation and management measures, particularly where shark catches from directed and nondirected fisheries have a significant impact on vulnerable or threatened shark stocks, in order to ensure the conservation and management of sharks and their long-term sustainable use, including by banning directed shark fisheries conducted solely for the purpose of harvesting shark fins and by taking measures for other fisheries to minimize waste and discards from shark catches, and to encourage the full use of dead sharks;

49. *Urges* all States to cooperate with the Food and Agriculture Organization of the United Nations in order to assist developing States in implementing the International Plan of Action for the Conservation and Management of Sharks, including through voluntary contributions to work of the organization, such as its FishCODE programme;

50. *Invites* the Food and Agriculture Organization of the United Nations, in consultation with relevant subregional or regional fisheries management organizations or arrangements, to prepare a study relating to the impact on shark populations of shark catches from directed and non-directed fisheries and their impact on ecologically related species, taking into account the nutritional and socioeconomic considerations as reflected in the International Plan of Action for the Conservation and Management of Sharks, particularly as they relate to small-scale, subsistence and artisanal fisheries and communities, as well as updating Technical Paper 389 of the Food and Agriculture Organization, entitled "Shark utilization, marketing and trade", in order to facilitate improved shark conservation, management and utilization, and to report to the Secretary-General for inclusion in a fisheries-related report as soon as practicable;

Resolution adopted by the UNGA Fifty-ninth session (2004)

59/25. Sustainable fisheries, including through the 1995 Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks, and related instruments

extracts from preamble:

Recognizing further the economic and cultural importance of sharks in many countries, the biological importance of sharks in the marine ecosystem, the vulnerability of some shark species to over-exploitation, the need for measures to promote the long-term sustainability of shark populations and fisheries and the relevance of the International Plan of Action for the Conservation and Management of Sharks, adopted by the Food and Agriculture Organization of the United Nations in 1999, in providing development guidance of such measures,

Reaffirming its support for the initiative of the Food and Agriculture Organization of the United Nations and relevant regional and subregional fisheries management organizations and arrangements on the conservation and management of sharks, while noting with concern that only a small number of countries have implemented the International Plan of Action for the Conservation and Management of Sharks,

.....

Expressing concern, while recognizing considerable efforts to reduce by-catch in longline fishing through various regional fisheries management organizations, at the reports of continued loss of seabirds, particularly albatrosses, as a result of incidental mortality from longline fishing operations, and the loss of other marine species, including sharks, fin-fish species and marine turtles, as a result of incidental mortality,

.....

Extracts from operative paragraphs:

72. *Calls upon* States, the Food and Agriculture Organization of the United Nations and subregional or regional fisheries management organizations and arrangements to implement fully the International Plan of Action for the Conservation and Management of Sharks as a matter of priority, inter alia, by conducting assessments of shark stocks and developing and implementing national plans of action, recognizing the need of some States, in particular developing States, for assistance in this regard;

73. *Urges* States, including those working through subregional or regional fisheries management organizations and arrangements in implementing the International Plan of Action for the Conservation and Management of Sharks, to collect scientific data regarding shark catches and to consider adopting conservation and management measures, particularly where shark catches from directed and nondirected fisheries have a significant impact on vulnerable or threatened shark stocks, in order to ensure the conservation and management of sharks and their long-term sustainable use, including by banning directed shark fisheries conducted solely for the purpose of harvesting shark fins and by taking measures for other fisheries to minimize waste and discards from shark catches, and to encourage the full use of dead sharks;

74. *Requests* the Food and Agriculture Organization of the United Nations to develop programmes to assist States, including developing States, in carrying out the tasks mentioned in paragraph 73 above, in particular the adoption of appropriate conservation and management measures, including the banning of directed shark fisheries conducted solely for the purpose of harvesting shark fins;

75. *Reaffirms* the requests contained in paragraph 50 of its resolution 58/14, and invites the Food and Agriculture Organization of the United Nations to report to the Secretary-General, for inclusion in his report on sustainable fisheries, on progress regarding the preparation of the study mentioned therein, as well as the programmes mentioned in paragraph 74 above, and to consider at the sixty-second session of the General Assembly whether additional action is required;

76. *Reiterates* the crucial importance of cooperation by States directly or, as appropriate, through the relevant regional and subregional organizations, and by other international organizations, including the Food and Agriculture Organization of the United Nations through its FishCODE programme, including through financial and/or technical assistance, in accordance with the Agreement, the Compliance Agreement, the Code and the International Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing and the International Plan of Action for the Conservation and Management of Sharks, to increase the capacity of developing States to achieve the goals and implement the actions called for in the present resolution;

....

Resolution adopted by the UNGA Sixtieth session (2005)

60/31. Sustainable fisheries, including through the 1995 Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks, and related instruments

Extracts from preamble:

Recognizing further the economic and cultural importance of sharks in many countries, the biological importance of sharks in the marine ecosystem, the vulnerability of certain shark species to over-exploitation and the need for measures to promote the long-term sustainability of shark populations and fisheries, and the relevance of the 1999 Food and Agriculture Organization of the United Nations International Plan of Action for the Conservation and Management of Sharks in providing development guidance of such measures,

Reaffirming its support for the initiative of the Food and Agriculture Organization of the United Nations and relevant regional and subregional fisheries management organizations and arrangements on the conservation and management of sharks, while noting with concern that only a small number of countries have implemented the 1999 Food and Agriculture Organization of the United Nations International Plan of Action for the Conservation and Management of Sharks,

Expressing concern over reports of continued losses of seabirds, particularly albatrosses and petrels, as well as other marine species, including sharks, fin-fish species and marine turtles, as a result of incidental mortality in fishing operations, particularly longline fishing, and other activities, while recognizing considerable efforts to reduce by-catch in longline fishing through various regional fisheries management organizations and arrangements,

.....

Extracts from operative paragraphs:

X. Capacity-building

83. *Reiterates* the crucial importance of cooperation by States directly or, as appropriate, through the relevant regional and subregional organizations, and by other international organizations, including the Food and Agriculture Organization of the United Nations through its FishCode programme, including through financial and/or technical assistance, in accordance with the Agreement, the Compliance Agreement, the Code and the International Plan of Action to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing and the International Plan of Action for the Conservation and Management of Sharks, to increase the capacity of developing States to achieve the goals and implement the actions called for in the present resolution;

.....

Report of the Secretary General on Sustainable Fisheries (A/60/189, 2005)

Extracts from: III. Responsible fisheries in the marine ecosystem

C. Towards ensuring the conservation and management of sharks

49. The International Plan of Action for the Conservation and Management of Sharks (IPOA-Sharks) has been developed to address widespread concern over the increase in shark fishing and its consequences for the populations of certain shark species. The goal of IPOA-Sharks is to control directed shark fisheries and fisheries in which sharks constitute a significant by-catch to ensure the conservation and management of sharks and their long-term sustainable use. To that end, States are invited to adopt national plans of action for the conservation and management of shark stocks if their vessels conduct directed fisheries for sharks or if their vessels regularly catch sharks in non-directed fisheries. National plans should contain an assessment of the prevailing state of shark stocks and populations, associated fisheries and management frameworks and their enforcement, and strategies for achieving the objective of IPOA-Sharks, including: controlling access of fishing vessels to shark stocks; decreasing fishing effort for any stock where the catch is unsustainable; improving the utilization of sharks caught; improving data collection and the monitoring of shark species; providing training in identification of shark species; facilitating and encouraging research on little known shark species; and obtaining utilization and trade data on shark species.

50. According to FAO, only about 30 per cent of States replying to a survey reported having made an assessment of the need for a national plan and only one in three, about 11 per cent, have actually developed and implemented IPOA-Sharks. These results indicate that more progress is needed in the implementation of the Plan. In its resolution 59/25, the General Assembly called on States to fully implement IPOA-Sharks and, where directed and non-directed fisheries have a significant impact on vulnerable or threatened shark stocks, to ban directed shark fisheries for the sole purpose of harvesting shark fins and to minimize discards of shark catches by encouraging the full use of dead sharks.

51. **States:** the United States and the United Kingdom reported that they have adopted national plans of action for the conservation and management of sharks. The United States has banned the practice of shark finning in areas under its

jurisdiction and by its nationals. The United States has initiated training opportunities and policy dialogues within APEC concerning shark conservation and management and is working with other partners to disseminate the manual, *Elasmobranch Fisheries Management Techniques*, which is aimed at assisting developing countries in the preparation of national shark fisheries management plans. The United Kingdom indicated that some territories have already collected catch statistics for sharks, although they have not yet introduced specific conservation and management measures for the species. The United Kingdom stressed that there are no direct shark fisheries in maritime areas under its jurisdiction, and that it does not support shark finning or other destructive practices, as a matter of policy.

52. Croatia, European Community, Myanmar, New Zealand, the Philippines and Serbia and Montenegro indicated that they have not yet adopted any national plans of action to conserve and manage sharks, although EC, New Zealand and the Philippines intend to do so in the near future. Both EC and New Zealand have legislation in line with IPOA-Sharks, EC stated that many rules in its Common Fisheries Policy are in accordance with IPOA-Sharks, including monitoring of catches; collection of scientific data on shark catches, including fishing efforts, landings and discards, biological parameters, scientific surveys and prices at the first sale, as minimum data requirements; conduct of specific research on shark biology and exploitation; adoption of catch limitations for a number of species in the Community EEZ; and prohibition of shark fisheries for the sole purpose of selling shark fins. Portugal requires that fishers who separate shark fins on board keep the remaining parts of the shark, in accordance with Community legislation. In the Philippines, the National Fisheries Research and Development Institute routinely collects scientific data regarding shark catches and the authorities are considering the banning of shark fisheries under the so-to-be adopted national plan of action. New Zealand indicated that some species of sharks are already under its Quota Management System, which makes their reporting mandatory. Myanmar stated that shark fisheries are prohibited in maritime areas under its jurisdiction and that, since May 2004, it has already declared two shark fishing protected areas. Pakistan reported that it had no direct shark fisheries in its waters and that sharks caught by other fisheries are fully utilized. Others stated that they do not have any shark fisheries, but collect scientific data on sharks (Croatia, Kuwait, Qatar and Saudi Arabia), and/or are involved in conservation measures on the advice of the competent RFMO (Cambodia and Kuwait). Morocco and Qatar encourage the full use of dead sharks taken as incidental catch and Qatar prohibits the export of sharks or any part thereof, such as shark fins.

53. FAO reported that in 2004 it had not received any requests for assistance in the implementation of IPOA-Sharks. It pointed out that in order to assist developing countries have sufficient financial and technical resources dedicated to the task. Most countries have few, if any, existing elasmobranch management activities on which to build programmes of assistance. Nonetheless, FAO has undertaken a number of activities that could benefit the conservation and management of sharks. In cooperation with APEC, it is publishing a study on elasmobranch fisheries management techniques to facilitate national management initiatives at the operational level. It is also developing a revised and expanded version of the catalogue “Sharks of the World” and a catalogue of batoids of the world (skates and rays). It is mapping elasmobranch distribution and preparing a digital archive of shark and ray illustrations and pamphlets.

54. With regard to the preparation of the study referred to in General Assembly resolutions 58/14 and 59/25, FAO indicated that it had not taken any step to update the study. This would be a major undertaking and it is not included in the FAO programme of work and budget, nor have funds been sought to support the work.

55. **RFMOs:** most RFMOs providing information indicated that they had made efforts to implement IPOA-Sharks, although they do not have a regional plan of implementation. Measures include releasing shark by-catch alive (CCAMLR, IATTC and ICCAT), distributing publicity materials to fishing vessel operators, providing advice in the formulation of management plans (CECAF), collecting bycatch data on sharks (ICCAT, IPHC and NAFO), adopting resolutions on shark fisheries that promote the full use of dead sharks, encouraging the implementation of national plans of action (ICCAT), and assessing shark populations (IATTC and ICCAT). NAFO announced that it is now regulating the conservation and management of the elasmobranch skates through TAC and quotas, thus becoming the first RFMO to manage an elasmobranch. Some RFMOs that had not taken measures indicated that they would do so in the near future (CPPS), that shark bycatch was not a problem in their convention areas (NASCO) or that insufficient resources and a lack of interest on the part of members had prevented them from doing so. Members of SPC consider that current shark catch or by-catch levels in their region are sustainable, while other fisheries are considered to be unsustainable and in need of more attention.

56. **Other competent bodies:** the UNDP/GEF YSLME²⁵ Programme has initiated activities associated with the conservation and management of sharks, including assessment of the status of commercially important stocks, quantification of carrying capacity, maximum sustainable yield for fisheries and the development of mechanisms for regular assessments and the protection of vulnerable and endangered species. Such mechanisms will be implemented by the adoption of best practice measures. The UNDP/GEF BCLME²⁶ is currently gathering baseline data on the capture of pelagic sharks by tuna longline fishing vessels in maritime areas under its purview as a first step towards assessing the severity of the problem. Follow-up recommendations will subsequently be made to mitigate the impacts of longlining

²⁵ YS Large Marine Ecosystem

²⁶ Benguela Current Large Marine Ecosystem

on sharks. In addition, because bronze whaler sharks migrate between Angola and Namibia, their joint management by the two countries is currently being implemented through the programme.

57. CITES reports that several shark species have been included in the Convention's appendices and additional species may be proposed for inclusion at the fourteenth session of the Conference of Parties in 2007. Previous CITES Conferences have adopted a number of resolutions on the conservation and management of sharks and CITES has convened a workshop on the topic.

58. Since 2002, the Southeast Asian Fisheries Development Center (SEAFDEC) has implemented a regional programme on the management of fisheries and the utilization of sharks in South-East Asia. The programme involves a regional study on the implementation of the IPOA-Sharks and includes the collection of data and information at the national level on the status of shark resources and their utilization. All members have reaffirmed their intention to develop a national plan of action on sharks in 2005 and the programme will support them in the formulation and implementation of their national plans.

59. **Non-governmental organizations:** a number of non-governmental organizations have initiated activities in various forums to promote the conservation and management of sharks, in accordance with the IPOA-Sharks. WWF has worked with ICCAT and NAFO as well as CITES to promote the adoption of measures related to sharks. In its assessment of RFMOs, WWF is gathering data on measures taken by these organizations and arrangements to conserve and manage sharks.

Resolution adopted by the UNGA Sixty-first session (2006)

61/105. Sustainable fisheries, including through the 1995 Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks, and related instruments

Resolution text not yet available at time of writing. Press release of 8th December 2006 states that the UNGA adopted consensus on 'Sustainable Fisheries' Resolution:

Deploring the fact that overfishing, illegal catches, wasteful methods and destructive techniques were leading to the rapid depletion of fish stocks and spoiling fragile marine habitats in many parts of the world, the United Nations General Assembly today called on States to take "immediate action", individually and through regional organizations, to sustainably manage fish stocks, and protect vulnerable deep sea ecosystems from harmful fishing practices. Adopting a consensus resolution on sustainable fisheries, the Assembly called on all States, directly or through regional fisheries management organizations, to apply widely, in accordance with international law, the precautionary approach and an ecosystem approach to the conservation, management and exploitation of fish stocks, including straddling fish stocks, highly migratory fish stocks and discrete high seas fish stocks. It also called on States parties to the 1995 Fish Stock Agreement to implement fully the provisions of article 6 (on the precautionary approach) of that accord, as a matter of priority.

ANNEX 7. Membership and geographic coverage of Regional Fisheries Bodies.

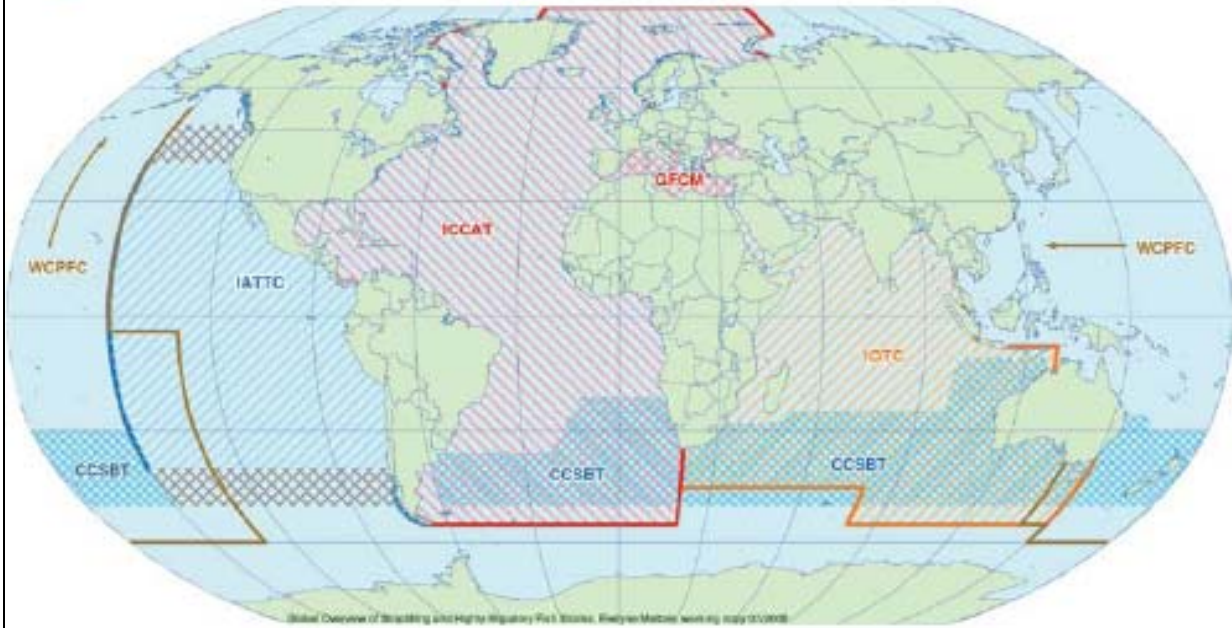
This table is not exhaustive, but lists the three RFBs responsible for fisheries that take particularly large quantities of migratory shark species and have engaged in shark fisheries management to some extent (for example through implementing finning bans and, in the case of ICCAT, attempting to undertake shark stock assessments). The map on the following page is taken from Willock and Lack (2006).

International Commission for the Conservation of Atlantic Tunas (ICCAT)		Inter-American Tropical Tuna Commission (IATTC)	Indian Ocean Tuna Commission (IOTC)
Algérie	Libya	Costa Rica	Australia
Angola	Maroc	Ecuador	China
Barbados	Mexico	El Salvador	Comoros
Belize	Namibia	France	Eritrea
Brasil	Nicaragua	Guatemala	European Community
Canada	Norway	Japan	France
Cap-Vert	Panama	Mexico	Guinea
China, People's Rep. of	Philippines	Nicaragua	India
Côte d'Ivoire	Russia	Panama	Iran, Islamic Rep, of
Croatia	São Tomé e Príncipe	Peru	Japan
European Union	Senegal	Spain	Kenya
France (St-Pierre et Miquelon)	South Africa	United States	Korea, Rep. of
Gabon	Trinidad & Tobago	Vanuatu	Sultanate of Oman
Ghana	Tunisie	Venezuela	Madagascar
Guatemala	Turkey		Malaysia
Guinea Ecuatorial	United Kingdom (O. Territories)	<u>Cooperating Non Parties or Fishing Entities</u>	Mauritius
Guinée-Conakry	United States	Canada	Pakistan
Honduras	Uruguay	China	Philippines
Iceland	Vanuatu	European Union	Seychelles
Japan	Venezuela	Honduras	Sri Lanka
Korea, Rep. of		Korea	Sudan
		Chinese Taipei	Thailand
			United Kingdom
			Vanuatu



Global Overview - Straddling Fish Stocks

- RFMO Boundary
- Proposed Regulatory Area (not yet adopted or not yet in force)
- Other Unregulated High Seas Areas where Straddling Fish Stocks Occur
- CCAMLR
- NAFO Regulatory Areas



Global Overview - Highly Migratory Fish Stocks (Tuna and Tuna-Like)

- IATTC
- ICCAT
- Antigua Convention (not yet in force)
- GFCM
- CCSBT
- IOTC
- WCPFC

WCPFC Note: Northern boundary and most of Western boundary for RFMO are not defined, and Area is not intended to include waters in South-East Asia which are not part of the Pacific Ocean, nor is it intended to include waters of the South China Sea.

ANNEX 8. Global distribution and aggregations of migratory sharks listed on CMS.

1. White shark

The white shark is most commonly recorded from the waters of Southern Africa (particularly from Namibia to KwaZulu-Natal and Mozambique); Eastern, Western and particularly Southern Australia; New Zealand; the Japanese archipelago; the North-eastern seaboard of North America, especially Long Island and environs; the Pacific coast of North America, primarily from Oregon to Baja; the coast of Central Chile; and the Mediterranean Sea, primarily the Western-Central region and Tyrrhenian Sea (Fergusson *et al.* 2005).

Known centres of abundance including breeding areas:

1. Eastern North Pacific off northern and southern California, **USA**, with adults of both sexes and young of the year off southern California, probably extending to the west coast of **Mexico**. No pregnant females reported.
2. Western North Atlantic coast of the **USA**, (Mid-Atlantic Bight from southern Massachusetts to New Jersey), including adults of both sexes and probably young of the year, but no pregnant females reported.
3. Eastern South Atlantic and Southwestern Indian Ocean: the southeast coast of **South Africa** from False Bay to the Eastern Cape and KwaZulu-Natal, with adults of both sexes and probably young of the year, but no pregnant females reported.
4. Southeastern Indian Ocean and Western South Pacific: Southeastern **Australia** (Western **Australia** to New South Wales and Queensland), including the Great Australian Bight, with adults of both sexes, pregnant females, and small young, possibly young of the year, reported. **New Zealand** similar with young and pregnant females but possibly contiguous with Australian area via migration.
5. Western North Pacific: **Japan** and possibly adjacent areas of **Korea** and **China**, including **Taiwan Province of China**. Pregnant females and young known, but more poorly known than other areas.
6. Mediterranean: Historically, primarily Western-Central region and Tyrrhenian Sea, mating and pregnant females recorded). Now extremely rare here.

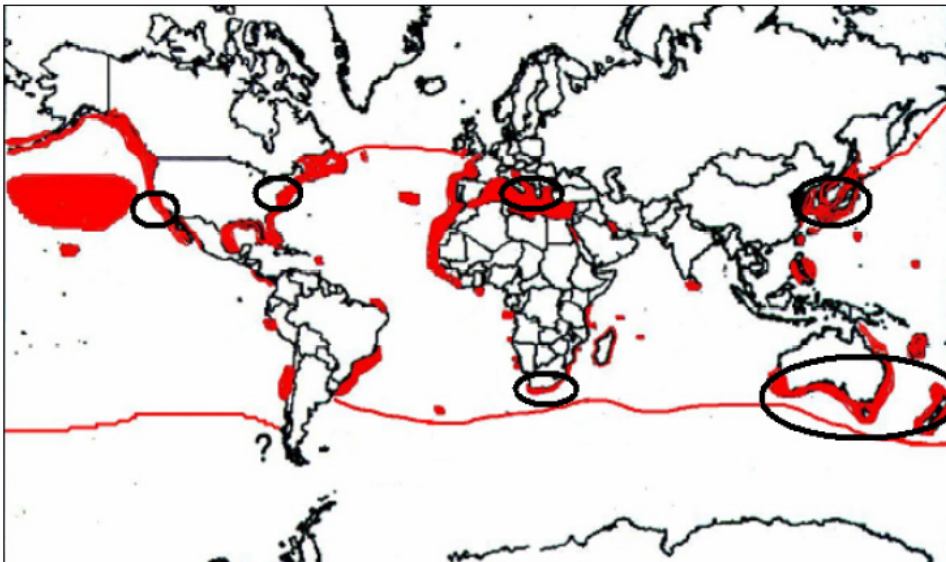


Figure E.1. Unpublished world map of the distribution and centres of abundance of white shark (derived from Compagno in preparation²). See Annex 1 for more information.

Sources:

Anonymous. 2002. Proposal for the inclusion of *Carcharodon carcharias* on Appendices I and II of the Convention on the Conservation of Migratory Species of Wild Animals. Prepared by the government of Australia. Proposal I/22 and II/21. URL: <http://www.cms.int/>.

Anonymous. 2002. Proposal to include the White shark (*Carcharodon carcharias*) in Appendix II of the convention on International Trade in Endangered Species (CITES). Prepared by the Governments of Australia and Madagascar, and presented to the 13th Meeting of the Conference of Parties to CITES, Bangkok, Thailand, 2-14 October 2004. URL: <http://www.cites.org>.

Anonymous, 2004. Report of the FAO ad hoc expert advisory panel for the assessment of proposals to amend Appendices I and II of CITES concerning commercially-exploited aquatic species. FAO Fisheries Report No. 748, FAO, Rome, Italy.

Fergusson, I.K., Compagno, L.J.V., and Marks, M.A. 2005. White shark *Carcharodon carcharias*. In: Fowler, S.L., Camhi, M., Burgess, G.H., Cailliet, G., Fordham, S.V., Cavanagh, R.D., Simpfendorfer, C.A. and Musick, J.A. In Press (2005). *Sharks, rays and chimaeras: the status of the chondrichthyan fishes*. IUCN SSC Shark Specialist Group. IUCN, Gland, Switzerland and Cambridge, UK.

2. Whale shark

Aggregations of whale sharks are often reported feeding on large seasonal concentrations of their planktonic prey. Examples include following synchronous coral spawning events (Ningaloo Reef, **Australia**), during lunar reef fish spawning events (**Belize**), after land crab spawning at Christmas Island, and feeding on crustacean blooms such as juvenile shrimp near estuaries in **Malaysia** (Borneo) and **Philippines**. Fisheries have targeted some of these aggregations, some of which now may be depleted.

Indian Ocean: **Australia** (Western Australia), **India** (Gujarat), **Sri Lanka**, **Maldives**, **Seychelles**, **Mozambique**, **South Africa**, **Iran (Gulf)**.

Pacific: **Mexico** (Baja California), **Philippines**, **Malaysia**, **Taiwan Province of China**.

Caribbean Sea: **Belize** and **Mexico** (Yucatan Peninsula), **Honduras** (Bay Islands).

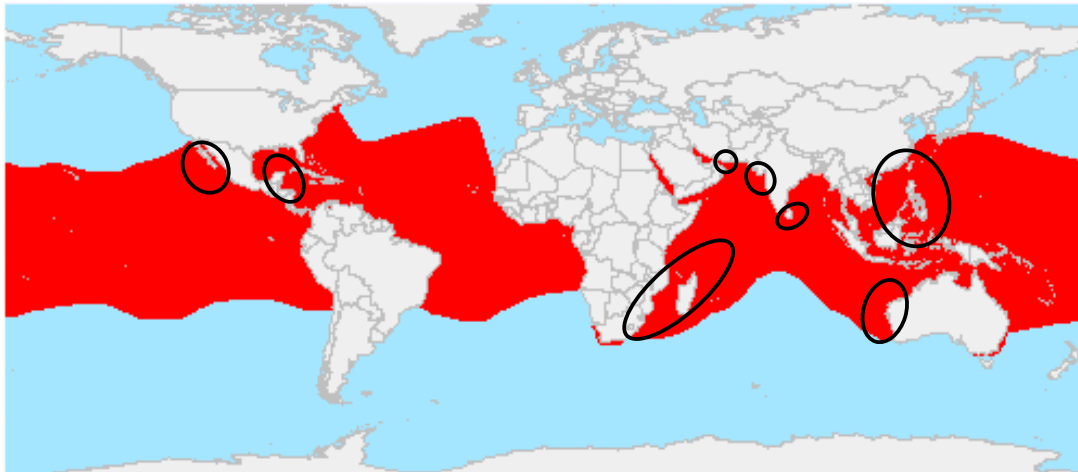


Figure 2: World map of the distribution and reported centres of abundance of whale shark adapted from FAO's Species Fact Sheet Map prepared by Leonard Compagno and Fabio Carocci.

Sources:

Anonymous. 1999. Proposal for the inclusion of *Rhincodon typus* on Appendix II of the Convention on the Conservation of Migratory Species of Wild Animals. Prepared by the government of the Philippines. URL: <http://www.cms.int/>.

Anonymous. 2002. Proposal to include the Whale Shark (*Rhincodon typus*) in Appendix II of the convention on International Trade in Endangered Species (CITES). Prepared by the Governments of the Philippines

and India, and presented to the 12th Meeting of the Conference of Parties to CITES, Santiago, Chile, 3–15 November 2002. URL: <http://www.cites.org>.

FAO Species Fact Sheet. *Rhincodon typus*. 2007. Available at: <http://www.fao.org/figis/servlet/species?fid=2801>. Downloaded on 30 January 2007.

3. Basking shark

Basking sharks may aggregate to feed along deepwater or surface frontal systems, where their planktonic prey becomes concentrated by water movements. They may also aggregate to breed or also use feeding aggregations for breeding. Certain years have seen very large influxes of sharks to some **United Kingdom** areas, while in others the numbers recorded are low (Kunzlik 1988, Speedie 1998, Fairfax 1998). Some of the following aggregations have been targeted by fisheries and are now depleted.

North East Atlantic: **Norway**, West coast of **UK**, **Ireland**, Northwest **France**, **Spain** (Galicia and Balearics), **Italy**.

North West Atlantic: **USA** (New England, Gulf of Maine to Carolinas),

North East Pacific: **Canada** (British Columbia), **USA** (California, Monterey Bay)

South West Pacific: **New Zealand**

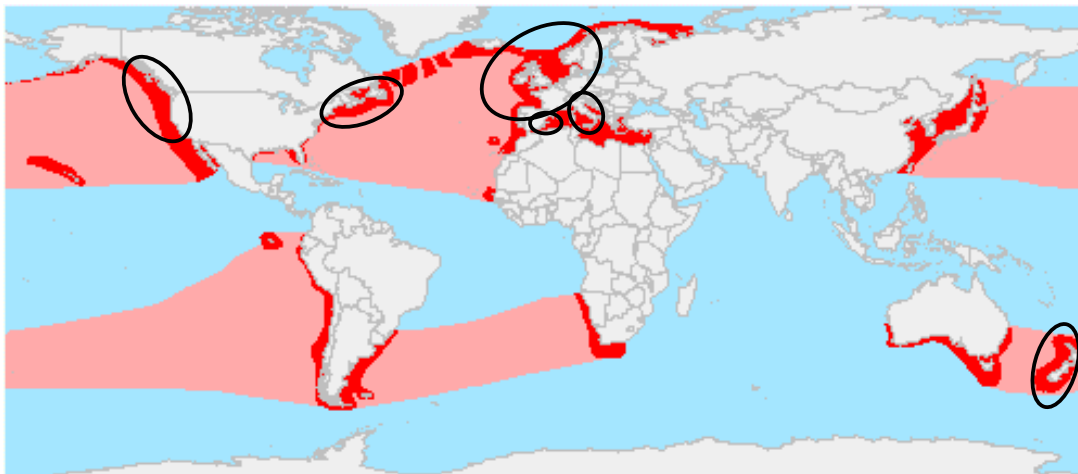


Figure 3: World map of the distribution and reported centres of abundance of basking shark adapted from FAO's Species Fact Sheet Map prepared by Leonard Compagno and Fabio Carocci.

Sources:

Anonymous. 2002. Proposal to include the Basking Shark (*Cetorhinus maximus*) in Appendix II of the Convention on International Trade in Endangered Species (CITES). Prepared by the United Kingdom, on behalf of European Community Member States, and presented to the 12th Meeting of the Conference of Parties to CITES, Santiago, Chile, 3–15 November 2002. URL: [ww.cites.org](http://www.cites.org).

Anonymous. 2005. Proposal for the inclusion of *Cetorhinus maximus* on Appendices I and II of the Convention on the Conservation of Migratory Species of Wild Animals. Prepared by the Government of the United Kingdom of Great Britain and Northern Ireland, and the Government of Australia URL: <http://www.cms.int/>.

FAO Species Fact Sheet. *Cetorhinus maximus*. 2007. Available at: <http://www.fao.org/figis/servlet/species?fid=2005>. Downloaded on 30 January 2007.