

Status and Conservation of Sharks in the Mediterranean Sea

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Introduction

Shark fisheries have expanded dramatically in size and number around the world since the mid-1980s, primarily in response to the rapidly increasing demand for shark fins, meat and cartilage. Despite the boom-and-bust nature of virtually all shark fisheries over the past century, most shark fisheries today still lack monitoring or management ⁽⁶⁾. The Mediterranean region is known to be an important habitat for cartilaginous fish and is thought to encompass unique breeding grounds for species such as the White Shark (*Carcharodon carcharias*) and Thornback Ray (*Raja clavata*). It may be surprising then that there is insufficient information for the majority of (up to 70%) Mediterranean species. Further research on the ecological status and exploitation of these populations is urgently needed.

The preliminary results of a workshop of experts convened by the IUCN Shark Specialist Group in San Marino last year highlighted the highly threatened status of several sharks and rays. Some species, such as the Mediterranean populations of Sawfishes (*Pristis* spp.) and Common or Gray Skates (*Dipturus batis*), may even be locally extinct ⁽⁴⁾.

The term “sharks” is used to refer to the Chondrichthyan or cartilaginous fishes, which comprise elasmobranchs (sharks and batoids; batoids include the sawfish, skates and rays) and holocephalans (chimaeras and rabbitfish).

Why the concern?

Sharks are a small, evolutionarily conservative group, comprising approximately 1000 species that have functioned successfully in diverse ecosystems for 400 million years. Despite their evolutionary success, some sharks may now be threatened with extinction as a result of human activity. Sharks are recognized as highly vulnerable to overexploitation leading to population depletion due to their life history strategies ⁽³⁾.

They are predominantly characterized as long-lived, slow growing and producing few offspring. These characteristics are associated with low productivity, close stock recruitment relationships, and long recovery times in response to over-fishing. Late sexual maturity, few offspring, and complex spatial structures (size/sex segregation and seasonal migration) result in low biological productivity ⁽⁷⁾. Their low reproductive capacity is illustrated by the Grey Nurse Shark (*Carcharias taurus*) that has only two offspring per reproductive season or the Spiny Dogfish (*Squalus acanthus*) that has a gestation period of up to 24 months.

Such life histories make these species highly vulnerable to overexploitation and slow to recover once their populations have been depleted ⁽⁶⁾. As keystone predators at the top of marine food webs, sharks fulfil an important role in the ocean ecosystem by maintaining prey species diversity and abundance. Thus their removal can have harmful ecological implications. For example, the removal of tiger sharks may result in a decline in numbers of important commercial fish species because sharks keep populations of other fish predators in check ⁽³⁾.

Species Spotlight

Regional protection has been achieved for the Basking Shark (*Cetorhinus maximus*), Great White Shark (*Carcharodon carcharias*), and Giant Devil Ray (*Mobula mobular*).

However, urgent legal protection is needed for the Sawfishes, *Pristis* spp. (CR IUCN Red List), Sand Tiger Sharks, *Carcharias taurus* and *Odontaspis ferox* (CR preliminary assessment in the Mediterranean), Gray Skate, *Dipturus batis* (EN preliminary assessment). There is also an urgent need to further assess the many Data Deficient species in the region such as Hammerhead Sharks (*Sphyrna* spp.), Guitarfishes (*Rhinobatos* spp.), and Speckled Skate (*Raja polystigma*).

Fisheries management programs for sustainable catch (both target and by-catch) need to be developed for the main commercial species which include dogfish (*Squalus acanthias*), Thresher Sharks (*Alopias* spp.), Makos (*Isurus* spp.), Porbeagle (*Lamna nasus*), and Blue Shark (*Prionace glauca*). Other commercially important species such as Angel Sharks (*Squatina* spp.), Catsharks (*Scyliorhinus* spp. and *Galeus melastomus*), Hound Sharks (*Mustelus* spp. and *Galeorhinus galeus*), Requiem Sharks (*Carcharinus falciformis*, *C. limbatus*, *C. obscurus* and *C. plumbeus*), Skates (*Leucoraja* spp., *Raja* spp.), and Stingrays (*Dasyatis* spp.) should also be addressed in management programs.

UNEP Mediterranean Action Plan for the Conservation of Cartilaginous Fishes 2003

Relevant Red List Categories

Critically Endangered, CR: Species considered to be facing an extremely high risk of extinction in the wild

Endangered, EN: Species considered to be facing a very high risk of extinction.

Vulnerable, VU: Considered to be facing a high risk of extinction

Data Deficient, DD: There is inadequate information to make a direct, or indirect, assessment of the species' risk of extinction based on its distribution and/or population status

Detailed information on Red List: http://www.redlist.org/info/categories_criteria.html

The Great White Shark (*Carcharodon carcharias*)

Endangered in the Mediterranean

This flagship species has long been the focus of negative media attention as a result of its occasional lethal interactions with humans and perceived nuisance to commercial fisheries. Due to this much exaggerated threat the species has been targeted in the past for sportfishing income, commercial trophy hunting or human consumption. The IUCN 2000 global assessment found the species to be Vulnerable globally, and this is currently under review. New information from the San Marino Workshop found the Great White Shark to be Endangered in the Mediterranean Sea. It has previously been listed as Endangered under Appendix I in the Convention of Migratory Species, Bonn 1983. It is also listed under Appendix II of the Bern Convention (Strictly Protected Fauna Species) and Barcelona Convention (Endangered or Threatened species) for the protection of the marine and coastal environment of the Mediterranean. Malta, however, is the only state to have provided legal protection for this species in its national legislation ⁽²⁾.

The San Marino Workshop (2)

To better determine the threatened status of sharks in this region through research and to develop and encourage regional collaboration, the IUCN Shark Specialist Group (SSG) has established a regional sub-group for the Mediterranean. The first workshop was organized at Cattolica (San Marino), from 29 September to 1 October 2003. Thirty regional and international experts gathered to evaluate the Mediterranean cartilaginous fish fauna using the IUCN Red List categories and criteria and to formulate priorities for action in the region.

Preliminary results (to be finalised mid-2004 and submitted to the Red List)

- Approximately 46% of sharks and related species in the Mediterranean are threatened (IUCN categories "Critically Endangered", "Endangered" or "Vulnerable"). However, 30% are "Data Deficient" which indicates a lack of scientific and fisheries data but it must be emphasised this does not necessarily exclude these species from being a conservation concern.

- The common (or grey) skate, *Dipturus batis*, once common but highly vulnerable to trawling, has now virtually disappeared from the Mediterranean Sea⁽⁴⁾. Other species of particular concern are the 2 species of tiger sharks found in the Mediterranean Sea, the sawfishes and angel sharks.

Recommendations

- To improve coordination between existing organisations/conventions that address shark conservation and management in the Mediterranean (namely FAO/GFCM, European Commission, Barcelona Convention, Bern Convention, Convention on Migratory Species and CITES).

- That the General Fisheries Commission for the Mediterranean (GFCM) includes the implementation of the FAO-IPOA-Sharks as a high priority on its agenda, in particular regarding the collection of information on the status of shark and ray stocks.

- That the GFCM addresses the basic aspects of shark conservation and management in the region when implementing the UNEP Mediterranean Action Plan for the Conservation of Cartilaginous fishes and that the GFCM implement the IPOA-Sharks by developing regional and national-level plans for fisheries management.

- That there is urgent action for the five shark and ray species under Annex III of the Barcelona and Bern Conventions. These species are: *Squatina squatina*, *Prionace glauca*, *Raja alba*, *Isurus oxyrinchus*, and *Lamna nasus* and other species for which there is conservation concern.

The Mediterranean Sea

Covers an area of about 2,512,000 km², including the Sea of Marmara but excluding the Black Sea. Its maximum depth is 5,121m, with average depth of 1,500m.

It is home to 82 species of cartilaginous fish (47 sharks, 34 batoids and one chimera). 80% are coastal species, the majority of these demersal fish. Several species, like the Basking Shark (*Cetorhinus maximus*), are pelagic.

The Basking Shark, measuring approximately 9 - 10 metres in length, is the Mediterranean's biggest shark (and the world's second biggest fish). There are frequent sightings of this animal in spring and summer off the coasts of Spain, France and western Italy. IUCN Red List cites it as globally Vulnerable and Endangered in NE Atlantic and N Pacific.

The Common Skate (*Dipturus batis*)

Locally Extinct in the Mediterranean

This species would now be more aptly named the 'uncommon skate' according to Nick Dulvy (SSG member and Red List assessor). It has already disappeared from the coastal waters of England and Ireland and is close to extinction in the Mediterranean Sea. During the period 1994-1999 this species was captured in only 2 of 6336 trawl operations of the MEDITS trawl survey. It was common in the Gulf of Lyons in 1950-60s and in a survey of the northern and central Adriatic Sea in 1948, but recent surveys confirm it is now absent from these areas. This decline is believed to be due to an increase in effort and number of trawl fisheries in the Mediterranean that overlap with the former geographic and depth range of the common skate ⁽²⁾.

Facts and Figures

- Some sharks have natural growth rates of only 1-2% per year.
- Every year, 100 million sharks and related species are caught in fisheries. Some species have been reduced by more than 80% over recent years, and some may become extinct before long.
- In 2000, FAO reports put total catches of shark at 828,364 tons. This was 20% more than in 1990.
- Indonesia had the largest recorded shark catch in 2000 at 111,973 ton. Spain had the second largest recorded shark catch total at 77,269 ton (FAO Fishstat).
- The FAO estimates that in 1997 world production of shark fins was 6 million kg.
- Hong Kong handles 50-80% of the world trade in shark fins.

Human Impacts on Sharks

There are five main ways that people can adversely affect sharks.

Over-fishing

Sharks have traditionally provided resources such as meat, skin and liver oil, considered to be of relatively low economic value, for human use. However, today many sharks have become the target of directed commercial and recreational fisheries around the world due to intensive industrialization of the fishing sector and a growing demand for shark fins. Commercial fishing of sharks has thus increased in terms of effort, yield and area covered. Over-fishing is, however, difficult to manage due to a lack of available biological and catch data. The FAO's International Plan of Action for Sharks (IPOA-Sharks) recognises the vulnerability of sharks to detrimental long-term commercial fishing. It also emphasises the need for international coordination in the management of both the direct and indirect catch of sharks given their wide-ranging distribution and long migrations, particularly on the high seas.

Shark Finning

Shark finning is widespread and largely unmonitored. The practise of finning is wasteful of protein and other potential products derived from sharks, only utilising 2-5% of the shark, the remainder being thrown away. This wastage can be a threat to the food security of developing states and prevents socio-economic benefits from accruing when other shark products are processed on shore. Finning causes the death of tens of millions of sharks, directly threatening rare and vulnerable shark species and indirectly impacting other commercial species due to the effects of removal of top predators from these food webs. Finally finning impedes the collection of species-specific data essential for monitoring in order to implement sustainable management.

Bycatch

Sharks are caught incidentally as bycatch whilst fishing for other more productive species. Bycatch rates are poorly documented but it is estimated that in the late 1980s approximately 12 million sharks were being caught as bycatch every year on the high seas alone, mainly from long-line tuna fisheries. This mortality may exceed mortality from directed fisheries ⁽⁸⁾. Observer programs provide the best available information but these are limited in the high seas. Bycatch data is rarely incorporated into national and international (FAO) statistics. Locally batoids and small coastal shark populations are seriously affected by bycatch in bottom trawl fisheries ⁽⁶⁾. A study on the Basking Shark in the Gulf of Cadiz and the Alborán Sea has shown there is a high percentage of incidental catch of this threatened species through trawling ⁽⁹⁾ and artisanal fisheries.

Pollution

As top marine predators, long-lived chondrichthyan species are significant bioaccumulators of pollutants ⁽⁶⁾. The Mediterranean Sea receives run-off containing heavy metals, pesticides and other products. Adult sharks accumulate such high levels of mercury that some shark fisheries in Australia have maximum size limits on sharks landed for human consumption ⁽⁶⁾. High mercury concentrations have been found in some Mediterranean sharks such as the Spiny Dogfish. The breakdown of pesticides (DDT, HCB and PCB) also results in high concentrations of organochlorine residues; these residues have been found in the eggs, muscles and liver of the Gulper Shark (*Centrophorus granulosus*) and the Longnose Spurdog (*Squalus blainvillei*). There is little information as to how contaminated habitats and bioaccumulation of pollutants affect the health and productivity of sharks or the overall dynamics of the marine food web ⁽⁶⁾.

Habitat Loss and Degradation

Habitat requirements vary for different species during different stages of their lifecycles. Critical shark habitats range from shallow estuarine sloughs and coastal bays, to coral reefs, kelp forests and the deep sea. Sharks are generally unable to adapt to rapidly changing environmental conditions. The use of inshore coastal nursery grounds (estuarine or freshwater) has become a particular liability as direct and indirect fishing pressures have intensified and coastal habitat loss and degradation have accelerated. Human activity threatens coastal habitats through development, fisheries activities, chemical and nutrient pollution, freshwater diversion from incoming rivers, and dumping of plastic and other manmade garbage ⁽⁶⁾.

Conservation Priorities for Mediterranean Sharks

- Identifying and mapping critical habitat.
- Developing research programs on general biology, ecology and population dynamics for species of concern, specifically reproductive and growth parameters.
- Initiating fisheries management strategies for commercially exploited species.
- Developing National Action Plans as per UN FAO IPOA-Sharks.

IUCN and Shark Conservation

- Globally and regionally assessing threatened status of shark species using the IUCN Red List categories and criteria
- Training and capacity building, shark biodiversity monitoring, encouragement of precautionary fishery management, education and awareness, and raising funds for shark conservation.
- Providing technical assistance and advice on the development of the UN FAO IPOA - Sharks and monitoring the progress with its implementation at national, regional, and international levels.

Shark finning

- "Finning" is the removal and retention of shark fins *and* disposal of shark carcass at sea.

- Considered by the IUCN Shark Specialist Group to be a threat to many shark stocks, the stability of marine ecosystems, sustainable traditional fisheries, food security and socio-economically important recreational fisheries.

- Contrary to the principles of the UN FAO Code of Conduct for Responsible Fisheries [Article 7.2.2 (g)] and to the guiding principles, objective and aims of the UN FAO IPOA ⁽⁵⁾

- Several major shark fishing countries (including Brazil, South Africa, USA, Oman, most Australian states and Costa Rica) have implemented a ban on the retention of fins without shark bodies. In some cases the ban has actively been promoted by the fishing industry. These countries are now urging others to do the same, particularly in view of the high numbers of transboundary, straddling, highly migratory and high sea stocks of sharks exploited by two or more countries.

- The Council of the European Union has adopted the Regulation that

'it shall be prohibited to remove shark fins on board vessels and to retain on board, transport or land shark fins. It shall be prohibited to purchase, offer for sale or sell shark fins which have been removed on board, retained on board, transhipped or landed in contravention of this Regulation'

Council Regulation (EC) No 1185/2003 of 26 June 2003

International, European, and Mediterranean Conventions Relevant to Sharks

In the last three decades, a number of significant conventions have highlighted the need for shark conservation and management both globally and regionally.

Convention on the Conservation of European Wildlife and Natural Habitats, Bern 1979

This Convention, also known as the Bern Convention, was adopted on September 1979 in Bern (Switzerland) and came into force on 1 June 1982. It has now 45 Contracting Parties including 39 member States of the Council of Europe, as well as the European Community, Monaco and four African States. Appendix II lists fauna species that should be Strictly Protected and includes 3 species of Mediterranean Chondrichthyans one of which is the Great White Shark.

<http://conventions.coe.int/treaty/en/Treaties/Html/104.htm>

Convention on Migratory Species, Bonn, Nov 1983

The Convention on the Conservation of Migratory Species of Wild Animals, also known as the Bonn Convention, aims to conserve terrestrial, marine and avian migratory species throughout their range. It is one of a small number of concerned with the conservation of wildlife and wildlife habitats on a *global* scale. Since the Convention's entry into force on 1 November 1983, its membership has grown steadily to include 85 (as of 1 February 2004) Parties from Africa, Central and South America, Asia, Europe and Oceania. Appendix I lists migratory species which are endangered and includes the Great White Shark.

<http://www.wcmc.org.uk/cms/>

Protocol for Specially Protected Areas and Biological Diversity in the Mediterranean (SPA-BD), the Barcelona Convention, June 1995

This Protocol which has come into force in December 1999 lists the Basking Shark and the Great White Shark along with the Devil Ray as Endangered or Threatened species (Appendix II). Parties signing the protocol must ensure "the maximum protection possible and the recovery of these species". This Protocol recommends that exploitation of five other species is regulated (Appendix III).

<http://www.unepmap.gr/pdf/spa.pdf>

United Nations Food and Agriculture Organisation, International Plan of Action for the Conservation and Management of Sharks, 1999 (FAO/IPOA-Sharks)

This IPOA was endorsed by the FAO Council in 2000 and is a voluntary instrument under the framework of the FAO Code of Conduct for Responsible Fisheries. IPOAs target specific fishery conservation and management issues that have been identified by the International Community as needing urgent attention. The IPOA-Sharks was proposed by the FAO and requires UN member countries (with targeted or bycatch shark fisheries) to identify national and regional objectives from which a unified international action plan can be developed. A need for consistent data collection and improved identification of commercial species was recognised. Multi-national coordination is encouraged, as it would allow assessment of local and multiple shark stocks and potential migration across economic exclusive zones.

http://www.fao.org/figis/servlet/static?dom=org&xml=ipoa_sharks.xml

Convention on International Trade in Endangered Species (CITES) Nov 2002

CITES imposes an obligation on signatory countries (including 21 Mediterranean Countries) to protect and conserve wildlife by prohibiting or regulating import and export of specified animals and goods. In the most recent CITES conference attended by more than 2,500 representatives from 160 countries, two of the world's largest and threatened sharks, the White Shark and the Basking Shark were included in Appendix II due to concern with international trade in their highly valuable meat and fins respectively. Appendix II lists species that are not currently threatened with extinction but may become so unless trade is closely controlled. This is the first time that sharks have been included in Appendix II and reflects serious international concern for the conservation of these species. Resolution 12.6 of the 12th Conference of the Parties underscores the urgent need for global shark monitoring and management.

<http://www.cites.org/eng/resols/12/12-6.shtml>

<http://www.cites.org/eng/cttee/animals/18/e18-19-2.pdf>

<http://www.cites.org/common/notifs/2002/ESF042A.pdf>

United Nations Environment Programme, Mediterranean Action Plan for the Conservation of Cartilaginous Fishes, Nov 2003

A specific Plan of Action has been developed by the UNEP for the Conservation of Cartilaginous Fish in the Mediterranean. This plan was drawn up in collaboration with the IUCN Centre for Mediterranean Cooperation and the Shark Specialist Group, and adopted by the contracting parties to the Barcelona Convention in November 2003. This is a very significant step, since it is the first regional Plan of Action on sharks drawn up by the United Nations Environment Programme (UNEP).

<http://www.unepmap.org/>

What is the Red List?

(<http://www.redlist.org>)

- ▣ *The IUCN Red List of Threatened Species is a widely-recognised, easy-to-understand system for classifying species at risk of global extinction.*
- ▣ *Uses an objective and explicit structure to classify the widest possible range of species according to their risk of extinction.*
- ▣ *Recognised worldwide as the greatest authority on biodiversity status.*
- ▣ *Purpose is to convey the scale of urgency of conservation problems to the public and political leaders, and to motivate the international community to fight against the reduction of species.*
- ▣ *Has no legal standing, but is frequently used by governments and directors of environmental institutions to set priorities and conservation actions, and to make subsequent evaluations of such long-term initiatives.*

The Shark Specialist Group (SSG)

<http://www.flmnh.ufl.edu/fish/Organizations/SSG/SSG.htm>

Established by IUCN as part of its Species Survival Commission in 1991. The SSG was formed to assess and address the conservation needs of sharks, rays and chimaeras (the cartilaginous or chondrichthyan fishes) (6).

Mission:

To promote the long-term conservation of the world's chondrichthyan fishes (the sharks, skates, rays and chimeras), effective management of their fisheries and habitats, and, where necessary, the recovery of their populations.

- *To date, a total of 262 species have been assessed globally, with 200 assessments in preparation. Fifty-six (or ~ 21%) of assessed shark species are globally threatened (CR, EN, or VU).*

- *A further 26 subpopulations are assessed as threatened at the regional level.*

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