The END of the LINE?

global threats to sharks

WildAid

OCEANA | Protecting the World's Oceans

The End of the Line? (second edition)

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In memoriam of **Peter Benchley**, author and conservationist

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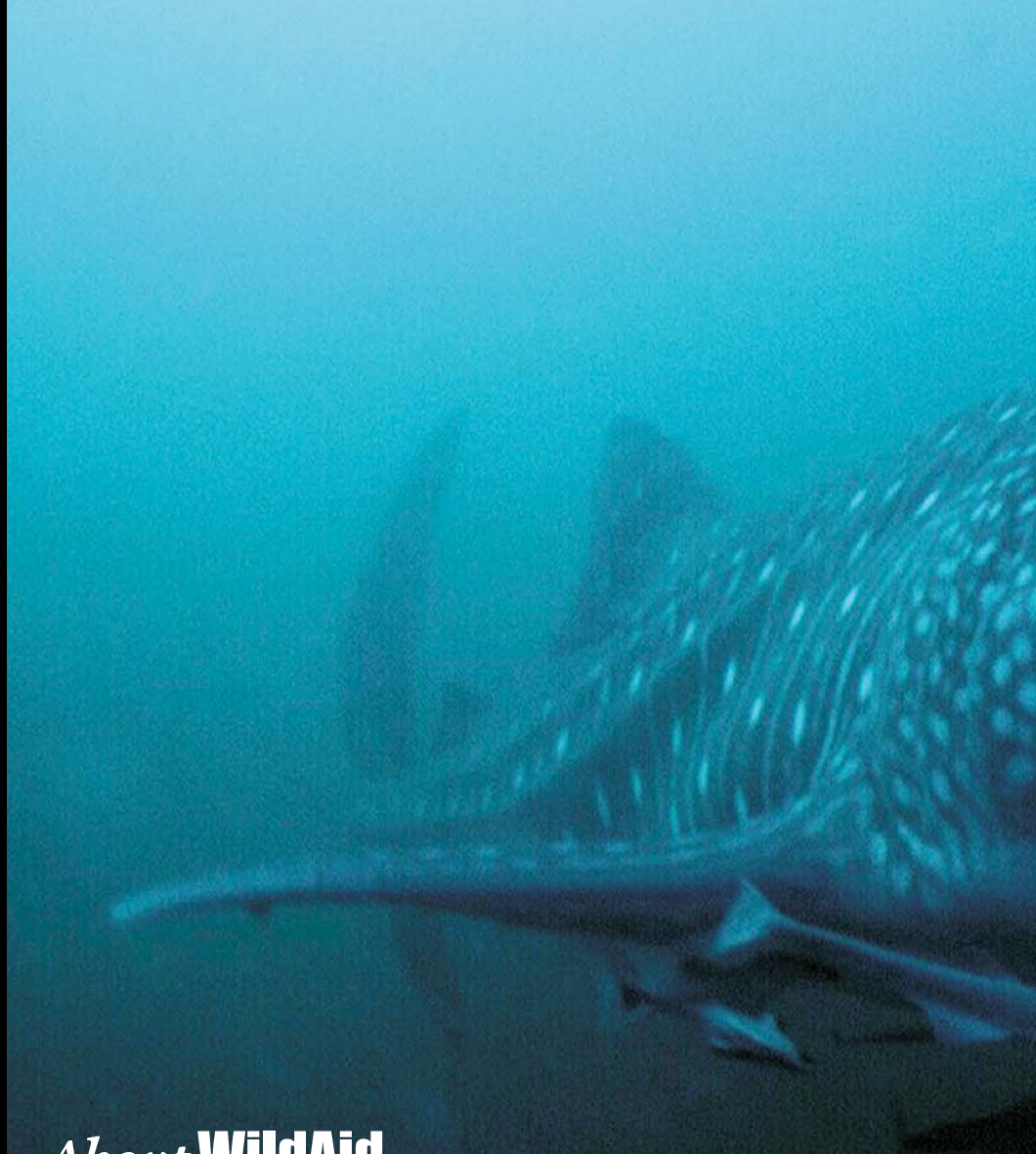


About WildAid

WildAid's Shark Conservation Program aims to:

- Raise awareness globally about threats to sharks
- Promote sustainable management of shark populations
- End the practice of finning globally
- Reduce excess demand for shark fin

In addition, WildAid is providing financial and technical support to the Galápagos Islands for patrolling and enforcing the Marine Reserves.

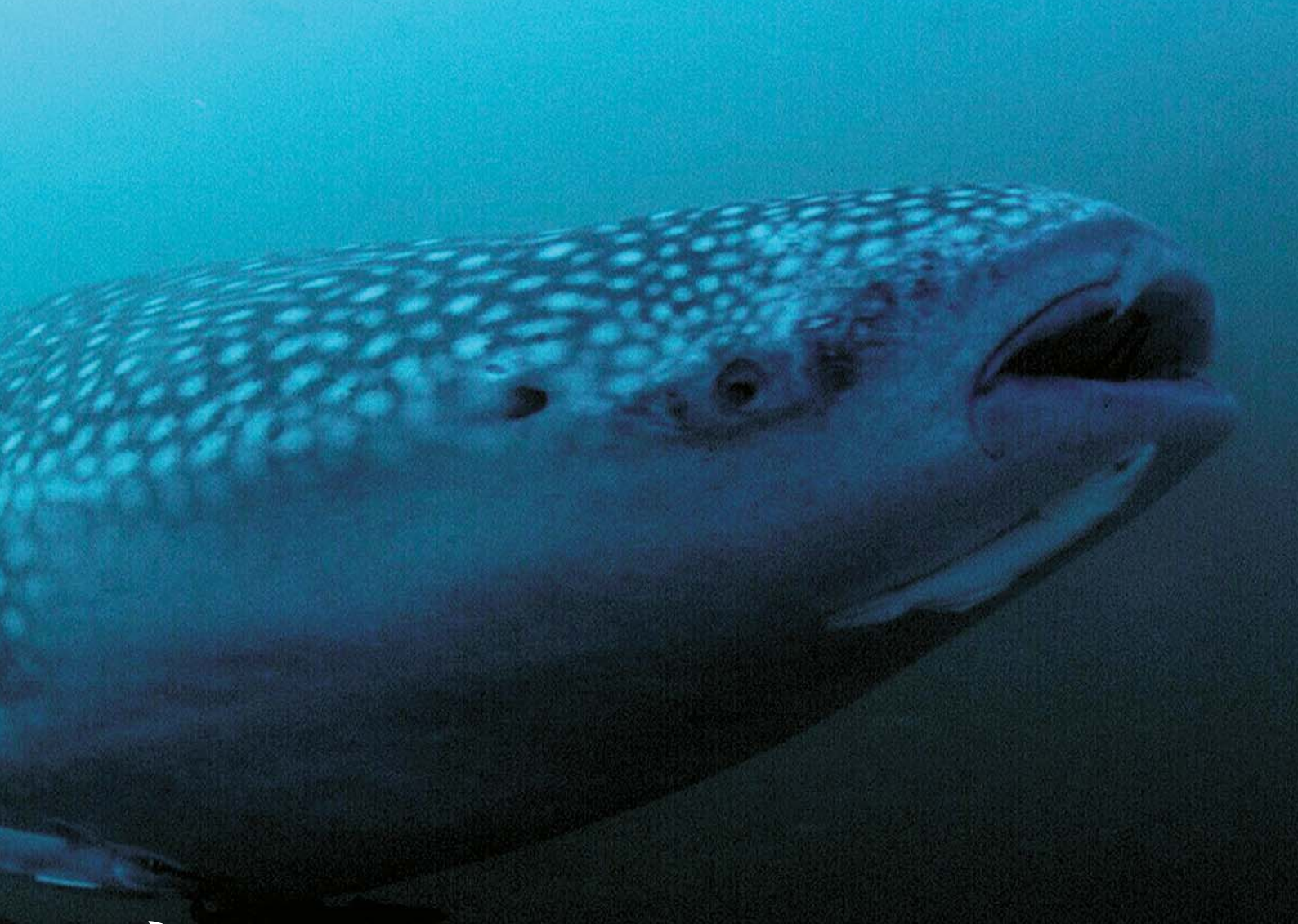
Through the WildAid 100% Direct Fund all public donations can go straight to field protection with no administrative or overhead deductions.

WildAid is a US registered public charity based in San Francisco with representation in London, the Galápagos Islands, Beijing and New Delhi.

WildAid-s mission is to end the illegal wildlife trade in our lifetimes.

WildAid focuses on reducing the demand for unsustainable and illegal wildlife products through public and policy maker education.

To learn more visit **www.wildaid.org**



OCEANA | Protecting the World's Oceans

Oceana campaigns to protect and restore the world's oceans. Our teams of marine scientists, economists, lawyers and advocates win specific and concrete policy changes to reduce pollution and to prevent the irreversible collapse of fish populations, marine mammals and other sea life. Global in scope and dedicated to conservation, Oceana has campaigners based in North America (Washington, DC; Juneau, AK; Portland, OR; Monterey, CA; Santa Monica, CA), Europe (Madrid, Spain; Brussels, Belgium) and South America (Santiago, Chile). More than 300,000 members and e-activists in over 150 countries have already joined Oceana.

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Hammerhead sharks
in the Galápagos

Foreword

Since earliest times, human beings have relied on wild resources. For most of our history, we were just another link in the food chain, another predator. Increasingly our ever-expanding populations, our technology and organization mean we have become a superpredator with few of nature's checks and balances. We now farm resources to produce them on the scale we desire—and fisheries are one of the world's last great wild harvests. Yet, in the last fifty years humanity has proven beyond a doubt that the oceans are not infinite. What seemed to be an inexhaustible supply as recently as twenty years ago has, in many areas, been taken to its limits and beyond. Leading marine biologists recently warned that we had been wrong to suppose that we could not cause the extinction of a marine fish species—we are already doing this.

Sharks are likely to be in the first round of marine extinctions caused by human activity. As top predators they are naturally relatively scarce, but also highly vulnerable. Some have gestation periods longer than an elephant, produce only a handful of young and take up to 25 years to mature. When they have faced directed fishing pressure, some populations have crashed, taking decades for a stock to recover, if ever.

Though they have swum the oceans since before the dinosaurs, they have never faced a predator as voracious as industrialized humanity. Traditionally they have been seen as more of a nuisance by fishermen than a saleable commodity and so were relatively little impacted on a global scale. Many of the poorest fishing communities consume shark meat themselves as it has so little market value.

"Sharks are likely to be in the first round of marine extinctions"

But in the last few decades the situation has dramatically changed. As other fisheries have been depleted, fishermen have compensated with sharks. A relatively obscure custom of the wealthy from southern China—using the needles of shark fins in soup as an ingredient to add texture, but not flavor—has burgeoned to the point where shark fin soup has become an almost ubiquitous dish at weddings, banquets and business dinners throughout the Chinese world. What was once eaten on a special occasion by the privileged few is now regularly eaten by hundreds of millions of people.

The word has gone out to fishermen far and wide that shark fins mean money, regardless of whether the rest of the body is dumped overboard. The shark fin trade has gone global, fisheries management for sharks has been left at the starting blocks. Only a handful of countries have any management of shark fisheries at all, and only three species are protected internationally. There is little data and monitoring of catches to alert us to population crashes. The consequences are easy to predict, but hard to document, as so little reliable data is available.

This report is not a scientific study or a systematic global trade review. Rather it is an attempt to assemble a broad overview in lay terms of the factors likely to affect the survival of sharks. And it is a call to action.

Using sharks sustainably is not just an option for the poor fishing communities that depend on shark meat as a protein source, it is a necessity. Nor is it an option for those who wish to continue eating shark fin soup. No sharks, no shark fin soup. It is sadly ironic that in countries such as Kenya and Brazil people are losing their subsistence food to supply one of the world's most expensive culinary items.

As well as being a food security issue, it is likely that removing sharks will have serious repercussions for many other species, which may ultimately disrupt fisheries with far greater economic value. We may only discover this when it is too late.

What hope then for sharks, and ultimately the oceans?

The United Nations Food and Agriculture Organization (FAO) has recognized the crisis and asked its 190 members to devise management plans by February 2001. However, the response of member states has been poor to date and other international bodies have been slow to play their role in conserving shark stocks.

Solutions will come only from a combination of actions: learning more about sharks, reducing fishing pressure, stopping unnecessary bycatch, monitoring shark fishing and trade, and more effective enforcement of regulations. However, none of these measures will be effective if the demand for shark products— and in particular the fins—is not reduced to sustainable levels.

This requires a truly global effort, but also strong leadership from Asia, where a dramatic leap in awareness, concern and self-restraint among consumers is needed. There is nothing wrong with eating shark fin soup, there are just too many of us doing it. The industry needs regulating to prevent stock depletions and the wastage of "finning". Those who wish to maintain the tradition of shark fin soup should be the loudest voices calling for regulation.

We still have an irrational fear of sharks which may explain our lack of will to conserve them. Perhaps because we fear the unknown and so much about sharks is still a mystery. Yet increasingly the well-informed are developing a respect for these magnificent predators, some of nature's most successful designs. Divers now cherish encounters with sharks, as terrestrial tourists do with elephants and gorillas, suggesting new ways for us to profit from sharks without destroying them.

Peter Knights
Executive Director, WILDAID

Steve Trent
President, WILDAID

Executive Summary

- Sharks have been swimming the world's oceans for over 400 million years – 100 million years before the first dinosaurs appeared on land. They inhabit every ocean and play a vital role in maintaining the health of marine ecosystems. We utilize them for a number of products, such as meat, cartilage and fins and they are a critical food source for many in developing countries. They are an increasingly important revenue source for dive tourism around the world.

- Yet sharks are being overfished in many parts of the globe, and many populations have declined by as much as 90%. As other fish stocks have dwindled due to overfishing, and demand for fins has expanded, sharks are increasingly targeted. Reported world catches rose from around 625,000 metric tons (mt) in 1985 to over 810,000 mt in 2004. These figures are likely to be a gross underestimate, however, with one recent study claiming that shark catches are at least four times higher. Of the 546 shark species assessed by the World Conservation Union (IUCN), 110 (20%) are classified as endangered, threatened or vulnerable.

- Despite declines, only great white, basking and whale sharks, covered under CITES regulations, are protected internationally. Other than that, only a handful of countries manage shark fisheries.

- Effective conservation and management are hindered by meager insight into the biology, distribution, migration and exploitation of most shark species.

- Sharks are highly vulnerable to overfishing because they are generally slow-growing and long-lived. Females reproduce late in life, and have few offspring. This makes them inherently unable to withstand heavy, protracted exploitation – and slow to recover following declines. As a result, shark fisheries often follow a "boom and bust" pattern.

- As shark populations plummet worldwide, Marine Reserves are the new target of illegal fisheries. Many of the world's marine protected areas, such as the Galápagos Islands and Cocos Island, are now regularly fished illegally for increasingly valuable shark fins.

Cat shark, the Philippines.

- Artisanal fishermen in the developing world are losing their catches to modern technology. In many areas, shark abundance has declined due to the arrival of modern longliners and trawlers, many foreign-owned and fishing illegally. With human populations increasing and shark stocks decreasing, poor countries are being deprived of an essential source of protein.

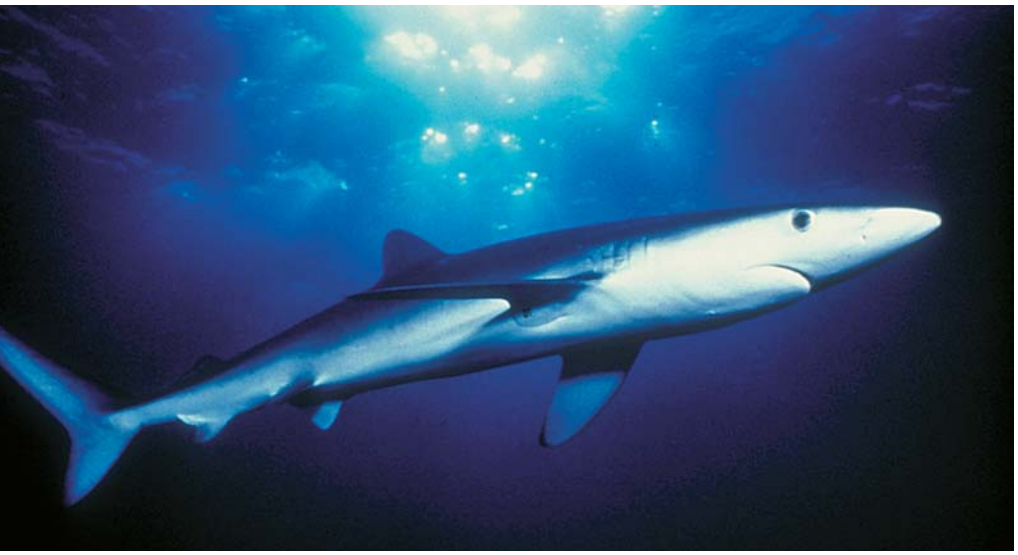
- The demand for shark fin soup is at an all-time high. As affluence grows in Asia, and in China particularly, so does the market for luxury items. One recent study estimated that fins from between 26 and 73 million sharks are traded globally each year, while reported world trade in fins has nearly tripled from 4,900 metric tons in 1987 to 13,600 mt in 2004. Shark fin is one of the most expensive seafood products: at up to US$100 per bowl for shark fin soup, demand – and profit – are greatly increasing pressure on shark populations. Now sharks in all regions of the globe are sought solely for their fins.

- A survey conducted by WildAid and China Wildlife Conservation Association (CWCA) in 16 Chinese cities found that 8,400 people out of 24,000 surveyed (35%) had eaten shark fin soup. 2,200 (9%) reported eating it three times or more.

- During the finning process, a shark is hauled up on deck, its fins sliced off, and the animal – sometimes still alive – is thrown back into the sea to bleed to death. This practice is not only cruel, it is incredibly wasteful as finning only utilizes 1–5% of the shark's body-weight.

- Consumers are largely unaware of the origins of shark fin. Studies in Mainland China, Hong Kong and Taiwan show that consumers have little understanding of where shark fin soup comes from (as shark fin soup in Chinese is "fish wing soup"), of overfishing, of illegal shark fishing, or of the practice of finning. They wrongly believe in some cases that fins grow back, that shark fin is flavorsome and nutritious, and that it has medicinal properties. In fact, as apex predators, sharks accumulate the toxic load of the animals below them in the food chain and their long life-spans exacerbate this effect. Shark meat and fins have been found to contain dangerous levels of methylmercury, a potent neurotoxin in humans, which if ingested can be particularly hazardous to fetal development and is linked to male infertility.

An Introduction to Sharks



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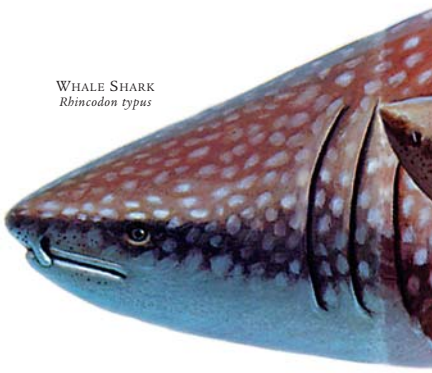


WHALE SHARK
Rhincodon typus

WHAT IS A SHARK?

Sharks comprise about seven percent of living fish species. They inhabit almost every marine ecosystem on earth and are found in all the world's oceans, as well as many inland waterways. Unlike most fish, shark skeletons are composed of cartilage.[1]

Sharks and their close relatives, skates, rays and chimaeras – known collectively as chondrichthyans – fall into two main groups. Elasmobranchs include the 490 or so species which people generally recognize as "sharks," along with around 630 species of skates and rays. Chimaeras, such as elephant fish and ghost sharks, are thought to comprise 50 species.[2]

EVOLUTIONARY SUCCESS

In evolutionary terms, sharks are one of the most successful families of animals, thriving in the world's oceans for hundreds of millions of years. The earliest shark species predate the first dinosaurs by 100 million years. They survived mass extinction events with their diversity relatively intact and may therefore make excellent indicator species in gauging the effects of human activity on marine ecosystems.

ECOLOGICAL IMPORTANCE

Since they are often the "apex", or top predators in their ecosystems, the depletion or removal of sharks is likely to affect marine ecosystems and the abundance of other fish species in ways that cannot currently be predicted. Many marine experts believe that sharks are vital in maintaining marine biodiversity and are concerned that some species may become extinct before their ecological role is fully understood.

LEARNING FROM SHARKS

Scientists are still discovering the unique characteristics of shark biology. It is known that they have extra senses, like their electrosense (which picks up electrical fields), and that some species can generate body heat for greater muscle efficiency. The hydrodynamics of their skin has even inspired the swimwear industry. *Fastskin*, a swimsuit developed by the Australian manufacturer Speedo, replicates the microscopic toothlike structures on shark skin to reduce drag and turbulence, increasing swimming speeds. The US Navy is reported to study shark skin and propulsion in considering a new generation of submarines, whilst NASA is reported to consider using shark skin as a model for the hull of the Space Shuttle.

Note on terminology

In this report, "shark" refers to all chondrichthyans except in citations, verbatim quotations, or where explicitly stated otherwise. The term "fishermen" refers to individuals of either gender engaged in fishing activity.

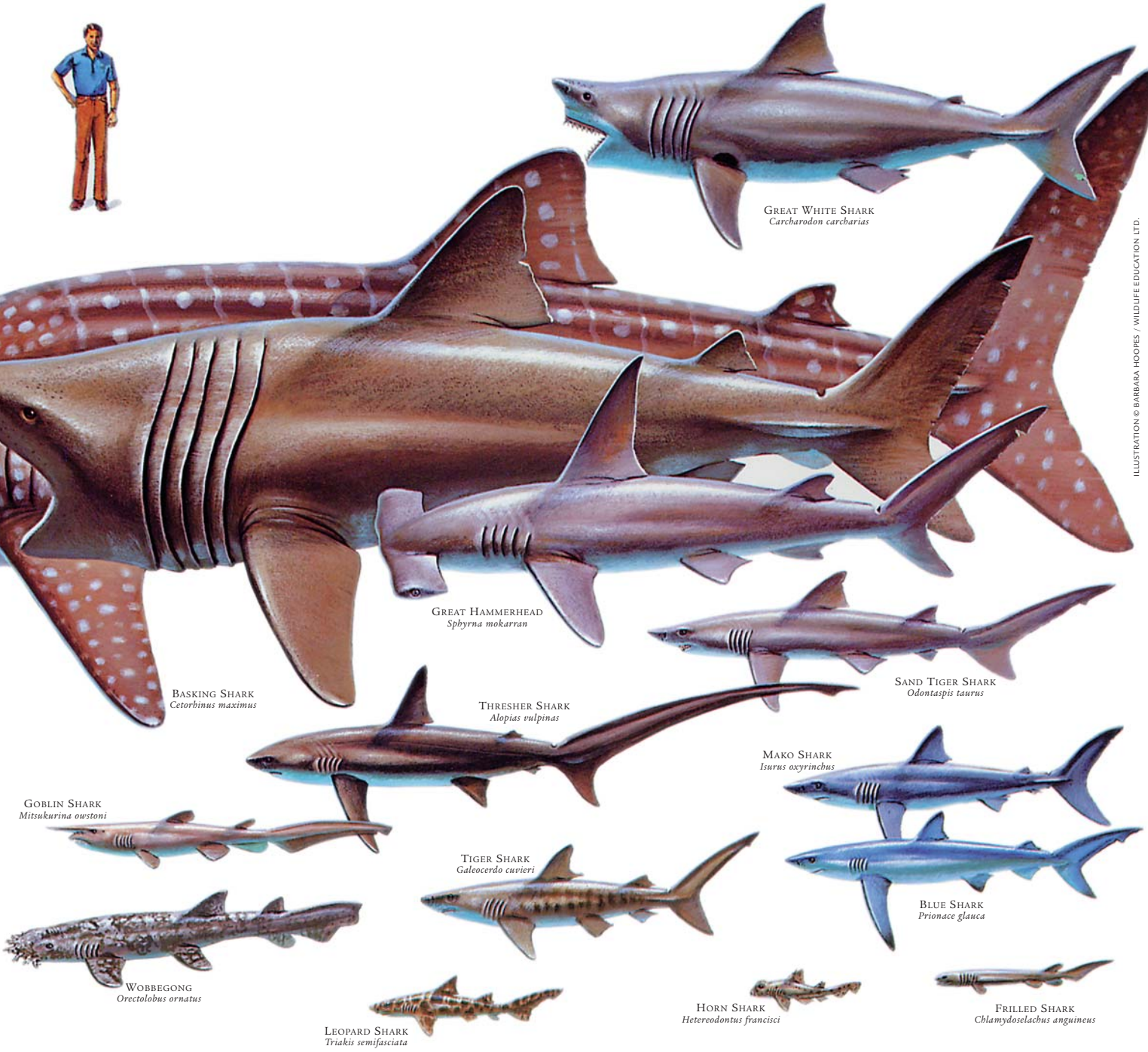
All weights have been converted into metric tons (mt) and all values to US dollars.

MIGRATION

Some shark species migrate vast distances to find food or to reproduce:

- In 2000, a blue shark, *Prionace glauca*, tagged off Tasmania was caught off the coast of southwest Africa, 9,500 kilometers (km) away.[3]
- A spiny dogfish, *Squalus acanthias*, tagged off Washington State, US, appeared in Japan seven years later, a journey of 6,000 km.[4]
- In 2003–2004, researchers tracked a female great white shark (*Carcharodon carcharias*) across the Indian Ocean from South Africa to Australia and back again in just nine months – a distance of more than 20,000 km. This makes it one of the fastest long-distance journeys for any swimming animal – only tuna come close.[5]
- Whale sharks (*Rhincodon typus*) undertake very long distance migrations. Studies off the Malaysian and Philippine coastline indicate that whale sharks swim an average of 24 km/day and have a minimum range of 2,000 km. One tagged whale shark traveled 13,000 km over 37 months as it migrated from the Sea of Cortez, Mexico, to the western Pacific Ocean.[6]

The fact that sharks can cross entire oceans makes it imperative that shark management becomes a global issue, not one regulated in just a handful of countries.



SHARK FACTS

- Sharks range from the world's largest fish, the plankton-eating whale shark, which can reach 14 m in length, to the 15 cm spined pygmy shark, *Squaliolus laticaudus*.
- Most shark species are small and harmless to humans. Half of them reach less than 1 m in length and 80% are smaller than an adult human.[1]
- Some shark species lay eggs and others give birth to live pups, sometimes after lengthy gestation (pregnancy) periods.
- Sharks have seven senses: hearing, sight, touch, smell (which can range for several miles), taste, electrosense, and lateral line and pit organs (which pick up weak vibrations).[1]
- Sharks are capable of learning and can display complex social behavior. They have brain-to-body ratios well within the range of birds and mammals.[3]
- Sharks diverged from bony fish 400 million years ago, evolving without swim bladders or lungs, and with teeth not in sockets but attached to the jaw by soft tissue and continually replaced. Sharks have no gill covers, bony fin spines or prominent scales. Shark skin is covered with tiny tooth-like projections called "denticles", which channel water to reduce friction.[1]

How We Use Sharks

Sharks are used worldwide for a variety of purposes. The many products derived from sharks include meat and fins for human consumption; liver oil to produce lubricants, cosmetics and vitamin A; cartilage as a purported (but unproven) medicinal treatment; skin for leather; and jaws and teeth for curios and trinkets.[7]

MEAT

Shark meat is eaten in most, if not all, countries of the world, although consumption is much lower than that of bony fish species. Unless quickly processed, the high urea content can render some shark meat inedible. In some countries in the developing world, such as Sri Lanka, Mexico and parts of Africa, shark meat is a significant part of the human diet and provides much of the protein requirements of poorer communities.

In the west, however, shark meat is traditionally viewed as inferior. To make it more appealing the spiny dogfish, a widely eaten shark species, is marketed under names like rock salmon in the UK, saumonette ("little salmon") in France, and Schillerlocken ("locks of Schiller") and seeaal ("sea eel") in Germany.[8] Recently, mako (*Isurus oxyrinchus*) and thresher (*Alopias vulpinus*) meat has begun to increase in popularity.

In Asia many types of shark are eaten. The Japanese, for instance, consider meat from the mako shark to be highly palatable and it can fetch prices comparable to swordfish (*Xiphias gladius*).[9] Both blue shark and spiny dogfish meat are also eaten, although the former needs to be processed quickly to avoid deterioration. Shark meat is often ground into a paste called "surimi"[9].

Other shark parts are eaten in various countries: shark skin is eaten in Japan, Taiwan, the Solomon Islands and the Maldives; liver in Japan, China and the Solomon Islands; and shark stomach is consumed in the Solomon Islands, Uruguay and Taiwan.[7]

SHARK FIN SOUP

Shark fin, known as *yu chi* in China ("fish wing" in English), has been considered a delicacy in Chinese cuisine since the Sung dynasty (AD 960–1279), and shark fin soup was established as a traditional component of formal banquets by the Ming dynasty (AD 1368–1644).[10] Although originally a southern Chinese dish, shark fin has spread throughout Chinese communities in Asia and the rest of the world, and is now standard fare at weddings, banquets and corporate functions.

The processing of raw shark fins has multiple stages and involves removal of the skin, cartilage and any attached meat to leave only the fine collagenous fibers known as "needles". First, the fins are blanched in very hot water and the skin scraped off. Next, they are placed in ice water to aid removal of cartilage, and then sun-dried on racks. Once this is complete, they are transferred to a cool drying room to prevent softening and, finally, refrigerated. Fins are also usually bleached to give them a desirable whitish color – methods involve smoking with sulphur overnight or treatment with hydrogen peroxide.[11] At the cooking stage, the fins are soaked again, this time to remove their fishy odor. After they have softened, further preparation is up to the chef.[12]

Because of its association with privilege and social rank, shark fin soup is served to celebrate important events such as weddings, birthdays, or corporate functions. There is also the issue of "face" (respect), which is of paramount importance in the Chinese culture. As a leading chef in Singapore explained, "If you don't serve shark fin soup at weddings, or at important dinners, the host will look very cheap and that is not giving face to your guests".[13] This display of wealth and generosity is measured by the cost of the food and reflects on the efforts of hosts to provide their best hospitality to guests.

For many superstitious Chinese, even the words for shark fin have a bounteous ring. In the famous Chinese saying *Nian nian you yu*, meaning "yearly prosperity", *yu* means "plentiful" (in terms of material wealth) and because it has the same tone as *yu* (fish), it is important that a fish dish is served at Chinese New Year meals to represent and welcome prosperity. Although steamed fish is often used symbolically, consumers now often eat shark fin as well.[14]

Shark fin soup can be very expensive. Depending on the amount of fin in the soup, the price can range from US$10 to as high as US$100 per bowl. Although the quality and texture of shark fin is important in making the soup (the longer and thicker the strands, the better and costlier they are), the fins are essentially tasteless. The flavor of shark fin soup lies entirely on the preparation of the broth, which is usually chicken soup. The broth is prepared separately from the fins and they are combined just before serving. As a leading chef in Singapore explained, "The fins with their noodle-like tissues have no taste in themselves and are used only as a soup thickener".[13]

Even though it is widely known that shark fins lack flavor, the demand for

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Above & Upper left: **Shark meat is eaten in most countries around the world and is an important source of protein in many developing countries.**

Left: **"Rock salmon" in British "fish and chips" is spiny dogfish, a species of shark.**

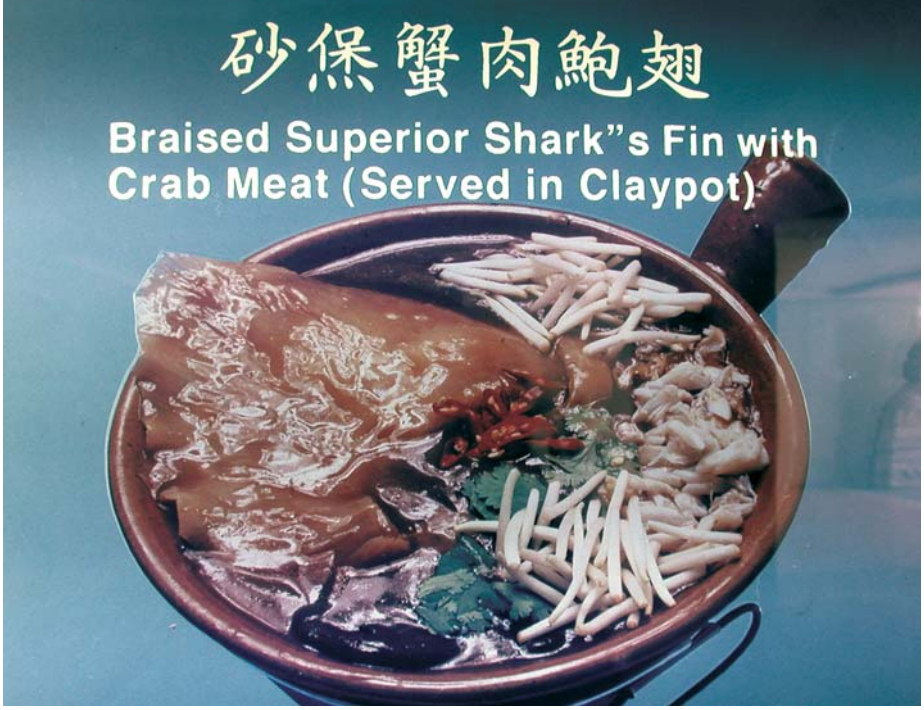
shark fin soup continues to escalate. In recent years, it is rumoured that restaurants are putting less and less shark fin into the soup, or in some cases, to mixing real shark fin with artificial fibers.[15] Far from turning their backs on shark fin, consumers are opting instead for a dish that contains a whole unbroken fin – evidence that it is the authentic product.[13]

IS SHARK FIN GOING DOWN-MARKET?

WildAid's recent research in the consumer markets reveals that shark fin is going down-market. Having gained reputation over the centuries as a symbol of wealth and success, soup and other products made from shark fin are now becoming commonplace.[16]

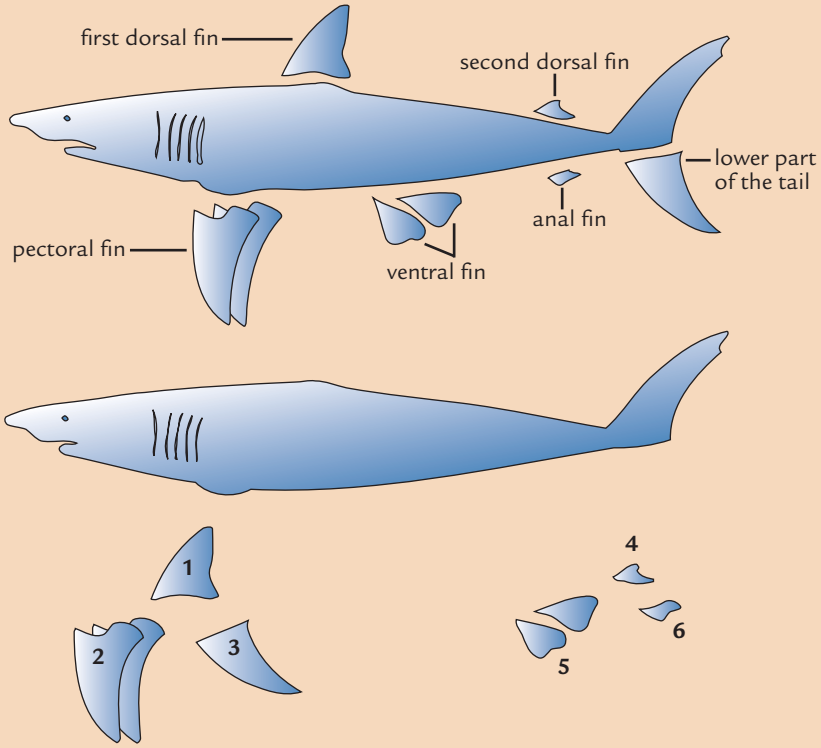
- Singapore now boasts US$8.99 All-You-Can-Eat shark fin buffets.
- Japanese consumers can now buy shark fin bread, sweet shark fin cookies, shark fin sushi, instant shark fin noodles at US$4.20 per serving and, perhaps most alarming of all, shark fin catfood.
- In a restaurant in Qingdao on Mainland China, a set menu consisting of abalone, bird's nest and shark fin soup was advertised at a cost of just US$24.
- Dried shark fin retailers in Qingdao and Shanghai sell 12-gram boxes of fin fiber for US$6.50.
- Press reports from Shanghai reveal that the economic recession has prompted consumers to opt for cheaper, mass produced shark fins.

While it maybe argued that this development will reduce the "mystique" of shark fin and, thereby, its consumption, it seems far more likely that it will simply encourage consumers to believe that they can still buy into the symbolism of shark fin but at a price affordable to all.



Above: **Shark fins are often served whole to prove they are the real thing.**

Fins on sharks



FIRST GRADE:

1. first dorsal fin
2. pair of pectorals
3. lower lobe of the tail

LOWER GRADE:

4. second dorsal fin
5. pair of ventral fins
6. anal fin

The most coveted fins on a shark's body are the first dorsal, pectorals and lower lobe of the caudal fin, and these are usually sold as a set from each shark. The smaller second dorsal and pelvic fins – known as "chips" – are also taken, but are much lower value and many fins are mixed from several sharks.[17] The upper lobe of the caudal fin contains no fin needles[17], but is still frequently harvested.[18]

Mercury poisoning

The flesh of large, slow-growing predatory fish, like sharks, is known to contain high levels of mercury. This is because mercury is stored in the muscle tissues of fish, and when a predatory fish eats another fish, it assumes all of the mercury stored in the body of its prey. Therefore, the higher up the food chain a fish is positioned, and the older it gets, the greater the concentraion of mercury stored in its body.[25]

Mercury enters the environment in both organic and inorganic forms from natural (volcanoes, mercury deposits, etc) and man-made (coal combustion, metal processing, etc) sources. In the ocean, inorganic mercury is converted into organic methylmercury by micro-organisms, which are fed upon by plankton. Methylmercury thus enters the food chain and gradually accumulates in apex predators like sharks, swordfish and tuna.[25]

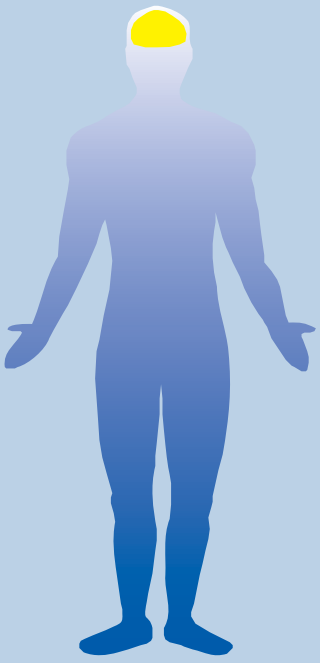
Methylmercury is a potent neurotoxin that affects the brain, spinal cord, kidneys and liver.[26] In mild cases of poisoning, adults complain of reductions in motor skills and dulled senses of touch, taste and sight.[27]

Developing fetuses are at greatest risk from mercury exposure as methyl-mercury can pass through the placenta and adversely affect the developing brain,[28,29] and high mercury levels have also been linked to infertility in men.[30,31,32]

Numerous studies have confirmed that shark meat contains methyl-mercury at levels that exceed the safe limits for humans.[33,34,35] As a result, various health advisory bodies have recommended lowering or avoiding the consumption of shark meat and other large predatory fish: young children and women of childbearing age are advised to avoid shark by the Food Standards Agency (UK), US Food and Drug Administration and US Environmental Protection Agency.[36,37]

However, it is not just shark meat that can contain dangerous levels of mercury. Tests commissioned by WildAid and carried out at the state-run Thai Institute of Scientific and Technological Research in 2001 showed shark fins to contain mercury concentrations up to 42 times higher than the safe limit for humans.[38]

Mercury health effects



- Deteriorates nervous system
- Impairs hearing, speech, vision and gait
- Causes involuntary muscle movements
- Corrodes skin and mucous membranes
- Causes chewing and swallowing to become difficult

LIVER OIL

The use of shark liver oil as a lubricant and source of vitamin A in the 1930s and 1940s sparked a boom in several shark fisheries. However, the development of synthetic substitutes caused the shark liver oil market to collapse and although it is still used in the production of pharmaceuticals and cosmetics, reported production is now extremely low.[7]

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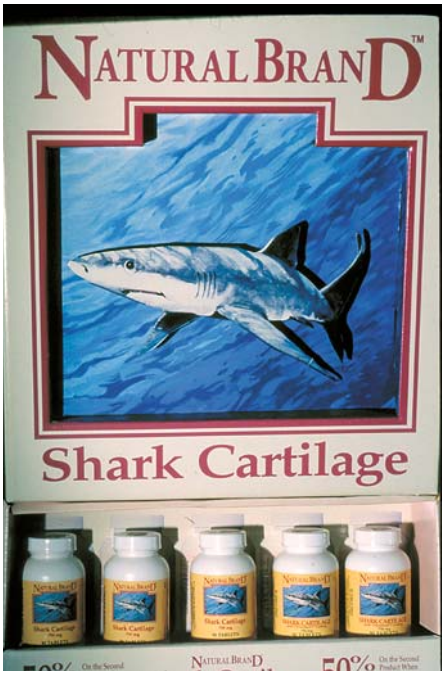
Other traditional uses include as wood preservative on boat hulls, fuel for street lamps, and in the manufacture of skin healing products.[7]

CARTILAGE

Shark cartilage is increasingly marketed as a health supplement and alternative cure for certain diseases, including asthma, eczema, arthritis and even cancer – claims which have little or no scientific basis (see box below). Chondroitin, derived from shark cartilage, has been used as an ingredient in artificial skin for burn victims.[7]



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SKIN

Tanned skin is used to make leather, the main markets for which are the USA, Germany, France and Japan. Stingray skin is also used in luxury leather products in the USA.[24] Untanned skin, called Shagreen, is used as sandpaper in the woodworking industry.

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JAWS AND TEETH

The jaws and sharp pointed teeth of sharks are used to make traditional weapons and jewellery, trinkets, curios and souvenirs for tourists.

© SUSIE WATTS

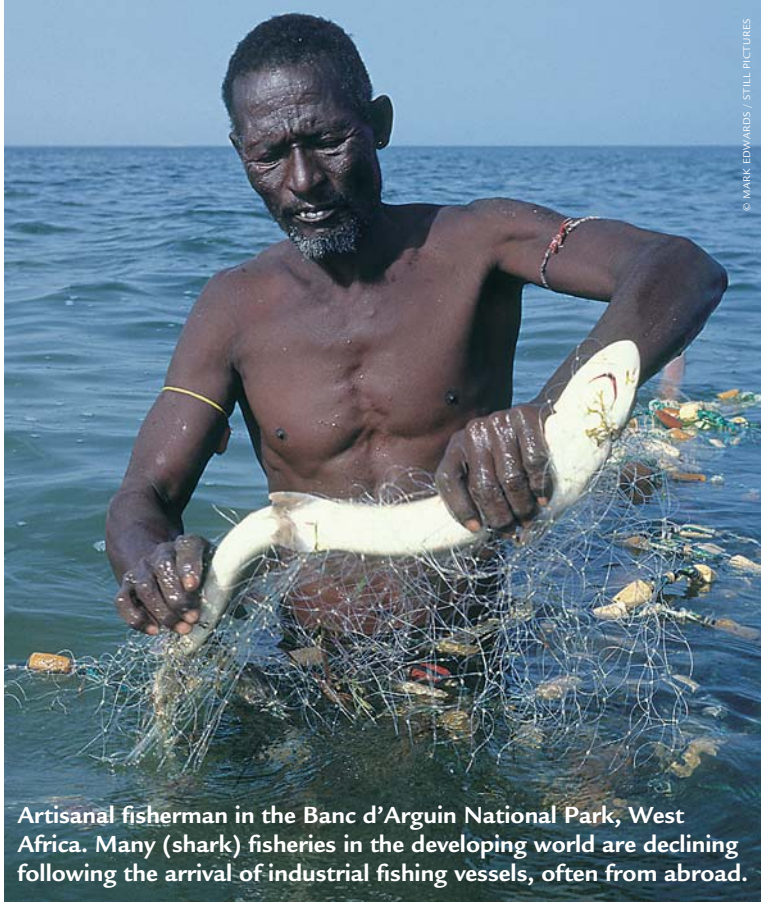
Sharks and Cancer

The promotion of crude shark cartilage as a cure for cancer has contributed to at least two significant negative outcomes: a decline in shark populations, and a diversion of patients from effective cancer treatments.[19] The idea was popularized in the best-selling book "Sharks Don't Get Cancer" by William Lane, published in 1992 in the United States, which justifies using crude cartilage extracts on the (false) basis that sharks very rarely get cancer.[19] A survey carried out by WildAid last year in China confirmed that it is a widely held belief that sharks are immune to cancer and that eating shark fin soup or crude extracts of shark cartilage can prevent and even cure the disease.[20]

Research has shown that shark cartilage does contain some "anti-angiogenic" properties – that is, it can stop the blood supply necessary for the growth of a tumor – and this has led to the development of various potential cancer therapy drugs, currently undergoing clinical trials.[21,22] However, there is absolutely no scientific evidence that consumption of raw shark cartilage or its crude extracts has any effect in preventing tumor growth[19], and in 2004, William Lane's company, Lane Labs-USA Inc., was ordered to refund money to purchasers of illegally marketed, unapproved shark cartilage-based drugs.[23]

The idea that sharks don't get cancer is also incorrect, as illustrated by a 2004 study that described benign and malignant tumors in 21 chondrichthyan species. Tumors of the skin, blood, nervous, digestive, excretory, reproductive and endocrine systems, as well as the cartilage itself, were all found.[19]

Why We Need Sharks



Artisanal fisherman in the Banc d'Arguin National Park, West Africa. Many (shark) fisheries in the developing world are declining following the arrival of industrial fishing vessels, often from abroad.

A MAJOR SOURCE OF PROTEIN FOR POOR COASTAL COMMUNITIES

Many coastal communities in the developing world depend on shark meat as an important source of protein. The meat is often sun-dried or salted to preserve it. For some communities in India, Africa, Mexico and Sri Lanka, for example, shark meat is the primary – and sometimes only – source of protein. The reliance on sharks has increased as over-fishing has depleted stocks of other fish.

WildAid's research has shown that shark catches in a number of traditional shark fisheries have declined – sometimes drastically. The declines have often coincided with the arrival of industrial (and often foreign) fishing vessels in the area, which frequently operate in flagrant breach of local fishing regulations. Such declines are poorly documented at local or national level, as few developing countries have active fisheries management or systems for collecting even basic data.

INDIA

Research conducted by WildAid has revealed the extent of shark catch declines and their impact on artisanal fishermen. Coastal communities in the States of Andhra Pradesh and Tamil Nadu have reported a significant decline in shark catches over the past six years. In 1999, WildAid visited 15 fishing communities on the east coast and interviewed a number of traditional fishermen. Although unable to make assessments of individual species' declines, locals suggested that overall shark catches had declined by between 50–70% over the previous five years.[41]

Fishermen in Chennai (Madras) have reported to WildAid that commercial vessels operating within India's coastal waters are posing a serious threat to artisanal catches. Shark finning on these commercial vessels is viewed as a major reason for the apparent declines.[41]

KENYA

6,500 artisanal fishermen account for 80% of Kenya's marine catches. Sharks are valued as a source of meat and are usually dried, salted and consumed locally.[42]

Fishermen and fish dealers in Kenya have reported serious declines in shark catches and, without exception, they blame this on the appearance of industrial longliners and shrimp trawlers over the past decade.[43] A spokesman for the shark-fishing village of Ngomeni in northern Kenya reported that, before the arrival of the longliners, a night's catch would feed the village and provide enough meat for sale outside the village. Now it does not provide enough for the village.[44]

At least 20 trawlers were reported to be in the immediate vicinity of Ngomeni, each using 3–5cm mesh nets, which were "sweeping the sea clean" and leaving virtually nothing for the shark fishermen of Ngomeni (who have always used 20–23 cm mesh nets). Malindi, a traditional fishing village for generations, has experienced severely reduced landings and now sharks and other fish are trucked in from Mombasa, 90-minutes away.[45]

MEXICO

Sharks are described as a resource vital to the Mexican economy[46] and many poor Mexicans subsist on a diet of shark meat[47]. The bull shark, *Carcharhinus leucas*, is widely eaten in Mexico and is probably the most important species from a commercial point of view.[46]

SPIRITUAL ASPECT OF SHARKS

Sharks retain a spiritual importance in numerous beliefs around the world:

- In Hawaii, the shark is an animal deity still revered today as the greatest Aumakua (guardian angel). Stories exist of canoe paddlers getting into difficulties at sea, only to be guided to a safe place by a shark.[39]
- In Vietnam, the whale shark was known as Lord Fish. Its remains were given sacred burials.
- In Fiji, the shark god was known as Dakuwaqa, from whom the high chiefs were believed to be direct descendants.
- In Japan, the shark was an important mythological figure worshipped as the God of Storms.
- In parts of Senegal, sharks are believed to be harmless to humans. If a shark does attack, it is said to be "invaded" by an evil spirit. In the village of Ngor, there is a sage who claims to remove evil spirits from invaded sharks and render them harmless.[40]

GUARDIANS OF OUR OCEANS

Although research on the ecological role of sharks is scarce, it is known that some shark species play a vital role in marine ecosystems and are therefore crucial indicators of marine health. The depletion or removal of sharks may lead to increases or declines in other species, with unpredictable consequences for ecosystems. Sharks maintain the "genetic fitness" of their prey by removing the sick and the weak and help to keep their population sizes in check.[48] It is likely that the removal of a significant number of sharks will affect numerous species below them in the food chain. This should be of special concern to fishermen and others who make their livelihoods from the sea.

One recent study in the tropical Pacific Ocean identified considerable declines in large predators (sharks, billfish and tunas) since the start of industrial fishing in the 1950s.[49] Conversely, several smaller species of fish were found to have increased in abundance over the same time period, probably because of the reduction in number of their predators. Similar results were found in the northern Gulf of Mexico where large coastal sharks (dusky, *Carcharhinus obscurus*; tiger, *Galeocerdo cuvier*; great white; and hammerhead, *Sphyrna* spp.) have declined precipitously due to overfishing.[50] As a result, several small shark species (Atlantic angel shark, *Squatina dumeril*; smooth dogfish, *Mustelis canis*), previously preyed upon by their larger cousins, have been able to thrive.[50]

The significance of these changes for the functioning of the marine ecosystem and biodiversity are unclear. However, in another recent experiment carried out in the Caribbean, it was suggested that overfishing of sharks can have a domino effect, ultimately leading to the degradation of entire coral reef ecosystems.[51] Overfishing means that there are fewer sharks to feed on carnivorous fish such as groupers (family Serranidae) – causing an increase in their numbers and their ability to prey on herbivorous parrotfishes (family Scaridae). The removal of plant-eating parrotfish in turn allows algae to thrive on the reef, smothering the coral and increasing its vulnerability to human disturbances.[51]

A 2004 study on a Fijian reef fish community also observed that the removal of large predatory fishes can have disastrous effects on coral ecosystems. A decrease in the abundance of top predators led to an increase in the abundance of coral-eating starfish, and consequently a 35% decline in corals and replacement by algae.[52]

***Top right:* Universal studios theme park. Despite their fearsome reputation, on average less than six people are killed by sharks each year.**

***Above:* The depletion of sharks could have catastrophic effects for marine ecosystems and mean lower catches of other fish in the future.**

SHARK ATTACKS: FACT & FICTION

Sharks always get bad press. They are seen as monsters of the deep, waiting to devour any human who dares to venture into the water. Books and films, such as *Jaws*, are often blamed for this myth, but sharks have been people's worst nightmares for centuries. Lurid headlines reinforce this on the rare occasions that an attack takes place.

Resort developers have been known to employ shark experts to remove any possible predators from the area.[52] Hawaii maintained a shark eradication program for decades after the death of a schoolchild in 1959, and in some parts of the world concern for shark attacks is so great that swimming areas are cordoned off by massive shark nets.[53]

Only three (white, tiger and bull) species account for more than half of all atacks on humans, and when sharks do attack, it is likely that they have mistaken humans for their normal prey. It is believed that many shark attacks are actually attempts by the shark to identify whether or not an object in the water is edible: there are numerous examples of sharks biting a human and then, realizing its mistake, swimming away.[54]

According to the International Shark Attack File (ISAF), the number of shark attacks in 2005 fell for the fifth year in a row, with 58 unprovoked attacks and four fatalities recorded worldwide.[55] However, the longer-term trend reveals a steady increase in attacks over the past century. Overall, the 1990's had the highest attack total (470 with 61 fatalities) of any decade, and the first decade of the 21st century looks to be continuing that upward trend. In the first half of this decade there have so far been 310 attacks.[55]

George Burgess, Director of the ISAF, points out that the increase in attacks is "a reflection of human population growth and increased interest in aquatic recreation rather than a rise in the *rate* of attacks". In fact, all other factors being equal, there are likely to be more attacks each year as human population grows and we spend increased leisure time in the sea. However, "the attack rate is not increasing – in fact it is likely decreasing as a result of diminished shark stocks and large increases in human utilization of our nearshore waters".[56]

Shark attack is undoubtedly a potential danger that must be acknowledged by anyone who frequents marine waters, but it should be kept in perspective. It is statistically more dangerous to get into a car and drive to the beach than it is to get into the water. More people are killed each year by lightning, by bee stings, by dog bites or by slipping in the bath than are killed by sharks.[54]

Ecotourism industries based on viewing whale sharks generate at least US$47.5 million annually – significantly more than they are worth as meat and other products.

SHARK TOURISM

The realization that sharks are worth far more alive than dead is gradually taking hold around the world. During the past decade, shark-based ecotourism operations have developed in numerous locations, and today some of the most vociferous calls for global shark conservation come from nations that have a developed or developing marine tourism industry. Tourists are prepared to pay huge sums of money to view and even dive with sharks.

AUSTRALIA

Ningaloo Marine Park in Western Australia is an example of a whale shark tourism success story. It has been prospering since the early 1990s and whale shark tourism in Ningaloo reef is now estimated to be worth in excess of US$10 million.[57] The area probably hosts more whale shark observers than anywhere else in the world.[58]

BAHAMAS

In the Bahamas, longlining was outlawed in the mid-1990s following campaigns by local dive operators. Today, dive tourism is expanding and markets sharks as the main attraction. A single live reef shark is estimated to be worth US$250,000 because of dive tourism, whereas a dead reef shark has a one-time value of US$50–60 to a fisherman.[59]

THE PHILIPPINES

In the Philippines, fishermen who once targeted whale sharks in the Donsol region have been retrained as tour guides for whale shark-watchers. Business is booming, with over 7,000 tourists visiting Donsol's whale sharks in 2005 – up from 867 tourists in 2002.[60] This has created more than 300 jobs and in 2005 contributed more than US$620,000 to the Filipino economy.[60] Some groups contend, however, that this is only a fraction of what could be earned if correct management and financial assistance were put in place.[60]

THE MALDIVES

Tourism is the largest industry in the Maldives and is a significant source of income to the country. Diving with sharks is a major attraction, drawing US$2.3 million every year – 100 times more than the export value of shark meat.[57] In 1993, a study found that a single reef shark had a renewable value of US$35,500 per year from diving, while the same shark brought only US$32 to a fisherman.[58]

BELIZE

In Belize, divers from all around the world visit the town of Placencia to observe whale sharks in Gladden Spit Marine Reserve. The number of whale shark tour operators in Placencia has grown from just one in 1997 to 22 in 2004[61] and a study in 2002 concluded that over a six-week peak tourist period, the industry was worth US$3.7 million to the town.[57] From national tourism statistics, it is calculated that each live whale shark is worth around US$35,000 annually. If a shark lives for 60 years, each individual would therefore be worth over US$2 million if it repeatedly visits ecotourism sites throughout the Mesoamerican Barrier Reef.[57]

Threats to Sharks

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BIOLOGICAL VULNERABILITY

As apex predators, sharks are not designed for heavy predation, either by other marine species or by humans. Whether caught in directed fisheries or as bycatch, most shark species are unable to withstand protracted periods of heavy exploitation.

Shark species are generally slow-growing and long-lived, breeding late in life, with long breaks between reproductive cycles. They produce very limited numbers of live young or eggs. This makes them inherently vulnerable to overexploitation and slow to recover from decline.

Unlike most fish, sharks invest heavily in a small number of well-developed young. Most sharks feed their young inside their bodies with a yolk, while others provide embryonic nutrition through a placenta. Shark mothers often give birth in nursery areas which are separated from the rest of the population.

Unlike sharks, most fish species are adapted to a fluctuating environment and are referred to as "r-selected" species. They are usually small, mature quickly, mate early, and produce large numbers of small offspring which receive little or no parental care.[62]

NOT DESIGNED FOR HEAVY PREDATION

Sharks are completely different. They are generally described as "k-selected" species. That is, they grow slowly to a large size, mature late in life, reproduce seasonally (year after year), and produce a few large offspring – either as eggs or as live young – which experience a lower natural mortality rate. They may have been the first vertebrate group to evolve a k-selected life history. While predation levels on sharks were low the k strategy served them well.[62]

The spiny dogfish is perhaps the most extreme example of the k-selected life history. Living up to 70 years, the female does not breed until she is over twelve years of age. Gestation can be up to two years and she will produce a maximum of 20 live pups at a time.

Lemon shark (*Negaprion brevirostris*) pups develop over a twelve-month period, and their mothers require another year before mating again. Thus, a mating pair of lemon sharks barely reproduce themselves over the 24-month reproductive cycle. Typically 8–12 pups are born every other year, with a first year mortality approaching 50%. At birth, a lemon shark pup averages 60 cm in length and weighs around one kilogram. It grows less than 10 cm in its first year of life and requires 13–15 years to become sexually active.[62]

SEGREGATING BY AGE AND SEX

A further characteristic makes sharks vulnerable to overfishing. Most sharks segregate by sex and size. This means there are groups consisting solely of mature females, and if targeted by fishermen, the effect on breeding can be devastating.

FEWER SHARKS CAN MEAN LOWER BREEDING RATES

If overfished most species of fish can compensate by increasing egg production to take advantage of decreased competition for food. Because sharks produce relatively few eggs or pups, they are not capable of doing this, though increased growth rate and juvenile survival may provide some compensatory mechanisms.

Classical models of fisheries management assume that recruitment rate (the number of fish added to the population each year due to reproduction and migration) is virtually independent of stock size. These models are less applicable to sharks because generally recruitment rate and stock size are positively related.[63] That is, the more sharks, the higher the birth rate. Conversely, a reduction in the number of sharks causes a reduction in birth rate.

ABSENT FROM THE ABYSS

Whilst most fish thrive to depths of around 9,000 m, marine biologists recently discovered that sharks have failed to colonize depths greater than 3,000 m, possibly due to a lack of food in these remote regions.

This means that they are confined to just 30% of the world's oceans: surface waters, ocean margins, around oceanic islands, mid-ocean ridges and seamounts. All shark populations are therefore within reach of human fisheries, a fact that raises further concerns about the vulnerability of this group to overexploitation, as unlike most fish, there is no hidden reserve of sharks in the deep sea.[64]

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Top: **Some sharks produce elaborate egg cases.**

Left: **Many sharks, like this spiny dogfish, have long pregnancies and give birth to small numbers of live young.**

Increasing Fishing

Despite their known vulnerability to overfishing, sharks have been increasingly exploited in recent decades. A number of factors are responsible for this trend, including improvements in fishing technology, processing and consumer marketing, expanding human populations, and declines in other fish stocks, all of which have made sharks a more valuable fisheries resource. Shark fisheries have experienced rapid growth since the mid-1980s due to an increased demand for shark products (fins in particular, but also meat, skin, cartilage, etc), especially in Asian markets. Between 1984 and 2004, world catches of sharks, rays and chimaeras (chondrichthyans) grew from 600,000 to over 810,000 metric tons.[65] In addition, many thousands of sharks have been taken accidentally in tuna longline fisheries every year since their introduction in the 1960s.

© JUSTIN EBERT

Above & opposite page: **Tens of millions of sharks are killed in fisheries around the world every year.**

How many sharks are caught every year?

Global exploitation of sharks is very difficult to quantify, as catch reporting is often unreliable and can be misleading. Member countries of the United Nations Food and Agriculture Organisation (FAO) report their shark catches in different ways and with varying degrees of detail, and vast amounts of shark catch are not recorded at all.

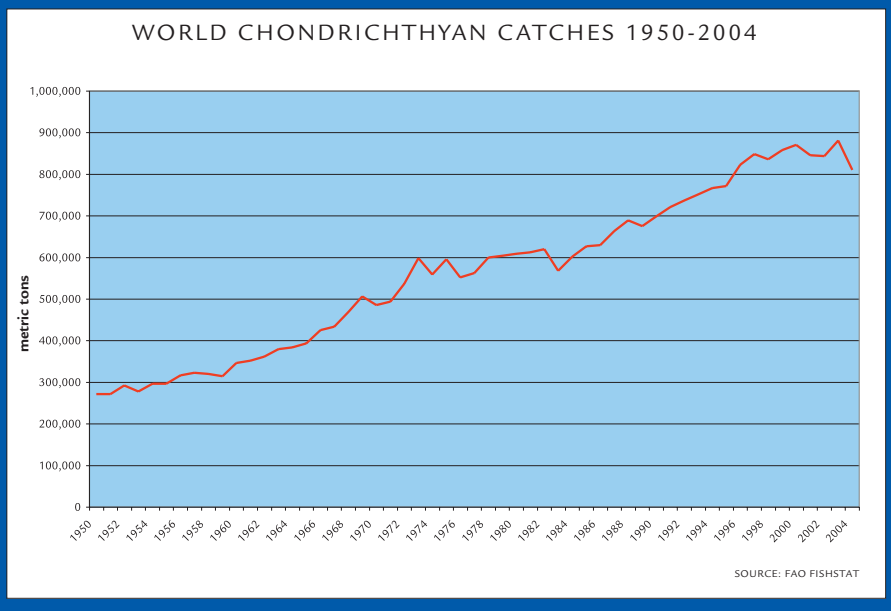
However, from the data available, it is clear that the exploitation of sharks and related species has increased dramatically since the onset of commercial fishing. Global reported landings of chondrichthyans have grown by almost 300%, from around 270,000 mt in 1950 to over 810,000 mt in 2004.[65] Assuming each animal weighs on average 15 kg, this means that total reported catches in 2004 represent over 50 million sharks, rays and chimaeras.

However, actual catches are likely to be much higher – possibly double the reported catch rate[66] (i.e. 100 million) – once other factors are taken into consideration. For instance, thousands of metric tons of sharks are discarded at sea, either whole or with their fins removed, and the weights of these discards are unaccounted for in fishery logbooks[7]. Many landings are also taken in countries that don't monitor their fishing industry, or are caught and consumed locally, thereby bypassing official record keeping.[7]

In the absence of reliable catch statistics, an alternative method of identifying the true level of exploitation is to examine the quantities of shark products in trade. Data gathered during a recent study of the shark fin trade in Hong Kong revealed that the total catch of sharks must be between 1.1 and 2.3 million metric tons per year, which equates to between 26 and 73 million sharks[67]. As shark landings (excluding skates, rays and chimaeras) reported to the FAO are in the region of 400,000 metric tons annually[67], this means that between 65% and 85% of the total catch is therefore unreported, worth an estimated US$292–476 million in shark fin value alone.[68]

The top three shark fishing nations of the world are Indonesia, India and Spain, which between them accounted for 25–40% of reported global catches between 2000–2004.[65] Other major shark fishing nations include Argentina, Brazil, France, Iran, Japan, Malaysia, Mexico, New Zealand, Pakistan, Sri Lanka, Taiwan, Thailand, the United Kingdom and the United States. These countries each report catches of more than 15,000 mt annually.[65]

While the People's Republic of China is by far the world's largest consumer of shark fin, it reported shark catches of only 100–300 mt



between 2000 and 2003 and negligible quantities in prior years.[65] However, Chinese distant-water fleets only recently began reporting shark bycatches in areas controlled by Regional Fisheries Management Organizations (RFMOs) and have no logbook requirements for sharks in other areas.[69] Hong Kong reports similarly low catches.[65]

Although global catches of chondrichthyans have remained fairly stable up to now, this is the product of considerable regional variation, with declining catches in heavily fished regions masked by increasing catches as fishermen move into new areas.[7] For example, there have been significant declines in the catch of countries such as Pakistan, Brazil, Mexico and Korea since the 1980s, whilst the catches of Indonesia have sky-rocketed – virtually doubling since 1988. In Pakistan, catches for 2004 of 27,000 mt are the lowest reported for 20 years and 50% lower than the country's peak catch in 1999[65].

CHONDRICHTHYAN CATCHES BY COUNTRY, 2004 figures in **metric tons**

Indonesia	121,750
India	61,314
Spain	51,071
Taiwan	43,797
Mexico	32,245
Argentina	32,039
USA	30,732
Thailand	27,944
Pakistan	27,363
Japan	27,150
Malaysia	25,154
France	21,613
Brazil	20,041
Sri Lanka	19,510
Iran	18,318
New Zealand	16,647
United Kingdom	16,066
Nigeria	13,560
Portugal	12,765
Yemen	12,750
Korea, Republic of	12,265
Canada	11,804
Australia	11,392
Venezuela	11,294
Maldives	9,475
Senegal	8,887
Peru	8,640
Uruguay	6,172
Other	98,564
Total	**810,322**

SOURCE: FAO FISHSTAT

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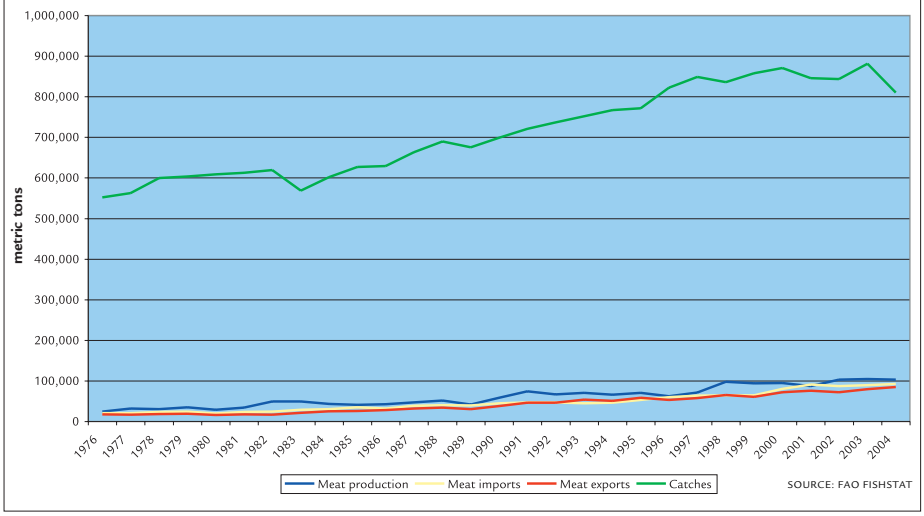
SHARK MEAT PRODUCTION AND TRADE

With the introduction of commercial refrigeration in the 1950s, consumption of shark meat gained in popularity, and today, the greatest quantity of international trade in shark products is in the form of fresh, chilled or frozen meat[69] – imports totaled more than 90,000 metric tons in 2004.[65] However, the price of shark meat is generally low and sharks are targeted specifically for their meat in only a small number of fisheries, primarily in temperate waters. Examples include trawl fisheries for spiny dogfish in the North Sea and off the northern coasts of the USA and Canada; and trawl and gill net fisheries for soupfin shark (*Galeorhinus galeus*), gummy shark (*Mustelus antarcticus*) and spotted estuary smooth-hound (*Mustelus lenticulatus*) off Australia and New Zealand[69]. In warmer waters, directed harpoon fisheries for whale sharks are banned in India and the Philippines, but are still pursued in several other countries.[69]

Markets for shark meat sufficiently valuable to warrant international trade are generally centered in Europe, for example in Spain, France, Italy and the UK, and are based on rays and small sharks. However, international trade in whale shark meat is believed to support the market in Taiwan and anecdotal evidence from the Philippines suggests there are markets for whale shark meat in Hong Kong, Singapore and Japan.[69]

FAO statistics show a considerable increase in the production of shark meat worldwide. Over the period 1985–2004, reported production of chondrichthyan meat grew by more than 150%, from 40,000 mt to around 103,000 mt.[65] Nevertheless, these figures still only represent around 10% of reported catches (see below), which suggests, assuming both sets of figures are accurately reported, that a large proportion of shark meat is either used domestically (for example for subsistence or local market use), or discarded at sea.[69]

GLOBAL PRODUCTION AND TRADE OF SHARK MEAT 1976-2004



Overfishing

BOOM AND BUST SHARK FISHERIES

Shark populations are generally fragile when targeted by unregulated fisheries, resulting in a pattern of "boom and bust". Rising catches are followed by rapid declines and very slow recoveries – when stocks are protected. Some populations do not recover.

Industrial shark fisheries have grown steadily since the 1920s and have frequently involved the targeting of new shark populations or species, as catches from established shark fisheries decline.[66]

- The collapse of the soupfin shark fishery in the US Pacific is typical. The fishery expanded spectacularly in 1938 with the discovery that liver oil was rich in vitamin A. Catches peaked at 4,000 metric tons (mt) in 1940, crashed in 1942 and by 1944 were down to only 300 mt. More than 50 years on, and despite the lack of fishing, the population has still not recovered to its former level.[17,70]

- Landings of spiny dogfish in the Northeast Atlantic peaked at almost 70,000 metric tons in the 1960s, when Norwegian and UK vessels targeted the species. However, the stock is now depleted – possibly down to 5% of its original size – with landings at their lowest levels since World War 2 (around 6,000 mt).[71]

- Catches of porbeagle sharks (*Lamna nasus*) in the Northeast Atlantic peaked in 1947 then declined dramatically. This collapse led to intensive target fishing by the Norwegians and Danes in the Northwest Atlantic in the 1960s; between 1961 and 1964 their catch rose from 1,800 mt to 9,300 mt and then declined to less than 200 mt. Renewed target fishing in the 1990s led to a further population decline of 83–89% within three generations.[72]

- A harpoon fishery for the basking shark (*Cetorhinus maximus*) off the west coast of Ireland began in 1770 and lasted until the 1830s, when the species became scarce. The stocks subsequently recovered and the fishery was revived in the 1940s, but the catch quickly peaked and declined by the end of the 1950s.[6]

- US Pacific angel shark (*Squatina california*) catches peaked in 1985–86 at 560 mt but decreased quickly to 120 mt three years later. A ban in 1994 "likely averted population collapse".[72]

- A fishery for bluntnose sixgill sharks (*Hexanchus griseus*) began in the Maldives in 1980, peaked in 1982–84 and collapsed by 1996. Other fisheries for this species, in Australia, New Zealand, France, Brazil and possibly Argentina, are all reported to have declined.[73]

- The common skate (*Dipturus batis*), as the name implies, was historically one of the most abundant skates and rays in the Northeast Atlantic. It was widely distributed in the seas surrounding the British Isles, though catch rates of this species declined during the 20th century due to overfishing. By the 1970s the common skate was considered extinct in the Irish Sea, and they also disappeared from the English Channel and the southern and central North Sea.[72]

- North Atlantic populations of leafscale gulper shark (*Centrophorus squamosus*) and Portuguese dogfish (*Centroscymnus coelolepis*) have crashed by 80% in just ten years, since the development of an unregulated gillnet fishery in the mid-1990s. These deep-sea sharks are targeted by Spanish vessels for their oil which is sold to cosmetic and health companies, and also for their meat. Deep-sea sharks reproduce very slowly and according to ICES – the organization responsible for marine research in the North Atlantic – are in extreme decline.[71,74]

Many more shark fisheries are likely to be in serious decline, but are not formally documented. However, anecdotal reports from artisanal fishermen, divers, researchers and recreational fishermen in many parts of the world reveal that areas where sharks were once abundant have become depleted. WildAid research in Costa Rica, Ecuador, India, Kenya, Mexico and Senegal confirms this.

Another indication of declines is the widespread illegal fishing of sharks in marine reserves and the large-scale incursions into Australian waters by Indonesian boats. It seems unlikely that fishermen would risk loss of their boats and gear unless legal sources were seriously depleted.

© WATTS / WILDAID

Left: **Fishermen in many parts of India have seen catches of sharks decline rapidly.**

Can sharks be sustainably harvested?

Thirty years ago it was unclear whether long-term sustainable fisheries for sharks could ever be possible. Today, it is thought that economically viable and biologically sustainable yields can be taken from more productive species under careful management, for example the gummy shark caught off southern Australia.[75]

However, the majority of shark fisheries are still unregulated and the high catches of a number of countries are almost certainly unsustainable. A preliminary evaluation of shark species worldwide by the FAO identified severe population declines for nearly all the 26 shark species for which catch or landing data was available for more than ten years.[73]

Bycatch

Bycatch is a term used to refer to any species caught accidentally while fishing for other "target" species. It is responsible for mortality in a wide range of species: non-target fish, seabirds, whales, dolphins, turtles and sharks. A great deal of bycatch is discarded at sea and never appears in the records. Where bycatch must be reported, it is often under-reported.

According to the FAO, there are few fisheries that do not result in bycatch of sharks, skates and rays. Indeed, much of the difficulty in monitoring shark stocks arises because the majority of sharks are caught as bycatch, which is almost entirely undocumented and totally unregulated.

In cases where bycatch is recorded, the numbers are significant, sometimes even greater than the targeted catch. Previously, in many fisheries sharks caught accidentally were thrown back, sometimes still living, or the lines cut. But now, with demand for shark fin growing, sharks caught as bycatch are often finned, with the distinction between target and shark bycatch species increasingly disappearing.

Rates of shark bycatch depend to a great extent on the fishing gear used:

- In coastal areas, trawl fisheries are thought to be responsible for the largest bycatch of sharks, skates and rays, amounting to hundreds of thousands of metric tons annually.[76]
- Tuna purse-seine nets occasionally result in large-scale shark bycatch and gillnets are also considered to be the cause of heavy shark bycatch.[77]
- While less indiscriminate than some other fishing methods, the widespread use of longlines, combined with the sheer length of lines and number of hooks, means that more ocean-going (pelagic) sharks are caught as bycatch in longline fisheries than in any other fisheries on the high seas.[76]

TALES OF DISASTER:

- Research surveys in the Gulf of Mexico (1972–2002) demonstrate precipitous declines in coastal sharks and rays taken as bycatch in areas of intensive shrimp trawling. Smooth butterfly rays (*Gymnura micrura*) have declined by more than 99%, bancroft numbfish (*Narcine bancroftii*) by 98% and bonnethead sharks (*Sphyrna tiburo*) by 96%.[50]
- A recent study of the Moroccan driftnet fleet found that pelagic shark species are suffering massive bycatch rates, with blue shark, shortfin mako and thresher shark (*Alopias vulpinus*) numbering half the target catch (swordfish). In excess of 100,000 of these ocean-going sharks are estimated to be caught by the fleet annually – a level of fishing pressure well beyond the reproductive capacity for these species.[78]

Sharks are caught as bycatch in most of the world's fisheries

- Sharks represent a large bycatch of global high-seas longline fisheries targeting tuna and swordfish (dominated by vessels from Taiwan, Japan and Spain) and are retained primarily for their fins. The bycatch is comprised mainly of blue, oceanic whitetip (*Carcharhinus longimanus*) and silky sharks (*Carcharhinus falciformis*). In 2000, it was estimated that up to 470,000 metric tons of these three species were caught accidentally in the Pacific Ocean in just one year.[79]

- Populations of oceanic whitetip and silky sharks in the Gulf of Mexico plummeted by 99% and 90%, respectively, since the onset of industrialized offshore fisheries for tuna and billfish, in which they are caught as bycatch. Oceanic whitetip sharks comprised about 60% of shark bycatches in the 1950s but by the 1990s this figure was only 2%.[80]

UNNECESSARY WASTE

Some shark species are able to survive for long periods on hooks. Research in Brazil found that from a total of 508 sharks of different species observed in longline fisheries, 88% arrived alive on deck.[85] In Hawaii, it is estimated that 86% of blue sharks are alive when landed on deck as bycatch.[86] Allowing for some post-release mortality, it is clear that a very large proportion of sharks caught on longlines survive if released rather than finned.

© MARCEL BIGUE / WILDAID

Left: **Many sharks caught on longlines would survive if released rather than finned.**

Reducing shark bycatch

More than seven million metric tons of marine life is discarded by the world's fisheries every year.[81] International concern at this massive wastage has led to the development (but not always the implementation) of methods and technological innovations to minimize these bycatches. Significant focus has been placed on reducing the numbers of endangered species such as whales, dolphins, sea turtles and seabirds caught in fishing gears[82], but sharks, despite being frequent bycatch species, important in marine ecosystems, and extremely vulnerable to overexploitation, have received relatively little attention.

Several promising new methods are currently now in development. In 2006, an invention that involves placing strong magnets just above the baited hooks on longline gear won first prize in the 2006 WWF International Smart Gear Competition. The design utilizes the fact that sharks are able to detect and are repelled by magnetic fields, meaning fewer sharks are captured accidentally and less fishing gear is lost to non-target species.[83] Other fish do not respond to these magnets, so catch of targeted species, like tuna, is unaffected. Chemical repellents are another approach also being tested.[84] Sadly, many fishermen are likely to reject such innovations, because sharks, or at least their fins, have become such valuable bycatch.

The Shark Fin Trade

Above: **Shark fins are among the most expensive seafood products in the world, retailing at up to US$1,000 per kilogram**

A combination of two factors led to an explosion in the demand for shark fin soup over the past twenty years. Firstly, the rapid expansion of East Asian economies, particularly that of Mainland China, created a vastly increased middle class sector with disposable income, and what began as a rare and expensive delicacy is now standard fare at most weddings and corporate functions. Secondly, the consumption of shark fin soup in China, discouraged under Mao Tse-tung as an elitist practice, was politically "rehabilitated" in the late 1980s. The result is a massive surge in the international fin trade, prompting fishermen worldwide to target sharks for their fins and to remove the fins from sharks caught as bycatch in other fisheries. Fin traders systematically spread the word that fins are valuable to fishermen the world over, often providing equipment and monetary advances in order to secure fins.

Today the rapidly expanding and largely unregulated shark fin trade represents one of the most serious threats to shark populations worldwide, and shark fins are now among the most expensive seafood products in the world, commonly retailing at US$400 per kg[10], with the most expensive selling for US$1,000 per kg[87]. To put this in perspective, shrimp or prawns retail at around US$6 per kg.

A recently published report on the dried seafood trade in Asia revealed that one shark fin trader, who considers himself a medium sized operator, had a turnover of US$771,000 per month. Given a profit margin of between 10–15%, one of Hong Kong's largest dealers, rumored to have a turnover of US$129 million per year, could be making an annual profit of at least US$12 million.[10]

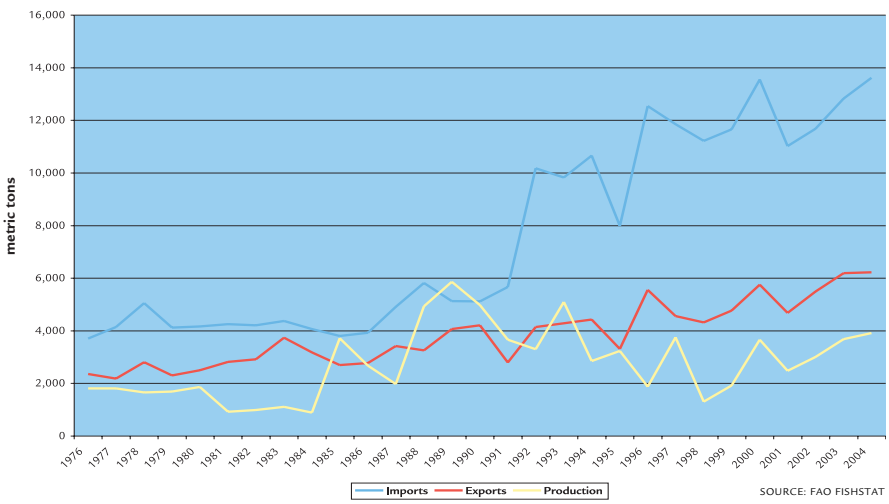
The lucrative and unregulated nature of the trade attracts involvement by criminal elements, with fierce competition for shark fins leading to widespread corruption, gangland wars and contract killings.[16] In Colombia, for example, drug dealers became involved in the shark fin trade as a way of laundering drug money.[88]

HOW MANY SHARKS ARE FINNED EACH YEAR?

During the finning process, a shark is hauled up on deck, its fins sliced off, and the animal - sometimes still alive – is thrown back into the sea to bleed to death. This practice is not only cruel, it is also incredibly wasteful, as finning only utilises 1-5% of the shark's body-weight.[89]

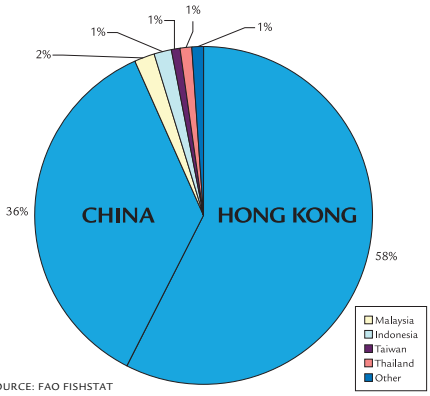
It is impossible to establish the precise number of sharks slaughtered in this way annually, as few fishermen will openly admit to finning sharks and the practice occurs at sea where there are no other witnesses. However, there is enough evidence to suggest that finning is widespread in numerous fisheries, that huge numbers of sharks are finned every year, and that the vast majority of these mortalities go unreported. The World Conservation Union's (IUCN) Shark Specialist Group estimates that tens of millions of sharks are finned worldwide every year,[89] while one recent study estimated that fins of between 26 and 73 million sharks are traded globally each year (although this figure includes both finned sharks and those whose bodies are retained for other purposes)[67].

GLOBAL PRODUCTION AND TRADE OF SHARK FIN 1976-2004



SOURCE: FAO FISHSTAT

LEADING SHARK FIN IMPORTERS 2004



SOURCE: FAO FISHSTAT

Note: all shark fin statistics are taken from the FAO, but frozen shark fins have been corrected by a factor of 0.25 as they are believed to be four times heavier than their dried equivalents.[10]

Estimating the scale of the global trade in shark fin products is also extremely complicated and data on imports, exports and production figures rarely match.[7] The industry is still largely conducted in the "grey market" and fins change hands for cash in many cases, and often transactions go unrecorded.

The only available global database on the shark fin trade, held by the FAO, shows that the trade has escalated enormously in the past two decades. In 1987, a total of 4,907 mt of shark fins were imported worldwide. By 1994 this had risen to 10,652 mt, and ten years on, reported world imports peaked at 13,614 mt.[90]

More than 90% of shark fin imports reported to the FAO in 2004 were to Hong Kong (57%) and China (36%). Other notable importers are Malaysia, Indonesia, Taiwan and Thailand.[90]

There are, however, problems with the accuracy of these figures, the main issue being that any given shipment of fins may be recorded as an import in every country it passes through, meaning that there is almost certainly double (or triple) counting. With export figures this is less of a problem as most countries distinguish between exports and re-exports (exports of a product that did not originate within the country) and as a result the exaggeration in export data is not so large.[90]

Export statistics do nonetheless indicate an expanding market, with exports doubling since the late-1980s to reach 6,220 metric tons in 2004. China accounts for 40% of reported exports, followed by Indonesia, Taiwan, the United Arab Emirates, Malaysia and Japan.[91]

An alternative estimate, which accounts for double counting and is based on national customs statistics, put the total quantity of shark fins in trade at around 10,000 metric tons in 2000, and growing at a rate of 6% a year. However, the authors state that this figure is likely to be an underestimate for a number of reasons: fins harvested illegally are not included in official record keeping, shark fins produced and consumed within the same country are absent from trade statistics, and only the largest shark fin markets (Hong Kong, China, Taiwan, Japan and Singapore) – not all markets – were included in the study.[10]

Reported world production of shark fins in 2004 totaled 3,909 metric tons, but as many countries do not record shark fin production (e.g. China), this figure must be considered an underestimate.[90] Nevertheless, reported production of shark fins would still account for catches of more than 260,000 metric tons*, which is equivalent to around a third of reported global chondrichthyan catches. However, if sharks caught for the fin trade were finned and discarded, the 260,000 mt would not be included in the catch figure and would therefore represent an additional take.[7]

In 2004, Indonesia was the world leader in shark fin production (1,660 mt), followed by Singapore (1,000 mt) and India (455 mt). These three collectively account for 80% of shark fin production reported to the FAO[90]. China has never reported any shark fin production to the FAO.[90]

FINNING: A CRUEL WASTE

At one time, it is likely that global catches of whole sharks provided sufficient fins to supply the markets of East Asia and East Asian communities worldwide. However, as shark meat is considered to be inferior to that of most commercially exploited fish species, particularly tuna and swordfish, the profits to be made from shark meat are naturally much lower. Limited space on-board fishing vessels, combined with the increasing value of shark fin, has made it economically advantageous for some commercial vessels to discard the bulky shark bodies while retaining the valuable fins, which can be sun dried and stored compactly without refrigeration.

The dumping of millions of sharks at sea results in significantly decreased shark catches in many developing countries. Fishers in eastern India and on the east and west coasts of Africa have reported serious declines in their catches, dating back to the arrival of large, industrial (and usually foreign) fishing vessels off their coastlines. Many coastal fishing communities in low-income countries rely on traditional shark fisheries to provide a vital source of protein, and wastage on this scale increasingly threatens their livelihoods and food security.[89]

Furthermore, as it is extremely difficult to identify many shark species from their fins alone, finning impedes the collection of vital species-specific catch, bycatch and landings data. Without such information, shark stocks cannot be accurately assessed and sustainable management is therefore not possible.[89]

FAVORITES FOR FINNING

Which shark species are most commonly used for finning? DNA-based species identification on samples from Hong Kong – the world's largest shark fin market – found that between 34–45% of fins belong to only 14 shark species.[92]

Blue sharks form a particularly large component of the market (17%), possibly because they are the most common bycatch species in high seas longline fisheries targeting tuna and swordfish. Other species, including the hammerhead, shortfin mako, silky, sandbar, bull, and thresher sharks represent at least 2–6% of the trade.[92]

Fins of all three CITES listed sharks – great white, basking and whale – are

A Growing Recognition of the Shark Fin Soup Problem

After fierce criticism from conservationists, the Walt Disney Company – creator of the blockbuster *Finding Nemo*, an aquatic adventure story with the tagline: "fish are friends, not food" – bowed to pressure and removed shark fin soup from restaurant menus inside the new Hong Kong Disneyland theme park. The dish was to be served at expensive "Fairytale" wedding banquets.[94]

"After careful consideration and a thorough review process, we were not able to identify an environmentally sustainable fishing source, leaving us no alternative except to remove shark's fin soup from our wedding banquet menu."

Irene Chan, Disney Hong Kong vice-president for public affairs.[94]

* Applying a dried fin-to-body-weight ratio of 1.5%.

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Above: **Shark finning wastes 95-99% of the animal. It is now a common practice in fisheries around the world.**

internationally traded, although it seems the large size of these fins renders them more appealing as trophies than for consumption.[69] Traders in Hong Kong claim that the fins of basking and whale sharks are "coarse and taste of ash", and great white fins are considered to be of similarly poor quality.[69] However the recent seizure of fins from 21 juvenile great whites indicates that they may have some value as food, since small fins are unsuitable for display purposes.[93] Traders have been shown to deliberately mislabel fins from CITES listed shark species as other, unprotected species; but even without deliberate subterfuge, rare fins may be mixed within large volumes of other similar fins and thus become nearly impossible to detect.[92]

"The trade in shark fins through Hong Kong, which is likely to be indicative of the volume of the global trade, is growing at an annual rate of six per cent and appears to be linked to increases in disposable income in Mainland China."[69]

HOW TO BAN SHARK FINNING

The simplest way to implement a ban would be require all sharks to be landed whole, making the possession of detached fins on board vessels an offence.[95] This would simplify enforcement and eliminate cheating and also provide much-needed data about the number and species of sharks being taken, since sharks with their fins attached are far easier to identify by species. However, relatively few countries that prohibit finning (Costa Rica is an example) require sharks to be landed whole; most opt instead for regulations requiring that shark fins must not total more than 5% of the weight of sharks onboard.[95]

Although some nations have introduced legislation to control shark finning (see below), the highly migratory nature of many shark species means the only way to ensure full protection is to enact a ban on finning not only within the waters of individual nations, but on the high seas as well.

"Finning causes the death of tens of millions of sharks. This potentially threatens the survival of rare and vulnerable species and, by removing large numbers of top predators from the oceanic system, may have dramatic and undesirable ecological impacts that could potentially threaten yields of other species." [89]

FINNING BECOMES UNACCEPTABLE

- In December 2000 the US adopted legislation to prohibit shark finning in all US waters. Finning was previously banned on the Atlantic coast and in Californian waters.
- The European Union banned shark finning in 2003 for all vessels operating in EU waters and all EU vessels, wherever they fish.
- In 2003 the UN General Assembly recommended that Member States ban shark finning.
- In November 2004, the IUCN, made up of over 1,000 governmental and non-governmental organizations from over 140 countries, passed a resolution recommending that all States require shark fins to be landed attached to their bodies.
- The first international ban on shark finning was introduced by the International Commission for the Conservation of Atlantic Tunas (ICCAT) in 2004. This was followed in 2005 by the Inter-American Tropical Tuna Commission (IATTC), the Indian Ocean Tuna Commission (IOTC) and the Northwest Atlantic Fisheries Organization (NAFO).
- Shark finning is prohibited in all Australian States (out to three nautical miles) and in Commonwealth-managed (federal) fisheries (which cover the area from 3–200 nm from the shore).
- In February 2006, the Seychelles banned finning by all foreign-owned vessels, including those registered under or flying the Seychelles flag. The ban does not apply, however, to Seychellois-owned fishing boats.
- Shark finning has also been outlawed by several other major shark fishing nations, including Brazil, Canada, Costa Rica, Ecuador, Oman and South Africa.

The case for a finning ban

- Finning is responsible for the deaths of tens of millions of sharks every year.
- The removal of the ocean's top predators may have serious, widespread effects for marine ecosystems and potentially threaten yields of other commercially important species.
- Finning is hugely wasteful – throwing away 95% of a valuable protein source should not be an option in a world where fish stocks are declining and millions of people face chronic hunger.
- Finning prevents species-specific catch data from being collected. Without such information, sustainable management of shark fisheries is not possible.

Lack of Management

UNMANAGED FISHERIES

Shark fishing on the whole is widely unmanaged. In the past, sharks lacked commercial value, so comparatively little is known about many species' abundance, range, distribution, reproductive behavior and response to external stresses. Records of shark catches are vague and few countries break down their shark catch by species.[75]

Today, sharks continue to be a low priority for conservation and research in many nations because of their low overall economic value (considering flesh and fins together) and the fact that sharks constitute a small proportion of marine fisheries.[75] The FAO's latest catch statistics show that chondrichthyan landings accounted for only around 1% of the total world fish catch in 2004, with sharks comprising approximately half of this total.[65]

There are currently no binding international agreements for the protection of sharks (with the exception of CITES, which deals with issues of trade, not directly with shark management – see opposite), and at the national level, only Australia, Canada, New Zealand, Japan, the UK and the US have developed specific shark management programs.

Some countries, such as Brazil, Costa Rica, Ecuador, Israel, Malta, Mexico, Namibia, Oman, the Philippines, and South Africa, have restrictions ranging from a ban on finning in national waters, to a prohibition on the catching of specific species, to the closure of directed shark fisheries during certain seasons. And in a few areas, shark fishing is banned completely – for example, in Egypt there is a total ban on shark fishing in the Red Sea[96], and shark fishing is prohibited in all Congolese waters.[97]

But considering that well over 100 different nations report shark catches to the FAO, and 24 boast annual catches in excess of 10,000 metric tons[65], it is clear that there is a serious lack of comprehensive management.

A major problem with the management of shark fishing is that comprehensive shark management plans are mainly being created in developed countries, even though more than two thirds of reported chondrichthyan landings occur in developing countries where management is often weakened by a lack of funding for research and enforcement of regulations. In addition to unrestricted fishing by domestic fleets, poor enforcement means that industrial fleets from other nations are often found fishing illegally in the waters of developing countries, catching sharks and further decimating fish stocks.[75]

Domestic initiatives are vital for the conservation and management of shark populations, particularly for those species with restricted distributions. However, it is important to recognize that many species and populations of shark are distributed widely, or undergo long migrations between the waters of multiple States and on the high seas. Therefore, for many shark species, international initiatives are essential for effective management.[98]

The rising demand for shark fins continues to fuel their exploitation, but paradoxically they continue to be a low priority for conservation and research because of their low economic value (considering flesh and fins together). [75]

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Left: **The results of a finning operation in Costa Rica**

LACK OF CATCH, BYCATCH AND TRADE DATA

As sharks were historically regarded as low-value "trash" fish, there was little incentive to collect catch, bycatch and trade data. A significant portion of global shark catches still go unrecorded and, when they are documented, species-specific information is sparse or non-existent and shark species are frequently categorized together, or even as "unidentified marine fish".[75]

The only source of information on global shark catches is the FAO, which relies on data collected from nations individually and so is restricted to the same limitations noted above. Some nations fail to report any catch data (they may be discarding sharks at sea after taking their fins, or intentionally withholding information), leaving the FAO to extrapolate data from previous years.

Species-specific (and ideally stock-specific) catch, bycatch and biological data is fundamental if shark populations are to be managed sustainably and global shark landings monitored in any meaningful way. Without knowledge of the level true of exploitation, it is impossible to accurately assess the status of shark populations, meaning management is likely to fail.

International trade in shark products is also very poorly documented. Customs codes are often unspecific and species of shark are frequently only categorized under a heading of "dogfish and other sharks".[7] Some countries have a separate category for shark fin (although not by species), but customs' records for shark skin, liver oil and jaws are rarely documented, and trade of shark cartilage goes totally unreported.[7,69] Several countries simply do not report their statistics on trade in shark products at all. These numerous shortcomings mean that accurately assessing the volume of international trade in shark products in general, let alone by species, is virtually impossible.

International Agreements

FAO International Plan of Action for Sharks (IPOA)

In 1999, the FAO adopted an International Plan of Action for Sharks (IPOA), with the overall objective of ensuring the conservation and management of sharks and their long-term sustainable use. The initiative, which is voluntary, calls on States to produce a Shark Assessment Report (SAR) and, if they have shark fisheries, to draw up a National Plan of Action (NPOA) identifying research, monitoring and management needs for all shark species in their waters.[98]

Progress by 2001 – the year by which NPOAs were to be completed – was very disappointing, with only 29 States reporting to the FAO on progress with IPOA implementation. By September 2002, none of the major shark fishing nations had produced a SAR, and a review of draft and completed NPOAs showed nearly all to be inadequate.[98]

Thirteen States have now reported that they have completed either a SAR, NPOA, or both, including eight major shark fishing nations – Australia, Brazil, Japan, Mexico, Taiwan, Thailand, the UK and the USA – although Thailand's and Brazil's are not available for review and their status is uncertain.[99] At present, only the NPOAs of Japan, the UK, Australia and the USA are available to view on the FAO Fisheries website.

Five States – the EU, Indonesia, Italy, Malaysia and South Africa – have draft SARs or NPOAs, while a further 47 States report that they are working towards implementation, including eight major shark fishing nations. Two of the latter – Canada and New Zealand – are already implementing shark fisheries management independently of the IPOA-Sharks.[99]

Worryingly, however, 32 States, including three major shark fishing nations – Nigeria, Sri Lanka and Taiwan, which collectively account for almost 10% of global catches – state that they have not or will not be implementing the IPOA-Sharks.[99] And in 2005, an expert consultation that assessed the effectiveness and achievements of the IPOA-Sharks concluded that despite the great benefit it could bring to the conservation of shark populations, it is constrained by the lack of priority given to the issue.[100]

Convention on International Trade in Endangered Species (CITES)

CITES was established in 1975 to ensure that international trade in wild animals and plants does not threaten their survival. It provides an international legal framework for the prevention of trade in endangered species, and for the regulation of trade in species that may otherwise become threatened.[98] Participation is voluntary, but countries that agree to the Convention are legally bound by it. At present, 169 countries are Party to CITES.[101]

Currently, only three species of shark – the basking shark, whale shark and great white shark – are listed by CITES. All are listed on Appendix II, which means that Parties to CITES must strictly regulate and monitor trade in these species. Export permits can only be granted if it will not be detrimental to the survival of the species, and that the products were not obtained illegally.[101]

A basking shark fin on display in Singapore. Basking sharks are now protected internationally under CITES and the CMS.

The Convention on Migratory Species (CMS)

The Bonn Convention on the Conservation of Migratory Species of Wild Animals (CMS) recognizes the need for countries to cooperate in the conservation of animals that migrate across national boundaries, or between areas of national jurisdiction and the high seas. Its membership has grown steadily and now incorporates 97 Parties. The CMS provides a framework for setting up protection measures for endangered migratory species.[102]

The basking shark and the great white shark, listed in 2005 and 2002 respectively, are registered on both Appendix I and II of the Convention, while the whale shark, added in 1999, is listed solely on Appendix II.[102]

Regional Fisheries Management Organizations

Regional Fisheries Management Organizations (RFMOs), created under international agreements, are responsible for the management of high seas fisheries and fish stocks that migrate through the waters of multiple countries. Many RFMOs are solely concerned with management of particular species (often tuna and their relatives) and shark populations are usually not covered.

Several RFMOs* have, however, in the past two years, agreed to resolutions banning shark finning and encouraging data collection, research, and the development of bycatch mitigation measures for sharks. Nevertheless, such actions fall well short of the requirements of the IPOA-Sharks[100] and, at present, ICES and ICCAT are the only RFMOs known to be utilizing shark fisheries and/or bycatch data to develop stock assessments.[98]

Other agreements and bodies that could help in the conservation of sharks include the UN Agreement on Straddling and Highly Migratory, and Fish Stocks the Convention on Biological Diversity.

* The International Commission for the Conservation of Atlantic Tunas (ICCAT), the Inter-American Tropical Tuna Commission (IATTC), the Indian Ocean Tuna Commission (IOTC), and the Northwest Atlantic Fisheries Organisation (NAFO).

Illegal Fishing

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MARINE RESERVES UNDER SIEGE

While only three shark species enjoy any degree of international protection under CITES, some sharks are protected in marine reserves, which are usually "no take" or restricted fishing areas.

Because of the difficulty and expense of patrolling large areas of ocean, marine reserves are often poorly protected in developing countries. WildAid has found that they are increasingly under pressure from illegal fishing, shark fin being one of the most lucrative targets. In some protected areas, illegal fishing now threatens dive tourism and divers are reporting reductions in shark numbers.

To maximize profits while fishing illegally, fishermen will often take only fins, dumping carcasses overboard. In this way, a relatively small boat can catch thousands of sharks in a short period, effectively fishing out an entire area.

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Top right: **Marine reserves in developing countries seldom have resources to enforce their regulations. The main patrol vessel for the Galápagos has only been kept in service with outside support.**

Above: **Sharks caught in an illegally-set net in the Galápagos Marine Reserve.**

GALÁPAGOS ISLANDS

The Galápagos Islands, designated a UNESCO World Heritage Site in 1978, suffer extensive illegal fishing incursions from both local and foreign boats (mostly from Costa Rica and Colombia), specifically targeting sharks for their fins.[88]

Local residents report that fishing for sharks began in the 1950s, but growing demand for fins resulted in intensive fishing in the 1980s, which has continued at a high level despite a ban on large-scale shark fishing in 1998.[88]

Until recently, Ecuador was a major exporter of shark fins to East Asian markets. According to the World Trade Atlas, between 1997–2003 Ecuador exported 850 metric tons of shark fins to China, Hong Kong, Singapore and Taiwan – an amount estimated to have required the lives of 1.7 million sharks[88]. Despite a prohibition on the export of shark fins since October 2004, fins continue to be harvested and exported illegally[104].

Most of these fins – an estimated 80% of Ecuador's exports – are taken from sharks in Galápagos waters, where they are officially protected. Scant environmental monitoring and enforcement means reliable estimates of sharks killed in the Galápagos are hard to come by, but the volume of dried shark fin produced from the Island of Isabela (the largest island in the archipelago) is estimated to be as much as 1,500 kg per month, representing approximately 3,000 sharks.[88]

Shark fins are smuggled out of the Galápagos in a variety of ways. Some companies use large "mother ships", which are stationed just outside the Marine Reserve and are regularly supplied with fins by small, fast moving boats, usually at night. In other cases, fins are packed into suitcases and smuggled from the Galápagos by plane. Shark fins have been found hidden in fuel-transport vessels and also on board cargo ships, concealed in coffee sacks and petrol containers.[88]

The Galápagos Islands are famed for providing opportunities to dive with large groups of hammerheads and the 42 other resident species of shark. According to a local scientist: "Diving here depends on sharks. If you reduce their numbers or make them aggressive, you have ruined dive tourism."[105]

Despite a general lack of information on shark populations, anecdotal information points to a worrying decline. The owner of a diving company in the archipelago reported that "huge schools of hammerheads, often numbering up to 300, could be seen in the area 15 years ago. Nowadays tourists are lucky to see 20 or 30."[88]

More than 80,000 international tourists, worth US$140 million, are attracted to the Galápagos Islands every year, representing around a third of Ecuador's US$430 million tourism business. By contrast, Ecuador is reported to earn just US$1.5 million from the shark fin trade, accounting for the death of 200,000 sharks.[88]

COCOS ISLAND MARINE RESERVE, COSTA RICA

Cocos Island is famed as one of the world's top dive sites and is billed as "The Island of Sharks." Fishing within 12-miles of the island, a World Heritage Site, is prohibited, but commercial fishers routinely ignore the ban and illegally catch and fin sharks at night, according to the authorities.[88]

Local shark populations, mainly great hammerheads inshore and silky sharks offshore, are suspected to be dwindling. Currently there are more than 80 local boats that are formally accused of fishing illegally, and several foreign operators have been arrested. One Ecuadorian vessel, the *San Jose 1*, was captured and confiscated and the captain imprisoned. A Colombian vessel was also impounded and forced to pay a US$18,000 fine. Pirate fishing is a great problem in Costa Rican waters and includes Taiwanese vessels. Similar situations are known to exist in other central American nations; for example, there is evidence of Costa Rican vessels in Guatemalan and Nicuaraguan waters, all longlining and catching sharks.[106]

Left: **Galápagos park rangers intercept a suitcase full of shark fins.**

The Park Service and Coast Guard are aware of the situation around Cocos Island, but lack the resources to combat illegal fishing. The Save Our Seas Foundation provided a fast patrol boat to the Parks authority in 2003 to provide year round enforcement of the 12-mile fishing exclusion zone surrounding the island. However, some illegal fishing continues and local dive operators are becoming increasingly concerned that it will seriously impact their operations.[107]

COIBA NATIONAL PARK, PANAMA

Situated 70 km off the Pacific coast of Panama, this newly designated World Heritage Site is attracting a growing number of tourists drawn by its remarkable biodiversity and pristine natural environment. Coiba National Park is one of the largest marine parks in the world and contains the second largest coral reef in the Central-Eastern Pacific Ocean.[108]

Despite stepping up patrols, illegal fishing around Coiba is rampant and increasing. Commercial fishing boats, both local and from Costa Rica, target sharks along the island's coast using longlines and gillnets. In 2002, citing the problem of shark fin soup, the then Director of Coiba National Park, Clemente Nunez, reported that around 100 boats come to fish around Coiba every month.[88]

Although larger scale operators present a persistent law enforcement problem both around Coiba and in Panamanian territorial waters generally, a local NGO has warned that a more serious long term threat comes from small artisanal fishing boats from the poverty stricken communities along the nearby Veraguas coast.[88]

Dive operators have reported a marked decrease in the number of sharks, rays, and other large fish as commercial fishing increased over the last five years. The longline and nylon gillnets widely employed by the fishermen also create unintended bycatch of sea turtles. Scientists from Oregon State University recently reported seeing no sharks at all while diving around Coiba.[88]

POACHING EPIDEMIC HITS AUSTRALIA

Even when countries are able and willing to invest hundreds of millions of dollars into fighting illegal fishing, protection for sharks cannot be guaranteed. In Australia, increasing numbers of Indonesian fishermen are encroaching into the country's tropical northern waters as overfishing has depleted shark populations in many other parts of Southeast Asia. With shark fin worth up to US$700 per kilogram on the Chinese market, Indonesian fishers are prepared to take huge risks, including hefty fines and jail terms, to pursue these lucrative catches. If they are not caught, a single trip can provide the same economic return as a year of fishing in Indonesian waters.

According to government sources, up to 25,000 metric tons, or more than 1 million sharks, are poached annually from Australia's territorial waters [109] which is more than double Australia's reported shark catches in 2004.[65] Sharks are finned and their carcasses discarded – illegal in all Australian waters.

The situation has got so bad that the Minster of Defence recently authorized the Navy to shoot at boats that do not submit to inspection, and there are reports of the Navy being attacked with samurai swords when boarding illegal fishing vessels.[110]

Breaking other countries' laws

Although very few countries have direct protection for sharks, many have fishing regulations designed to protect traditional and domestic fisheries. However, developing countries rarely have the resources to enforce these regulations and so unscrupulous fishermen, often from abroad, take advantage of this to fish illegally.

In West Africa, for example, countries such as Guinea, Sierra Leone, and Liberia suffer from some of the highest levels of illegal fishing in the world, as foreign industrial vessels from Europe and the Far East plunder their precious marine resources, upon which millions of people depend for food and livelihoods.[111]

Guinea is estimated to lose US$110 million worth of fish to so-called "pirate" fishing every year, Sierra Leone US$29 million, and Liberia US$10 million – a potential source of income these impoverished States can ill-afford to be without. Across the whole of sub-Saharan Africa, losses to pirate fishing are estimated at around US$1 billion, which is roughly equivalent to a quarter of Africa's total annual fish exports.[68]

Flags of Convenience

One common way in which fishermen circumvent management and conservation measures and avoid penalties for illegal fishing is by registering under a "Flag of Convenience" (FOC). Although international law specifies that the country whose flag a vessel flies is responsible for controlling its activities, certain countries allow vessels of any nationality to fly their flag for a few hundred or thousand dollars, and then ignore any offences committed. These so-called FOC countries are often developing States, and so lack the resources (or the will) to monitor and control vessels flying their flag, especially when the fisheries being plundered do not belong to them.[112]

Other Threats to Sharks

POLLUTION

Sharks, as predators at the top of many food chains, are known to accumulate high concentrations of toxic compounds dumped in the ocean.

Heavy metals, such as cadmium, mercury and lead, are highly toxic in animal tissues even at low concentrations and research carried out on heavy metal pollution in sharks shows that they can inhibit DNA synthesis, alter heart function, disrupt sperm production and alter blood parameters.[113]

Among the heavy metals found in sharks, mercury is known to reach particularly high levels. Mercury is responsible for causing severe neurological damage in many organisms, and although the dangers posed to humans from consuming shark meat are well documented, its effects on sharks themselves are poorly known.

Organochlorine contaminants (OC) also accumulate at high levels in sharks. A recent measurement of OCs in Greenland sharks (*Somniosus microcephalus*) showed them to be one of the most contaminated organisms in the Canadian Arctic. There is almost no information on the effects of OC contamination in sharks, but it has been associated with hormone disruption and low fertility in bonnetheads.[114]

Concentrations of Tributylin (TBT), a compound used in anti-fouling paints on boats, was detected in the kidneys of blue sharks caught off the Italian coast[115] and cadmium, lead and arsenic have been found in tissue samples of several shark species in the eastern Mediterranean[35]. The presence of these substances is likely to cause severe damage to basic biological functions.

More than two million metric tons of oil enter the marine environment each year from a mixture of natural sources, terrestrial runoff, discharges from tankers and ships, oil refineries, oil spills and the rupture of oil pipelines. Hydrocarbons and other toxicants in oil can contaminate the flesh of sharks, but the impacts from oil spills are most likely felt through the effects on sensitive coastal habitats.[116]

© KEVIN SCHAFER / STILL PICTURES

Left: **Sharks accumulate high concentrations of toxic compounds dumped in the ocean.**

MARINE DEBRIS

Every year an estimated 10 million metric tons of plastic ends up in the ocean.[117] This detritus is known to harm many marine species, including sharks, through entanglement or choking.[118]

Discarded commercial fishing gear is a big factor, with devastating affects for marine wildlife. Modern fishing gear is constructed from synthetic fibers that are non-biodegradable. This means that snagged or lost gear and torn fragments of net may continue to catch fish indefinitely – a phenomenon known as "ghost-fishing". Smaller fish caught in the net act as bait and attract larger fish, such as sharks, that get entangled and die due to injury or asphyxiation. The impact of ghost fishing and other marine debris on shark populations is unknown.[116]

RECREATIONAL FISHING

Recreational shark fishing is a popular pastime whose proponents have often sounded the alarm on declining catches and lobbied for protective measures. However, recreational fisheries can contribute significantly to shark mortality.[116,119]

Data from the US National Marine Fisheries Service for 2004 shows that over 12 million sharks, skates and rays were caught by anglers in US waters, of which 359,000 were retained.[120] In fact, estimated recreational catches of large coastal sharks were higher than commercial landings in 15 of 21 years between 1981 and 2001.[116] Off California, shortfin mako and leopard sharks (*Triakis semifasciata*) are the primary targets, with the recreational catch of leopard sharks six times the commercial catch.[116]

Parts of the US East Coast may well host more recreational fishing for large sharks than anywhere else in the world. One annual shark fishing tournament in Massachusetts awards extra points for catching 250 lb (113 kg) or more mako, thresher or porbeagle sharks.[121] Porbeagle sharks are classified as *Endangered* by the IUCN in the Northwest Atlantic following serious declines. In 2005, 2,500 different sharks were caught at this tournament in just two days.

© S. GRUBER / INNERSPACE VISIONS

Above: **Discards from a fishing tournament.**

In Australia, where large numbers of sharks are caught by recreational fishing, spearfishing has had a negative effect on Australian populations of the *Critically Endangered* grey nurse shark (*Carcharias taurus*), leading to a voluntary fishing ban in 1979. The species is now protected in all Australian waters.[116]

Increasingly, recreational fishermen are moving towards a catch-and-release policy for most large species. However, this practice is not without problems, as recreational fishermen usually allow sharks to "run with the bait" before hooking them, which results in more gut-hooked animals. Virtually all recreational releases of large fishes involve cutting the leader, leaving animals with hooks in the gut, throat, or moving mouth parts which can cause serious injury or death. This could be solved by the use of de-hooking tools, allowing even gut-hook removal.[119]

BEACH MESHING

Netting of popular bathing beaches as a protective measure against shark attack has been practiced for more than 50 years, mainly in Australia, South Africa and New Zealand, and is thus a localized threat to certain shark populations.[116] Beach meshing programs do seem to have been successful in reducing the number of attacks, but it is a common misconception that they physically prevent sharks from entering bathing waters. The nets, which are set on the bottom, often do not reach the surface and are open at both ends, so sharks can swim over and around them. However, those sharks that swim into them become entangled and "drown" – this is the purpose of shark nets: they reduce the local population size of sharks and thus the threat to swimmers.

© JEFF ROTMAN / JEFFROTMAN.COM

Above: **A three meter tiger shark caught in an anti-shark net off Durban Beach, Natal Coast – South Africa.**

Coastal development threatens shark breeding and nursery grounds.

© WOLCOTT HENRY

On average, some 1,500 sharks are caught in the Australian program each year and about 1,200 in South Africa, including a large proportion of species that are not considered dangerous to humans. In Australia, grey nurse and great white sharks, both protected under national law, are caught in beach meshes along with many other marine animals such as whales, dolphins, dugongs, seals, turtles, rays and bony fishes.[122]

Analysis of data from all programs indicates that beach meshing causes significant declines in the abundance of most shark species that are regularly captured.[7]

HABITAT LOSS AND DEGRADATION

Little is known about precisely how altered and contaminated habitats affect the health and productivity of sharks. However, considering the rapid rate at which coastal habitats are being destroyed around the world by human activities, shark species that rely on inshore waters for nursery grounds, or inhabit coastal or estuarine habitats, would appear to be the most likely to be affected by habitat change.[116]

Some of the most threatened shark species are those restricted to freshwater and estuarine habitats. The Ganges shark (*Glyphis gangeticus*), for example, has almost completely disappeared from its limited range due to human-induced habitat changes. Freshwater areas are much more accessible to human exploitation than marine areas, and the tropical rivers and lakes where freshwater shark species occur are mostly in developing countries with large and expanding human populations.[116]

Many species of shark are primarily associated with coral reefs. The widespread destruction of these habitats – due to sedimentation and pollution, rising sea temperatures associated with global warming, and destructive fishing practices – undoubtedly has major impacts for sharks.[116]

Mangrove forests are another coastal habitat critical to many sharks, serving as a nursery ground for both them and their prey species.[116] Like coral reefs, mangroves are among the most threatened habitats in the world today, with massive losses due to aquaculture, agriculture, coastal development, mining, pollution, and damming of rivers.[123]

SUB-SEA CABLES

Sharks possess acute "electro-reception" and "magneto-reception" capabilities for navigation and hunting purposes. Communications cables running beneath the seabed produce a complex array of electric and magnetic fields that are likely to affect shark behavior.[116]

CLIMATE CHANGE AND OZONE THINNING

Climate change is expected to alter the marine environment through changes in weather patterns, water temperature, sea level, tidal and current patterns, coastal erosion and storm frequency. This could affect the food supply, migration routes, and distribution of shark species, and the stability of ecosystems. Ozone depletion also has the potential to alter shark habitats through its effects on whole ecosystems.[116]

Species at risk

SHARKS IN DECLINE

While there is still very little comprehensive global data on the decline of shark species, research carried out in the past few years in specific regions and on specific shark populations has revealed dramatic declines. Some shark populations have declined by more than 80% in the past 50 years:

89% decline in hammerhead sharks in the NW Atlantic in the past 15 years;[124]

80% decline in thresher sharks in the NW Atlantic;[124]

79% decline in great white sharks in the NW Atlantic;[124]

65% decline in tiger sharks in the NW Atlantic;[124]

60% decline in blue sharks in the NW Atlantic;[124]

87% decline in blue sharks in the tropical Pacific;[49]

99% decline in oceanic white tip sharks in the Gulf of Mexico since the 1950s;

90% decline in oceanic silky sharks in Gulf of Mexico since the 1950s;[80]

88% decline in angel sharks in Brazilian waters;[72]

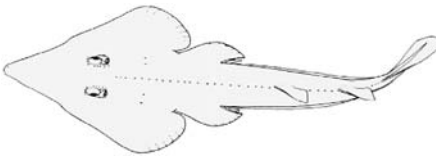
It is important to note that these shark populations are not exposed to unusual levels of fishing mortality – there is no reason not to assume that population declines of this magnitude are not replicated in other species and populations worldwide. In fact, global populations of large predatory fish (excluding sharks) have already been shown to have declined by 90% since the onset of industrial fishing.[125] Considering that sharks are more vulnerable to overexploitation than other fish, declines of at least the same magnitude seem highly likely.

IUCN's Red List of Threatened Species 2006 contains assessments of 547 sharks and related species. Of these, 20% (110) are classified as "Critically Endangered," "Endangered" or "Vulnerable", whilst a further 37% (205 species) are classified as "Data Deficient", meaning that insufficient information is available to assess a species' risk of extinction. Many species have not been assessed at all, however. [72]

Unless stated otherwise, all information in the following section is taken from the IUCN Red List 2006[72] and Fishbase[126].

BRAZILIAN GUITARFISH

Rhinobatos horkeli



IUCN Classification: Critically Endangered.

Max. size: Length 1.4 m.

Distribution: Western Atlantic: Lesser Antilles to Southern Brazil.

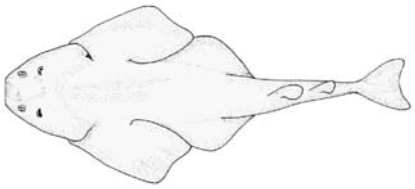
Reproduction: Not known.

Threats: Overfishing.

Notes: Extremely vulnerable to over-exploitation because inshore breeding and nursery grounds are fished heavily. Population off southern Brazil decreased by 96% from 1984–94; the species faces extinction in the near future if fishing continues.

ANGEL SHARK

Squatina squatina



IUCN Classification: Critically Endangered.

Max. size: Length 2.5 m, weight 80 kg, longevity not known.

Distribution: Eastern Atlantic: from Scandinavia to northwest Africa; Mediterranean and Black Seas.

Reproduction: Age at maturity unknown, males mature at 80–132cm and females at 128–169cm. Litter size: 7–25.

Threats: Bycatch.

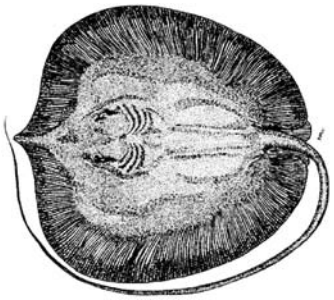
Notes: Formerly a common and important demersal predator in coastal areas of the Northeast Atlantic, Mediterranean and Black Seas during the 19th and early 20th centuries. Most of this region is now subject to intensive demersal fisheries, and the species is highly vulnerable from birth onwards to bycatch in bottom-trawls, set-nets and longlines. Abundance has declined dramatically in the past 50 years; is now declared extinct in the North Sea, extirpated from large areas of northern Mediterranean and uncommon throughout most of remainder of its range.

The IUCN Red List

The IUCN Red List is the most comprehensive inventory of the global conservation status of plant and animal species. Species are assessed on a formal set of criteria and placed in one of nine categories: Extinct, Extinct in the Wild, Critically Endangered, Endangered, Vulnerable, Near Threatened, Least Concern, Data Deficient and Not Evaluated.

GIANT FRESHWATER STINGRAY

Himantura chaophraya



IUCN Classification: Vulnerable; Thailand sub-population Critically Endangered.

Max. size: Length 5 m, width 2.4 m, weight 600 kg.

Distribution: Asia and Oceania: Mekong and Chao Phraya river basins; also from eastern Borneo, New Guinea and northern Australia.

Reproduction: Not known.

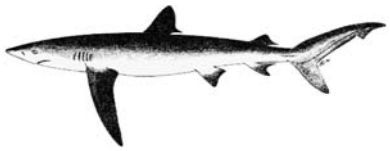
Threats: Habitat alteration and degradation of the Thai riverine systems (human induced) and overfishing.

Protection: Thai government trying to implement an experimental captive breeding program.

Notes: *H. chaophraya* has a characteristic rounded disk with a prominent snout and small eyes, and possesses a venomous sting on a large whip-like tail. Inhabits sandy bottoms of estuaries and large rivers, feeding on invertebrates and fishes. Possibility of biological extinction in the wild considered extremely high in some habitats although status in Australia is probably favorable.

BLUE SHARK

Prionace glauca



IUCN Classification: Lower Risk/Near Threatened.

Max. size: Length 4 m, weight 205 kg, longevity 20 years.

Distribution: Worldwide in open ocean – probably the widest ranging chondrichthyan.

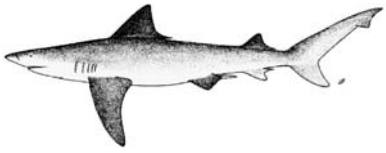
Reproduction: Males mature at 1.8–2.8m length and 4–5 years and females at 2.2–3.2m length and 5–6 years. Gestation period is 9–12 months and internally hatched eggs are nourished by a placental yolk sac. Pups are about 40 cm in length and 4–135 are produced per litter.

Threats: Bycatch and finning: usually caught with pelagic longlines (targeting tuna and billfish) but also hook-and-lines, pelagic trawls, and even bottom trawls near coasts. It is utilized fresh, smoked, and dried-salted for human consumption; its hides are used for leather; fins for shark-fin soup; and also for fishmeal and liver oil. Also considered a game fish and taken by sports anglers with rod and reel.

Notes: While blue sharks are among the most abundant, widespread, fecund and faster growing of all the sharks, and a pelagic species that is widely distributed throughout the world's oceans, they are also the most heavily fished sharks in the world. The impact of annual fisheries mortality (mainly of bycatch), estimated at 10 to 20 million individuals, is likely to be having an effect on the world population, but monitoring data are inadequate to assess the scale of any population decline. However a recent study the longline fishery in the tropical Pacific Ocean found that blue sharks have declined by 87% since the 1950s and that the mean mass of individuals caught has dropped from 52 kg to 22 kg.[49]

GANGES SHARK

Glyphis gangeticus



IUCN Classification: Critically Endangered.

Max. size: Length 3 m.

Distribution: Indo-West Pacific: Hooghly River, Ganges system, West Bengal, India, and likely from the vicinity of Karachi, Pakistan. Reported from Taiwan. Probably confined to turbid waters of rivers, estuaries and inshore waters in this area.

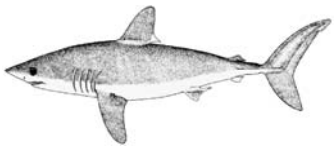
Reproduction: Not known.

Threats: Caught as incidental catch in other fisheries.

Notes: The Ganges Shark is known from only three museum specimens, all collected in the 19th Century. After an extensive search in the Ganges River over the past decade, a few additional specimens were caught in 1996.

PORBEAGLE SHARK

Lamna nasus



IUCN Classification: Vulnerable; Northwest Atlantic subpopulation Endangered; Northeast Atlantic subpopulation Critically Endangered; Mediterranean subpopulation Critically Endangered.

Max. size: Length 3.5 m, weight 230 kg, longevity 30 years.

Distribution: Cold waters of North and South Atlantic, South Pacific.

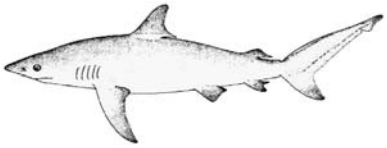
Reproduction: Males mature at eight years and females at 13. Females give birth to live young, with 1–6 pups per litter.

Threats: Porbeagle sharks are targeted for meat, oil, fishmeal and fins for shark-fin soup. Also a popular gamefish.

Notes: The eastern and western North Atlantic populations have both been seriously over-exploited by directed longline fisheries. Found singly and in schools, porbeagle feed on small pelagic schooling fishes, other sharks and squid. With a minimum population doubling time of more than 14 years, they are very susceptible to overfishing.

DUSKY SHARK

Carcharhinus obscurus



IUCN Classification: Lower Risk/Near Threatened; Vulnerable in western North Atlantic and Gulf of Mexico.

Max. size: Length 4 m, weight 180 kg, longevity 45 years.

Distribution: East, West and North Atlantic, western Indian Ocean and western and eastern Pacific.

Reproduction: Among the slowest-growing, latest-maturing of known sharks, bearing small litters after a long gestation, and one of the most vulnerable of vertebrates to depletion by man because of its very low intrinsic rate of increase. Mature at the age of 20 years (2.8 m in length), have gestation period of 16 months, produce eight young per litter.

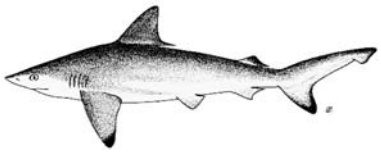
Threats: Overfished in western Atlantic. Taken on commercial longline as a bycatch in swordfish/tuna fishery.

Protection: Protected in US Atlantic after serious declines.

Notes: Found in coastal and offshore waters but not oceanic. Adults are commonly found at depths of 200–400 m, young in shallower waters. Feeds on bottom and pelagic bony fish, sharks, skates, rays, cephalopods, gastropods, crustaceans, sometimes human refuse. It is utilized fresh, dried-salted, frozen and smoked for human consumption; hides for leather; fins for shark fin soup; and liver oil extracted for vitamins. A 2004 study found that the dusky shark population of the Gulf of Mexico declined by 79% between the 1950s and the late 1990s.[80] Similar declines are expected to have occurred worldwide.

PONDICHERRY SHARK

Carcharhinus hemiodon



IUCN classification: Critically Endangered.

Max. size: Length 2 m.

Distribution: Indo-West Pacific: Gulf of Oman to Pakistan, India, and possibly Sri Lanka.

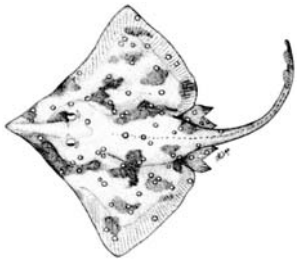
Reproduction: Not known.

Threats: Fishing for meat.

Notes: An extremely rare inshore shark, known only from around 20 specimens in museum collections. Subject to expanding widespread and unregulated fishing, last recorded from market surveys in 1979. Subsequent market surveys in 1982, 1996/97 and 1999/2000 in India, Malaysia and Philippines failed to find any specimens.

COMMON SKATE

Dipturus batis



IUCN Classification: Critically Endangered.

Max. size: Length 2.8 m, weight 97 kg, longevity 50 years.

Distribution: Eastern Atlantic: Norway, Iceland, the Faroes to Senegal, including western Mediterranean and western Baltic.

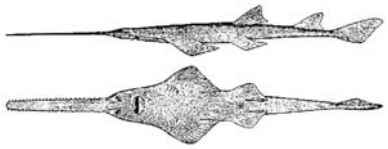
Reproduction: Attain sexual maturity at 1.2 m and around 10 years of age. Common skate are egg-layers and females produce about 40 eggs annually.

Threats: Overfishing: caught by bottom trawlers and traditionally landed due to its large size, *D. batis* is taken in targeted fisheries where/when abundant, and as a bycatch elsewhere within its range. Its slow growth and reproductive rate makes it very vulnerable to over-exploitation.

Notes: Once abundant in Northwest Europe, now extirpated from much of former range. Populations around UK extremely depleted.

SMALLTOOTH SAWFISH

Pristis pectinata



IUCN Classification: Critically Endangered; North and Southwest Atlantic subpopulation Critically Endangered.

Max. size: Length 7.6 m, weight 350 kg, longevity 40–70 years.

Distribution: Western and eastern Atlantic; Indo-West Pacific; possibly Mediterranean and eastern Pacific.

Reproduction: Slow growing and late maturing: large females produce between 15 and 20 young per year; the young are born at 70–80 cm. Size at maturity is estimated as 3.2 m.

Threats: The principal threat to all sawfishes is fishing, both targeted and bycatch, because their long tooth-studded saw makes them extraordinarily vulnerable to entanglement in any sort of net gear, and habitat destruction. Eradicated from the majority of its former range in the US.

Notes: Targeted for food, liver oil and sport; saws are sold as tourist souvenirs and adult fish stuffed for display. Sawfish have been wholly or nearly extirpated from large areas of their former range in the North Atlantic and the Southwest Atlantic coast by fishing and habitat modification. Remaining populations are now small and fragmented. It is apparently extinct in the Mediterranean and likely also in the Northeast Atlantic.

GREY NURSE SHARK

Carcharias taurus

Also known as sandtiger shark and spotted ragged-tooth shark.

IUCN classification: Vulnerable.

Max. size: Length 3.2 m, weight 160 kg, longevity 30–35 years.

Distribution: Widespread in inshore waters around the main continental landmasses in subtropical and cool temperate areas, except for the eastern Pacific.

Reproduction: This large coastal species has one of the lowest reproductive rates known among sharks, giving birth to one or two large young every two years. Males reach sexual maturity at around 10 years of age, females at around 15 years.

Threats: Populations in several areas have been severely depleted by commercial fishing, protective beach-meshing and spear fishing. Recovery is hindered by intrinsically low reproductive rate. Australian populations, which amount to no more than 500 individuals, are also extremely isolated and as a result have very low genetic diversity. This makes them susceptible to disease and less able to cope with environmental change such as global warming.[127]

Protection: Protected in Australian States of New South Wales (NSW), Queensland and Tasmania. Listed as Vulnerable in Australia, recently proposed for Endangered. Fully protected in South Africa, Namibia and the Maldives. Receives full protection on the Atlantic and Gulf coasts of the USA.

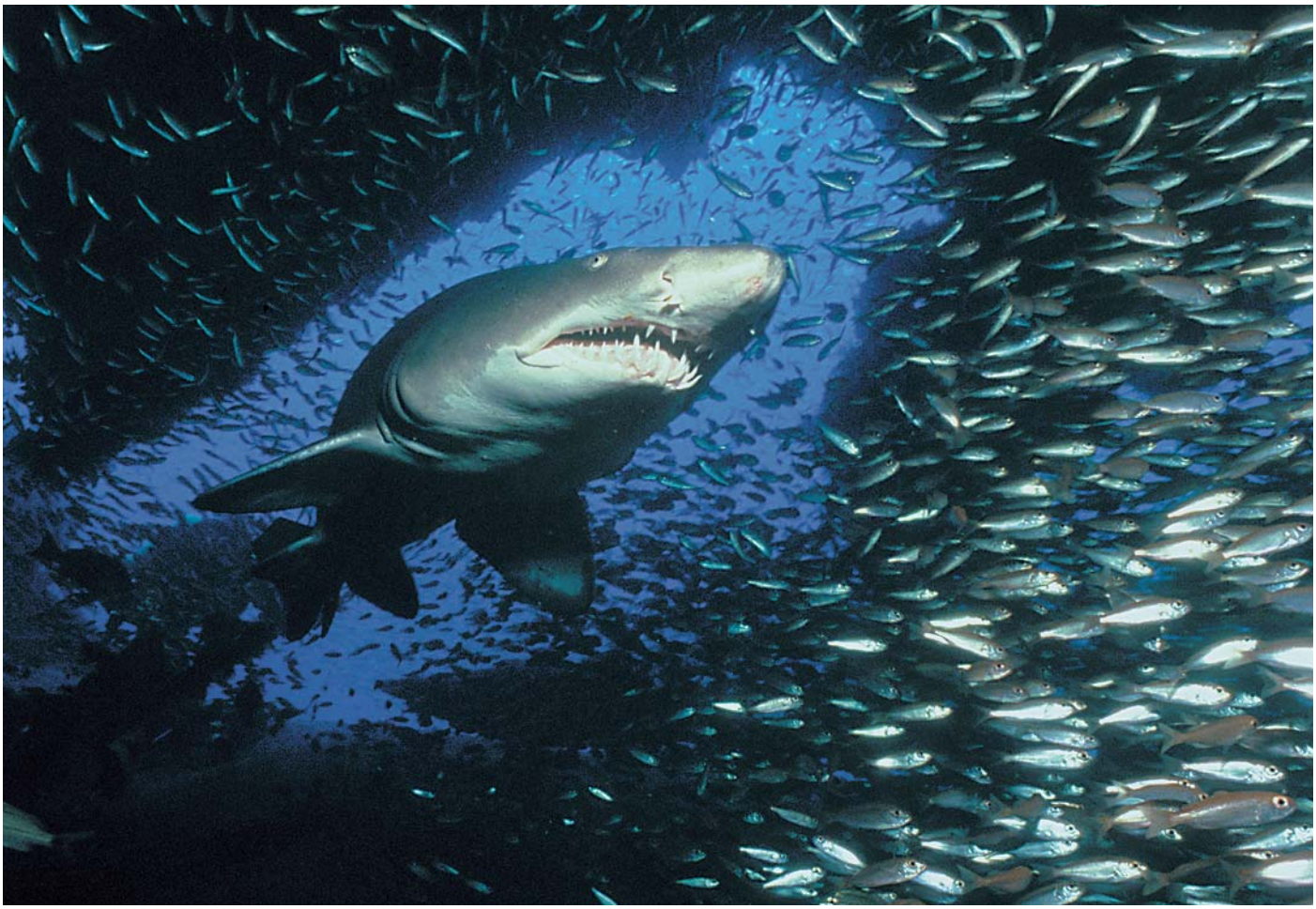
Notes:

1. Overfishing: Grey nurse sharks have been fished throughout their range in the past. They are utilized fresh, frozen, smoked and dried for human consumption, and also for fishmeal, liver oil, fins, and hides for leather. Its flesh is highly appreciated in Japan. No directed fishery since 1984, but bycatch in other fisheries has caused concern, although full impact is unknown. In Australia accidentally caught on baited lines targeting wobbegong sharks (*Orectolobus spp*).[128]

2. Beach meshing: The Australian States of New South Wales and Queensland have introduced beach meshing to protect bathers from potentially dangerous sharks. These nets are thought to be one of the major threats to grey nurse shark populations. In the period 1962–1972, 180 sharks were caught in beach meshing around New South Wales and Queensland, but in recent years (1993–2003) there have been only 11 mortalities. This decrease has been attributed to the declining grey nurse shark population.[129]

3. Recreational fishing: Between 1961 and 1980, 405 *Carcharias taurus* were landed by fishing clubs on the NSW coast. Recreational fishermen noted a decline during 1960s and 1970s and implemented a voluntary fishing ban in 1979. Nevertheless, the main current threat to grey nurse sharks in southeast Australia is probably the accidental capture of juveniles by recreational line fishers, and current figures indicate no subsequent recovery. Until 1980s, was perceived as "man-eater" owing to fierce appearance; many killed by spear-fishers and scuba divers and also caught live to sell to aquaria. Today, with protection and increased public awareness, there are very few reports of kills by divers.[128]

Below: **Fewer than 500 grey nurse sharks are estimated to remain in Australian waters.**



A number of fisheries for the second largest fish in the world, the basking shark, have collapsed.

BASKING SHARK

Cetorhinus maximus

IUCN Classification: Vulnerable; Endangered in Northeast Atlantic and North Pacific.

Max. size: Length 12 m, weight 4,000 kg, longevity 50 years.

Distribution: Found throughout the world's sub-arctic and temperate waters: the western and eastern Atlantic, western Indian Ocean and western and eastern Pacific.

Reproduction: Males and females attain sexual maturity between the ages of 12–16 and 16–20 years, respectively. Six pups are produced per litter with a 2–4 year interval between litters.

Threats: Targeted for liver oil, fins, skin and meat.

Protection: Strictly protected in British and US Atlantic waters; listed on Appendix II of the Bonn Convention; listed on Appendix II of CITES.

Notes: Second largest fish after whale shark; plankton feeder.

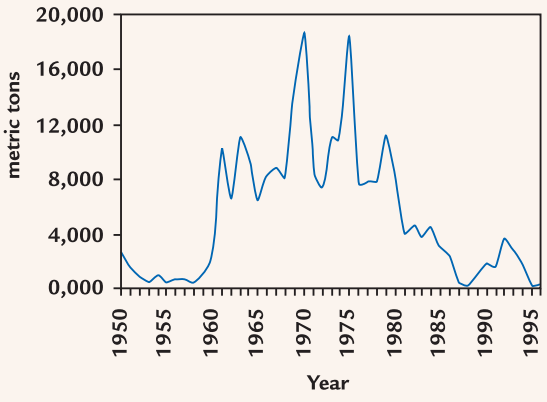
1. Overfishing: Basking sharks have been hunted for several centuries to supply liver oil for lighting and industry, skin for leather, and flesh for food and fishmeal. Modern fisheries yield liver oil, meat, cartilage and fins, which due to their large size attain extremely high prices in international trade to East Asia. In the past, basking sharks have been fished using nets or harpoons in Norway, Ireland, Scotland, Spain, Iceland, Canada, Japan, China, California, Peru, and Ecuador.

Most basking shark fisheries appear to have collapsed after initial high yields and this species is considered to be extremely vulnerable to overfishing. For example, between 1947 and 1975, basking sharks were netted and harpooned off the west coast of Ireland with peak annual catches reaching over 1,000 animals. By the 1970s catches had declined by over 90% due to overfishing. Similar stock crashes have occurred in fisheries in California, Canada and Japan.

In recent years, the FAO only received reports of catches in the Northeast Atlantic from Norway and occasional catches from Portugal, Spain and New Zealand (probably bycatch). The Norwegian fishery dates from 16th century but expanded in 1960s owing to increased demand for liver oil. Norwegian catches peaked in 1970 and 1975 at around 18,000 mt but have since declined to only 181 mt in 2004. According to ICES, this fishery has now ceased.

2. Bycatch: Basking sharks are sometimes landed and sold after becoming entangled in gillnets or pot lines or caught in trawls, but bycatch is rarely reported. Where reports do exist, bycatches in coastal areas are relatively high: for example, up to 120 basking sharks are taken each year in the bottom gillnet fishery of the Celtic Sea.

Basking shark total catches 1950–96



SOURCE: FAO FISHSTAT

GREAT WHITE SHARK

Carcharadon carcharias

IUCN Classification: Vulnerable.

Max. size: Length 6 m, weight 3,400 kg; longevity around 30 years.

Distribution: Worldwide, along continental margins of all temperate seas and entering tropics.

Reproduction: Males mature at about 3.5 m (8–9 years) and females 4.5 m (12–15 years). Females give birth to a litter of 2–10 pups every 2–3 years.

Threats: Sport fishing, bycatch, trade in jaws and fins.

Protection: From the perspective of domestic management, is the most widely protected shark in the world, with capture and trade in this species prohibited in South Africa, Namibia, Maldives, Malta, the USA, and Australia (except beach meshing). Listed on CITES Appendix II since 2004, it was also listed on both Appendices I and II of the Convention on Migratory Species in 2002.

Notes: Most famous (and feared) of all sharks, gained global notoriety from blockbuster movie and book *Jaws*. Perceived as unstoppable "killing machine" but in reality, this supreme predator is highly vulnerable. Naturally scarce, it is long-lived with relatively low natural mortality. Females do not reproduce until in excess of 4.5m. Owing to low reproductive potential, recover slowly from overexploitation.

1. Trophy fishing and trade in jaws and fins: Due to its reputation as a dangerous fish, largely blamed on the 1975 film Jaws, it is popular as a game fish among enthusiasts and has been targeted for its teeth and jawbones since the 1920's. In South Africa offers of up to US$20,000–50,000 have been made for great white jaws and US$600–800 for individual teeth. A fin set from a large individual may be valued at over US$1,000. The high value of great white shark products encourages poaching, clandestine trade and flouting of protective laws. However, many dive operators are catching on to the idea that great white shark cage diving can be extremely lucrative and this type of ecotourism is continuing to expand and develop around this species.

2. Bycatch: The majority of great whites are caught accidentally in commercial fisheries operating longlines, gillnets, trawls etc. They rarely survive if returned to the ocean and are often killed by fishermen. A recent study of shark populations caught as bycatch in the Northwest Atlantic longline fishery (targeting swordfish and tuna) found that great white sharks have declined by 79% the Northwest Atlantic in the past 15 years.[124] Similar declines in other areas are likely.

The great white shark is targeted as a trophy and for its jaws and fins.

SPINY DOGFISH

Squalus acanthias

Also known as piked dogfish and spurdog.

IUCN Classification: Vulnerable; Northeast Atlantic subpopulation Critically Endangered; Mediterranean, Northwest Atlantic and Northwest Pacific subpopulations Endangered; Black Sea, Northeast Pacific and South America subpopulations Vulnerable.

Max. size: Length 1.5 m, weight 9 kg, longevity 70–100 years.

Distribution: Spiny dogfish are found in temperate and sub-arctic waters; principle populations are in the North Atlantic, the eastern South Pacific, the South Atlantic off South America, the Cape coast of South Africa, the southern coasts of Australia and New Zealand and the North Pacific. Little mixing occurs between populations.

Reproduction: Females reach sexual maturity at 12 years, males at six. Pregnancy of up to two years – thought to be the longest of any vertebrate. Litter sizes average between 6–7 pups, but may be up to as many as 20 pups per litter.

Threats: Overfishing.

Protection: None.

Notes: Possibly the most abundant shark worldwide, supporting fishing industry of global importance, but highly vulnerable to overfishing due to exceptionally slow growth and reproduction. Spiny dogfish are highly migratory, traveling in large, dense "packs", segregated by age and sex. Mature females are targeted by fishermen due to their size, with devastating effects on breeding population.

1. Overfishing: The principle threat to spiny dogfish worldwide is overfishing from direct and indirect commercial fisheries. Spiny dogfish meat is eaten in Europe, Australia, New Zealand, South America and Japan, but they are often regarded as "trash fish" and discarded.

Most large-scale spiny dogfish fisheries, though initially yielding high catches, have depleted populations and collapsed. In the Northeast Atlantic, where catch effort is effectively unlimited, stocks have declined by 95%. Mediterranean and Black Sea stocks are also unmanaged, with a decline of more than 60% reported in a Black Sea stock assessment for 1981–1992. Mature females have declined by 75% in just 10 years in the Northwest Atlantic, where US federal efforts to manage the stock are hampered by high bycatch, continued

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exploitation in Canadian Atlantic waters, and regular defiance of scientific advice by US Atlantic States.

European demand continues to fuel markets around the world. Fisheries and population trend data indicate that the southern part of the Northeast Pacific stock has also declined through overfishing, but stocks appear stable off Alaska. The only data identified from the Northwest Pacific are from Japan, where landings of spurdog declined around 80% in 1952–1965, and inshore spurdog catches declined 80–90% from the mid-1970s to late 1990s. Unregulated and expanding target and bycatch fisheries take spiny dogfish in South America (Europe reports imports from this region), where population declines are reported. New Zealand manages the species, which is taken in target and bycatch fisheries, through its Quota Management System. There is only limited fishing pressure in Australia and South Africa, with most catches discarded.

WHALE SHARK

Rhincodon typus

IUCN Classification: Vulnerable.

Max. size: Length 14–20 m, weight 34 metric tons, longevity 60–100 years.

Distribution: All tropical and warm temperate seas, oceans and coastal areas around the globe.

Reproduction: Litter size may be up to 300. Gestation period is unknown, but average reproductive age is 35–63 years.

Threats: Targeted for meat and fins.

Protection: Listed on Appendix II of the Convention on Migratory Species in 1999 and Appendix II of CITES in 2003. It has been legally protected in the Philippines since 1988 and in India the whale shark became the first fish to be protected under the Wildlife Protection Act. It is also illegal to fish for whale sharks in Australia, Honduras, the Maldives and the USA.

Notes: The world's largest fish is well known for being a gentle giant; like the basking shark, whale sharks filter-feed on a variety of planktonic organisms. Ecotourism industries based on viewing whale sharks are now developing in several locations. These generate at least US$47.5 million worldwide annually – significantly more than it is worth as meat and other products.[57]

1. Overfishing: Small harpoon and entanglement fisheries for whale sharks have taken place in India (banned in 2001), Pakistan, Taiwan, the Philippines (banned in 1998), and the Maldives (prior to protection in 1995). These took whale sharks primarily for their meat, liver oil and/or fins. The huge fins are low quality and unsuitable for soup but are highly valued as restaurant signboards in east Asia, whilst the soft meat (known as "tofu shark") is in great demand in Taiwan and may fetch prices up to US$17 per kg.[69] A 10-ton shark recently sold for US$21,400 on the Taiwanese market.[57]

Today, whale sharks continue to be targeted in Pakistan, where recent landings are unknown, and Taiwan. Taiwanese catches appear to have declined since the 1980s, with annual landings from one particular site decreasing from 50–60 sharks per year in the mid-1980s, to 10 or less in the 1990s. In 1995, landings throughout Taiwan were approximately 250–272, but between 2001 and March 2002 it was reported that 113 whale sharks were taken. The domestic catch has apparently decreased by 60–70% since surveys ten years ago.

There are now serious concerns that whale shark populations are decreasing in many regions as a result of unregulated fisheries, and despite being protected in several countries, it is suspected that illegal hunting of whale sharks still continues with impunity. The species' low reproductive rate, highly migratory nature, and low abundance make it particularly vulnerable to exploitation. Scientists recently found that the average size of whale sharks spotted off the Australian coast has shrunk in the past decade from 7 m to 5 m – an extremely worrying sign considering whale sharks do not reach sexual maturity until they are 6–7 m in length. The researchers suspect that the decline in size is a symptom of overfishing and due to the capture of the largest sharks.[130]

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Top: **The spiny dogfish is sold as "rock salmon" in fish and chip shops. With a gestation period longer than an elephant, it is vulnerable to overfishing.**

Right: **The meat and fins of whale sharks are highly valued in many Asian markets. A 10-ton shark recently sold for over US$21,000 in Taiwan.**

Hong Kong is the center of the world's shark fin trade.

Hong Kong – The Global Hub

Hong Kong, as the gateway to China and with its international trading status, has been the center of the global shark fin trade for many years, with a large proportion of the remaining trade transiting Singapore and, increasingly, Mainland China. Just as it had been for the global ivory trade (both legal and illegal) prior to 1989, Hong Kong acts as an entrepôt, with some fins consumed domestically but a great deal re-exported to other parts of the Chinese-speaking world.

A recent analysis of national customs statistics for the major trading centers for shark fin – Hong Kong, Mainland China, Singapore, Taiwan and Japan – showed that 50% of the global trade passes through Hong Kong. Between 1991 and 2000, the trade in fins through Hong Kong, which is likely to be indicative of the volume of the global trade, grew at an annual rate of six percent, most likely due to increases in disposable income in Mainland China.[69]

Declared imports of unprocessed fins to Hong Kong rose from 6,900 to 9,800 metric tons between 1998 and 2002.[67] In 2004, imports reported to the FAO amounted to 11,000 mt, although this figure includes both processed and unprocessed fins.[90]

Shark fins (in unprocessed form) arrive in Hong Kong by sea from all around the world, and are then shipped across the border to processing factories in Guangdong Province (Mainland China). Once processing is complete, some of the fins are re-imported to Hong Kong for consumption or re-export, for example to overseas Chinese communities[69]. The remainder of the processed product is sold within Mainland China, primarily for domestic consumption.[69]

With the continued liberalization of the Mainland market, it is believed that shark fins are increasingly bypassing Hong Kong and instead traveling directly to the Chinese mainland[69]. However, declared imports to Hong Kong show no sign of declining – in fact they continue to grow – and the mainland proportion of reported fin imports is not increasing[69]. Nevertheless, other signs provide evidence of the expected trend: trade in shark fins between key Southeast Asian trading centers (e.g. Singapore, Malaysia and Thailand) and Mainland China has noticeably expanded in recent years.[69]

SOURCES OF FINS

Sharks are finned in all the oceans of the world to feed the markets of East Asia. In 2004, Hong Kong imported unprocessed shark fins from 80 countries[131]. This is a slight decrease from the 85 and 86 countries exporting shark fins to Hong Kong in 1999 and 2000, respectively, and a major reduction from the 125 countries recorded in 1995.[69]

Topping the list of countries importing shark fin into Hong Kong in 2004 were China, Taiwan, Spain, Singapore and Indonesia. These exporters represent a mixture of producers (for example, Taiwan, Spain and Indonesia) and countries trading fins for processing and consumption (China and Singapore).[131]

Changes since 1998-2000 include expanding production in Brazil and Costa Rica, and a reduction in exports from India, Yemen and the USA, which dropped outside the top ten exporters to Hong Kong in 2002[131], possibly as a result of the Shark Finning Prohibition Act.[69]

China

Until twenty years ago, China was a relatively small player in the international trade in shark fins. But in the late 1980s, the Chinese authorities relaxed the long-held official attitude to shark fin soup as an unacceptable symbol of wealth and privilege, thereby opening the door to a vast new market. Rapid economic development, especially in southern China and the cities of Beijing and Shanghai, led to huge increases in disposable income and the creation of a new middle class. Newfound wealth could be demonstrated to friends and business associates by serving shark fin soup.

The precise level of shark fin consumption in China is almost impossible to quantify. China does not report the volume or species composition of its shark catches, and for reasons that remain unclear, Chinese import statistics do not appear to reflect the true quantity of shark fins in trade.[69] Declared imports of shark fin into Mainland China rose from around 3,000 mt in 1992 to 4,400 mt in 1996, but have fluctuated at around 4,000 metric tons ever since, showing no real growth.[90] Imports in 2004 peaked at 4,776 mt, representing 36% of global imports and second only to Hong Kong.[90]

Chinese import figures are thought to be inaccurate for a number of reasons. A large proportion of China's shark fin imports are under-reported or smuggled into the country to avoid high taxes levied on imports. Furthermore, since 2000, Chinese customs codes have required that imports of fresh, chilled and frozen shark fins be recorded under the broad category of "shark meat".[69] Together, these factors render compilation of accurate figures on China's share of the global shark fin trade virtually impossible.[69]

Examination of declared imports of shark meat into Mainland China reveals a massive increase since 1998 – from around 300 mt to over 5,000 mt – which would suggest either an increasing trend of declaring shark fins as shark meat, or an expanding market for frozen shark meat (or both).[90] Interestingly, Mainland China's biggest reported suppliers of shark meat are also the country's biggest suppliers of fin, namely Singapore, Japan and Spain.[69]

The vast majority (90%) of shark fins imported by Mainland China are destined for processing plants in Guangdong Province.[69] China does not report production figures to the FAO, but exports have been around 2,000 mt per year since 1996; in 2004 China's exports amounted to 2,476 mt, making it the biggest exporter of shark fin worldwide with a 40% share of the reported total.[90]

Regardless of any ambiguities surrounding China's exact share of the global fin trade, it is unquestionable that Mainland China has become the world's largest consumer of shark fin. With a middle-class estimated to number in excess of 100 million, the number of potential consumers of shark fin soup in Mainland China exceeds the populations of all the other markets in the world combined. Given the continuing economic development and rising standards of living, it is expected that demand for shark fin will continue to grow over time,[7] with potentially devastating consequences for shark populations worldwide.

"Hong Kong's hold on the shark fin market is weakening as the trade in China expands, but Hong Kong is still a major center, with at least 50 wholesale or retail shops selling shark fins, and approximately 20-30 medium-to-large importing traders."[131]

"Worldwide, based on an average unit price and estimates of volume from customs data, the [shark fin] trade is probably worth US$400-550 million."[131]

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Above & Right: **China is the world's biggest consumer of shark fin.**

SHARK CONSUMPTION SURVEY

Between October 2005 and January 2006, WildAid and the China Wildlife Conservation Association (CWCA) conducted a survey of restaurants, grocery stores and wholesale markets in 16 major Chinese cities, including Shanghai, Beijing, and Guangzhou, to study the amount, price and attitudes towards shark fin on sale.

The study also included a questionnaire to gauge consumer attitudes towards shark fin soup and awareness of shark ecology. A brief summary follows:

- Of the 472 restaurants surveyed, 124 (26%) sold shark fin dishes. These were mid to high-end range restaurants.
- Of the 144 grocery stores surveyed, 20 (14%) sold shark fin, indicating that shark fin is now more accessible than ever to the average consumer.
- Only three of the 101 wholesale markets surveyed sold shark fin.
- 80% of interviewees did not know what shark fin (known as "fish wing" in Chinese) is made from. Although the average man on the street is not the main consumer of shark fin, this trend may be shifting as restaurants provide "economy" shark fin dishes to appeal to more customers. Some grocery stores have also started selling shark fin.
- 35% of those interviewed had consumed shark fin. 41–60-year-old men were the main consumers and, as expected, consumption was most prevalent among those with a higher income and standard of education.
- 31% of shark fin consumers chose to eat shark fin for its nutritional value and 49% said potential health risks would stop them eating it.
- Other reasons for eating shark fin soup were curiosity (27%), taste (23%) and social status (19%).
- Deep-sea fish were commonly believed to be subject to less pollution and thus more nutritious. Shark fin is also believed to balance *yin* and *yang*.

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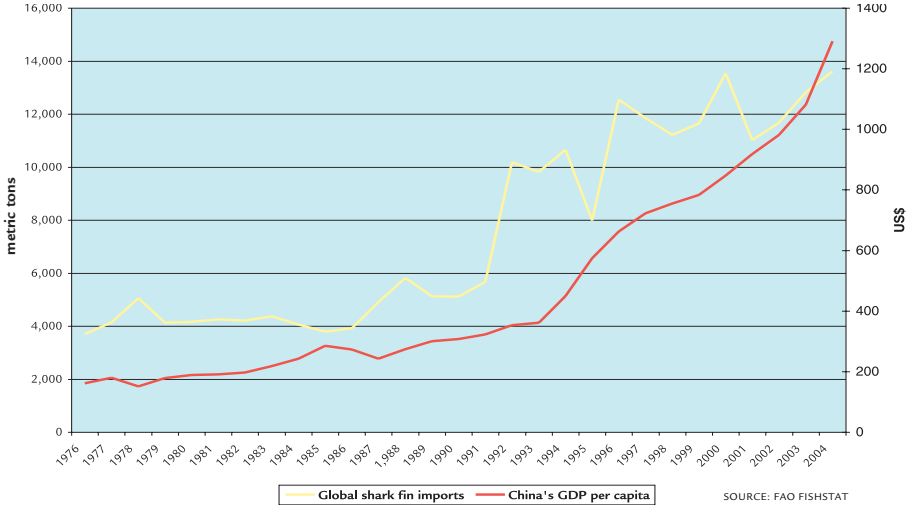
Above: **Shopping crowds on Nanjing Lu, Shanghai. As China's economy continues to grow, shark populations will be increasingly threatened unless consumer habits change.**

CHINA'S GDP PER CAPITA VS. GLOBAL SHARK FIN IMPORTS 1976-2004



SOURCE: FAO FISHSTAT

Common views expressed by consumers during the survey:

PERCEPTION	RESPONSE	FACT:
Shark fin soup is a status symbol and serving it shows respect to one's guests.	"I order shark fin in entertaining very important clients."	Many shark species are being hunted to extinction for the luxury of a bowl of soup. Finning wastes up to 99% of the shark and this wastage is jeopardizing food security and livelihoods around the world. Declining shark populations could also have catastrophic effects for marine ecosystems and mean lower catches of other fish in the future. Fierce competition for shark fins among criminal gangs has led to widespread corruption, gangland wars and contract killings.
Shark fin soup is highly nutritious.	"Deep sea fishes are safer because they are less affected by environmental pollution." "It must be nutritious, as it is low fat and is expensive."	Sharks, like other long-lived predatory fish, accumulate high levels of mercury in their tissues, and tests have shown shark fins to contain mercury at concentrations harmful to humans. Mercury is highly toxic and causes damage primarily to the brain and spinal chord, especially in developing foetuses. It can also cause male infertility. Shark fin soup is indisputably high in protein and low in fat; however, nutritional analysis shows that in comparison with other common – and far cheaper – foodstuffs, it is nothing special. For example, a bowl of chicken soup contains more fat and less iron than an equivalent serving of shark fin soup, but more calcium, carbohydrate, protein and energy .
Shark fin has many medicinal properties.	"Helps fight cancer." "Shark fin soup has anti-aging properties." "Good for skin and boosts energy levels."	It is widely believed that sharks don't get cancer and eating shark fin soup or crude extracts of shark cartilage can prevent and even cure cancer. Recent research has shown that sharks do get cancer (including in their cartilage) and eating shark cartilage or fin has absolutely no effects among cancer sufferers.
Sharks are vicious killers – they would eat us if given the chance.	"If you don't kill others, others will kill you. It's a natural law." "Sharks are ferocious animals that attack humans."	Of the 490 species of sharks, fewer than 30 (just 6%) are known to attack humans. So far this century, an average of 5.5 people have been killed by sharks each year; in comparison, more than 100 million sharks are killed by humans every year – tens of millions for their fins alone.

More than a third of people interviewed by WildAid had eaten shark fin soup

Conclusions & Recommendations

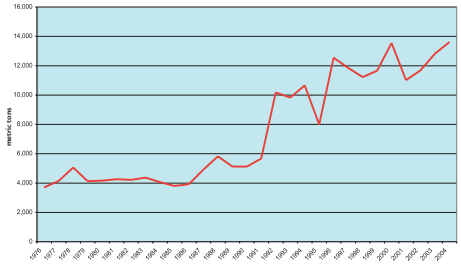
WildAid & Oceana concludes	WildAid & Oceana recommends
Measures to conserve sharks to date have focused entirely on managing the supply. As long as the high prices and high levels of demand for shark products, fins in particular, are not addressed, such measures are likely to have limited success. WildAid found there is little or no awareness of the threats to sharks among consumers or of the waste involved in finning or the extent of illegal fishing for sharks.	To assist in shark management, demand reduction programs are needed now in key consumer countries. China, as the world's biggest market for shark fin, is best placed to influence this situation. In addition, there should be a major international effort to raise awareness of the threats to sharks and to discourage the ongoing expansion of consumption of shark products. Alternatives to shark fin soup should be actively promoted.

FAO recommends	WildAid & Oceana concludes	WildAid & Oceana recommends
Control access of fishing vessels to shark stocks.	There is an urgent need to assist some developing countries in preventing illegal fishing within their coastal waters, as few have the resources to monitor and control the waters under their jurisdiction which can extend 200-miles out to sea.	Marine Reserves must be protected as a matter of urgency with international financing if necessary. If properly patrolled, they are among the few areas where sharks are assured of protection. Establishing which areas need closing during particular seasons and identifying and protecting shark pupping and nursery grounds should also be priorities. It will also be necessary to police such restrictions. Developed fishing nations should support these efforts financially.
Decrease fishing effort for any shark fishery where catch is unsustainable.	Many fisheries managers lack basic information to establish whether or not a fishery is sustainable. Evidence often clearly indicates sharks are being overfished. The "boom and bust" history of directed shark fisheries and the fact that sharks' life history makes them extremely vulnerable to overexploitation means that sustainability should be assumed the exception, not the rule.	Basic research is urgently to be carried out on catch levels, effort and composition. In the interim, a highly precautionary approach must be taken to quota-setting, area closure, bycatch reduction, species protection, and other management measures. Sharks will face increasing environmental pressures from pollution, global warming, ozone depletion, etc. Allowances should be made for these factors when using a precautionary approach to shark management.
Improve the utilization of sharks caught.	Finning not only wastes 95–99% of the shark, but also makes accurate monitoring of shark catches impossible. The burgeoning demand for shark fin over the past 20 years is very likely to continue. If it does, the practice of taking sharks for their fins will become even more widespread. As human populations grow, this constitutes a truly shameful waste of the world's resources.	The UN should enact an immediate ban on shark finning in international waters. Some shark species migrate many thousands of miles. Only an international ban would make sense for these species. Some nations already prohibit finning nationally; while similar bans do not exist in other countries' waters and on the high seas, their attempts to conserve sharks are compromised. Governments should enact immediate bans on finning in national waters. Enforcement could be made appropriate to the needs and resources of developing countries. Specific ports could be designated for shark landings, and on-board and beach-side observers could also be used.
Improve data collection and monitoring of shark fisheries.	Few countries record accurate catch data by species, which is the first step toward ensuring sustainable fisheries.	Data collection must be vastly improved in almost all countries. Catch and landings data should be species-specific. On-board observers could be used more extensively in monitoring catch effort, volumes and composition.

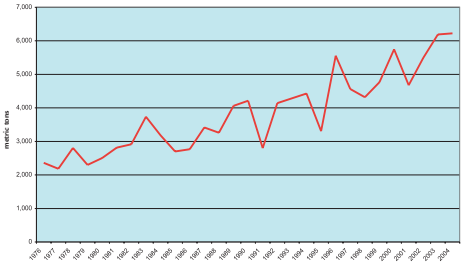
FAO recommends	WildAid & Oceana concludes	WildAid & Oceana recommends
Train all concerned in identification of shark species.	Many fishing communities have their own local names for shark species. There is no provision for these to be translated into commonly recognized names.	All fisheries should, at the very least, use species identification cards. Simple, inexpensive, waterproof cards showing the main species in the area with local names have been produced by Taiwan, for example.
Facilitate and encourage research on little known shark species.	Top shark specialists are concerned by the paucity of data on individual species, particularly those known to be heavily fished.	Research at all levels is an urgent priority, and not only for little known species. Governments of major shark-fishing nations should put far more resources into research on species and stock abundance, shark biology, reproductive behavior, migration patterns and responses to fishing pressure. Further research should also be done on predator-prey relationships and potential ecosystem changes following shark declines.
Obtain utilization and trade data on shark species.	Numerous factors hamper this process: poor reporting, the cash basis of many transactions, complex export and re-export arrangements and aggregation of data. These data are not compiled on a national (let alone an international) basis.	Trade and utilization data should be species-specific and should be submitted to the FAO and to CITES in a timely manner. The Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR) has designed a plan to track toothfish shipments in international trade. The system is based on certificates of origin and could equally be applied to the international fin trade. The FAO should be more pro-active in its data-gathering. Many nations keep detailed import and export data, in some cases making it available to the public.
Ban or restrict certain destructive fishing practices, e.g. limit length of longlines, etc.	Unnecessary shark bycatch is caused by inappropriate fishing gear and/or destructive deployment of fishing gear.	Highly damaging fishing methods must be limited or prohibited if the goals of fisheries managers are to ensure sustainable fisheries and maintain employment in the fishing industry. There should be considerable reduction of shark bycatch through the use of appropriate and selective fishing gear and fishing techniques.
States that contribute to fishing mortality on a species or a stock should participate in its management.	Many developing nations currently lack the resources to manage their shark fisheries sustainably.	Wealthier nations, particularly those that have benefited considerably from trade in shark products, should support these countries' research and management efforts financially. For example, Hong Kong has undoubtedly profited more than any other city or nation from the shark fin trade and yet has put few, or no, resources into sustainable management of sharks. It is in the long-term interest of consumers that sharks are managed sustainably.

Annex: Additional data

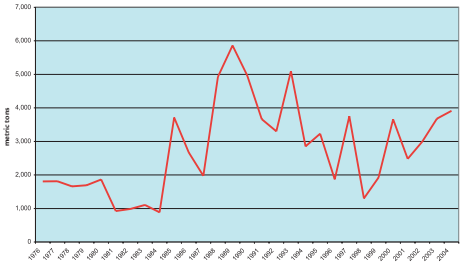
WORLD IMPORTS OF SHARK FIN 1976-2004



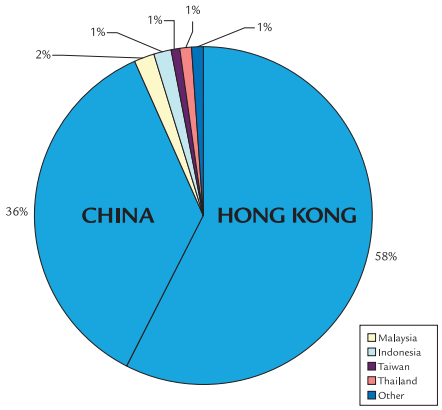
WORLD EXPORTS OF SHARK FIN 1976-2004



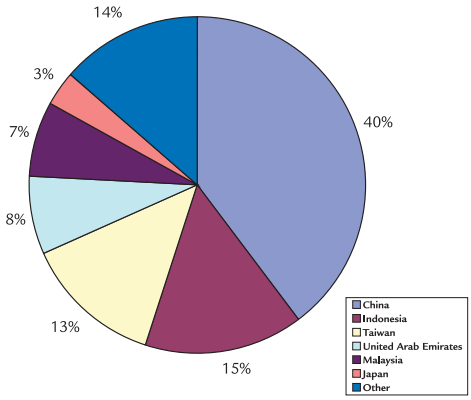
WORLDWIDE PRODUCTION OF SHARK FIN 1976-2004



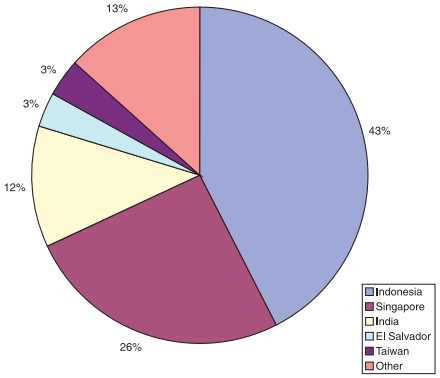
LEADING SHARK FIN IMPORTERS 2004



LEADING SHARK FIN EXPORTERS 2004

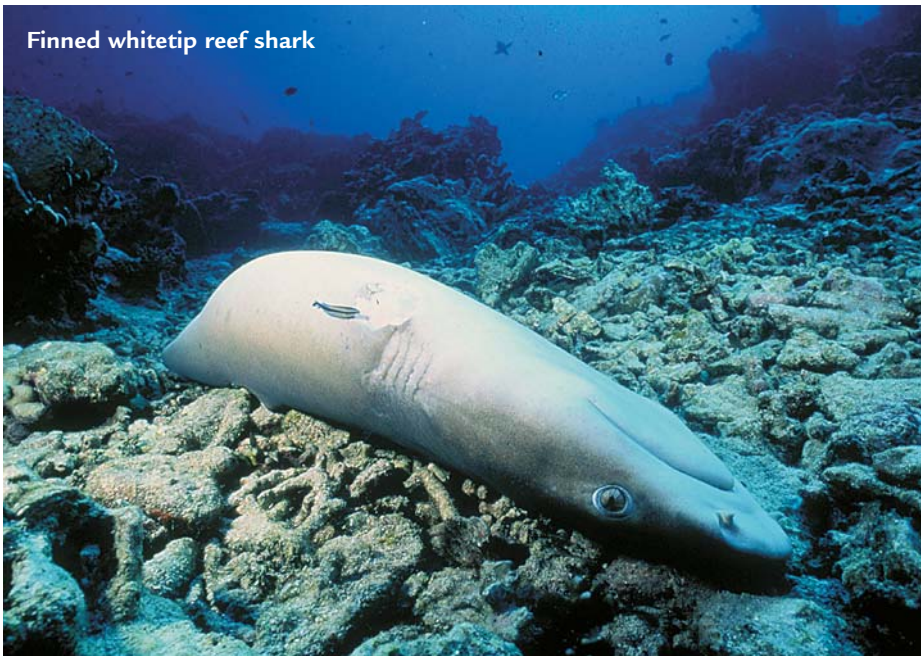


LEADING SHARK FIN PRODUCERS 2004



China's shark fin and meat imports figures in **metric tons**

	Shark fin	Shark meat
1992	3,023	172
1993	3,080	541
1994	3,375	547
1995	Not reported	772
1996	4,363	485
1997	4,389	577
1998	4,236	313
1999	4,062	1,215
2000	4,646	3,953
2001	3,129	2,801
2002	3,555	5,198
2003	3,818	4,713
2004	4,776	5,135



Finned whitetip reef shark

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